



Australian Government
Department of Veterans' Affairs

Vietnam Veterans Family Study

VOLUME 2

A Study of Health and Social Issues in Vietnam Veteran Sons and Daughters

October 2014

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Published by the Department of Veterans' Affairs, Canberra, 2014. Publication no. Po2092

| | | |
|------|-------------------|----------------------|
| ISBN | 978-0-9941961-0-1 | (Volume 1) |
| | 978-0-9941961-1-8 | (Volume 2) |
| | 978-0-9941961-2-5 | (Volume 3) |
| | 978-0-9941961-3-2 | (Volume 4) |
| | 978-0-9941961-4-9 | (full set) |
| | 978-0-9941961-5-6 | (electronic version) |

Suggested citation

Forrest W, Edwards B & Daraganova G 2014, *Vietnam Veterans Health Study*. Volume 2, *A Study of Health and Social Issues in Vietnam Veteran Sons and Daughters*, Australian Institute of Family Studies, Melbourne.

Copies of this report can be found on the DVA website: www.dva.gov.au

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Foreword

In October 2013 the Department of Veterans' Affairs engaged the Australian Institute of Family Studies to further investigate the intergenerational effects of service in the Vietnam War on the health of veterans' families. The aim of the work was to provide a comprehensive analysis of the impacts of service in the war on the sons and daughters of veterans.

Building on work already done by Colmar Brunton Social Research in the development, design and distribution of the questionnaires and preliminary analysis of results, the institute prepared a final report, delivering it to the department in June 2014.

The authors of the report are Walter Forrest, Ben Edwards and Galina Daraganova. They acknowledge the support of the Department of Veterans' Affairs in providing the data used and the helpful advice and comments in planning the report. The advice of Professor Bryan Rodgers and other members of the Scientific Advisory Committee who commented on the planning stage and the first draft of the report is also acknowledged.

Views expressed are those of the authors and may not reflect those of the Australian Government or the Australian Institute of Family Studies.

Summary

The Department of Veterans' Affairs commissioned the Vietnam Veterans Family Study, a comprehensive survey of Vietnam veterans and Australian Defence Force personnel and their families, in 2007. The survey was intended to enable an assessment of the impact of service in the Vietnam War on the lives of the sons and daughters of Australia's veterans. It is based on a study design in which the families of Vietnam veterans can be compared with the families of other men who served in the Australian military during the Vietnam War (1962 to 1975) but were not deployed (referred to here as Vietnam-era personnel). Using this approach, differences between the experiences of sons and daughters of Vietnam veterans and Vietnam-era personnel can be used to estimate the impact of service in the Vietnam War, provided that rival explanations can be excluded.

The Australian Institute of Family Studies was engaged to further analyse the results of the survey in order to answer two research questions:

- What effect, if any, has active Vietnam service had on the physical, mental and social wellbeing of the sons and daughters of Australian Vietnam veterans?
- Which risk, protective and mediating factors might account for those effects that also have implications for service delivery?

Areas of impact

In total, we tested for statistically significant differences in 34 outcomes between the sons and daughters of Vietnam veterans and Vietnam-era personnel after adjusting for pre-existing differences in the chances of being deployed to Vietnam. These analyses made use of a statistical technique called propensity score weighting.

Mental health and substance use

Of all the areas examined, most differences between sons and daughters of Vietnam veterans and Vietnam-era personnel were in the area of mental health.

Relative to the sons and daughters of Vietnam-era personnel, the adult children of Vietnam veterans were more likely to:

- be diagnosed with or treated for depression—21 compared to 14 per cent
- be diagnosed with or treated for anxiety—22 compared to 13 per cent
- be diagnosed with or treated for posttraumatic stress disorder—4 compared to 1 per cent
- have suicidal thoughts—41 compared to 31 per cent
- have suicidal plans and/or actions—12 compared to 7 per cent
- have tried marijuana/hashish—68 compared to 56 per cent.

We found no differences between the sons and daughters of Vietnam veterans and Vietnam-era personnel in terms of their current patterns of alcohol use.

Physical health

Relative to the adult children of Vietnam-era personnel, sons and daughters of Vietnam veterans were more likely to:

- have skin conditions—21 compared to 14 per cent
- have migraines—13 compared to 7 per cent
- experience sleep disturbances—15 compared to 9 per cent.

The following aspects of physical health were tested but no differences were observed: musculoskeletal system; circulatory system; neoplasms; endocrine, nutritional and metabolic system; respiratory system; genitourinary system; digestive system; hearing problems; and neurological problems.

We also found no differences between the sons and daughters of Vietnam veterans and Vietnam-era personnel in terms of their experiences as would-be parents of difficulty conceiving a baby, miscarriage, stillbirth, having a child born with spina bifida, or having a child born with a cleft lip/palate.

Social functioning

In the case of social functioning, there were some differences in relationships but not in terms of being a victim or being convicted of a criminal offence. More specifically, relative to the sons and daughters of Vietnam-era personnel, sons and daughters of Vietnam veterans:

- were more likely to be in a de facto relationship (19 compared to 11 per cent) but there were no statistically significant differences in the rates of being married (57 compared to 63 per cent), divorced/separated/widowed (8 compared to 6 per cent) and being single (17 compared to 21 per cent)
- were more likely to have had more than one marriage or de facto relationship (36 compared to 30 per cent) and were less likely to have had only one marriage or de facto relationship (53 compared to 62 per cent).

We found no differences between the sons and daughters of Vietnam veterans and Vietnam-era personnel in terms of their experiences of conviction for criminal offending or having ever been a victim of personal violence.

Economic wellbeing

For economic wellbeing, we tested for differences in the level of education achieved, employment, employment instability, financial stress in the past, financial stress in the last 12 months, ever being homeless and currently homeless. There were also some statistically significant differences for some variables in this area. Compared with the sons and daughters of Vietnam-era personnel, the sons and daughters of Vietnam veterans were:

- more likely to have a certificate or diploma—35 compared to 28 per cent
but
- less likely to have a university degree—41 compared to 49 per cent
and
- more likely to have experienced financial stress in the past (43 compared to 33 per cent) but not in the past 12 months.

There were no differences observed among the sons and daughters of Vietnam veterans and Vietnam-era personnel on current employment status, employment instability, financial stress in the last 12 months, and past or current experiences of homelessness.

Explaining the impact of deployment

Having established that there were 12 outcomes for which there was an impact of deployment to the Vietnam War on the offspring of veterans, we tried to explain these impacts using other information collected in the Main Survey of the Vietnam Veterans Family Study. We tested a model informed by previous research, which suggests that the impact of deployment can be explained by the following:

- serviceman's posttraumatic stress disorder
- sons' or daughters' experiences at primary and secondary school
- family environment
- serviceman's mental and physical health
- serviceman's use of services and supports.

There were two key findings from this model:

- The model was able to explain the impact of deployment in most instances (10 of the 12 outcomes examined).
- There were many pathways by which deployment influenced the outcomes of offspring, but these pathways usually consisted of a combination of a few key variables or groups of variables.

We examined a large number of factors in order to understand the pathways of the intergenerational impact of deployment (for example, children's experiences at school, family environment children were growing up in, father's health, father's use of services and support); nonetheless, only three factors appeared to explain the intergenerational impact of deployment:

- serviceman's posttraumatic stress disorder

- harsh parenting in childhood among the sons and daughters of veterans
- problems at school among the sons and daughters of veterans.

While the analyses of the mechanisms suggest primary candidates that could be involved in the transmission of the impact of deployment on the offspring of Vietnam veterans, the cross-sectional and retrospective nature of the survey means it is not possible to identify the precise mechanisms responsible. A prospective longitudinal study would provide better information so as to understand these causal mechanisms in more depth but is not possible in this instance.

Serviceman's posttraumatic stress disorder

The influence of PTSD was often indirect, the condition being associated with higher rates of problems for sons and daughters at school and poorer family environments. Veterans had higher rates of depression, migraines or skin problems than Vietnam-era personnel and, in turn, these difficulties were often associated with more problematic outcomes for their sons and daughters.

Harsh parenting

Childhood experiences of harsh parenting among the sons and daughters of Vietnam veterans helped account for the intergenerational impact of deployment on all measures of mental health, as well as having been diagnosed with sleep problems and having experienced financial stress during their lifetime. Harsh parenting also helped explain some of the intergenerational impact of having a father with PTSD on those same outcomes, with the exception of having ever used marijuana. It is important to note that the daughters and sons of the servicemen were asked to report on their experiences of harsh parenting in general and not specifically by their fathers. It is not clear, therefore, whether the higher rates of harsh parenting reported among the families of Vietnam veterans relate to the behaviour of veterans or that of their partners.

School problems

The sons and daughters of the Vietnam veterans and Vietnam-era personnel were asked whether they had problems at school. The experiences of school reported in response to these questions were also important in explaining the impact of deployment. In particular:

- School absenteeism and being bullied helped account for the intergenerational impact of deployment on all the mental health and substance use measures, three physical health measures and the lifetime measure of financial stress.
- Higher rates of school absenteeism and bullying victimisation among the sons and daughters of PTSD sufferers also helped explain the higher rates of depression, anxiety, PTSD, suicidal plans or actions, migraines and sleep problems found among the sons and daughters of Vietnam veterans.
- The sons and daughters of Vietnam veterans, especially of veterans who suffered from PTSD, were more likely than others to report having had learning problems, and this helped explain the intergenerational impact of deployment and PTSD, depression, anxiety, suicidal plans or actions, and education levels among their sons and daughters.

Deployment characteristics

We examined the specific impacts of deployment on the health and social and economic wellbeing of Vietnam veterans' sons and daughters. The main characteristics of deployment that were related to sons' and daughters' outcomes were:

- the total duration of the serviceman's deployment
- timing of the child's birth relative to serviceman's first deployment
- the serviceman's corps and rank.

Duration of deployment

Compared with sons and daughters of Vietnam veterans who spent no more than eight months on active military service:

- the sons and daughters of veterans who were deployed for longer periods were more likely to report being diagnosed with or treated for anxiety and less likely to have been in a married or cohabiting relationship
- the sons and daughters of veterans who were deployed for more than eight months but no more than 12 months were more likely to have been diagnosed with or treated for a sleep condition
- the sons and daughters of veterans who were deployed for more than 12 months were less likely to have completed post-secondary education.

Limiting the duration of deployments to a single year might need to be carefully considered in the light of these results. For example, the British Ministry of Defence recommends that military personnel be deployed for six months at a time and for less than 12 months in any three-year period (Buckman et al. 2011).

Birth relative to serviceman's deployment

Compared with sons and daughters who were born before their father was first deployed, sons and daughters who were born after their father was deployed were more likely to:

- ever experience financial stress
- be married
- have a university degree.

Corps and rank

The sons and daughters of enlisted men and veterans of the Royal Australian Infantry had a higher number of negative outcomes compared with men and women whose fathers were officers or non-commissioned officers or served in other corps. Specifically, the sons and daughters of men who served in the Royal Australian Infantry were more likely to:

- have been diagnosed with or treated for PTSD, skin conditions and migraines than the sons and daughters of veterans who served in the Royal Australian Engineers
- be in cohabiting relationships than the sons and daughters of veterans who served in the Royal Australian Engineers
- have been diagnosed with or treated for anxiety than sons and daughters of men who served in the Royal Australian Artillery and other selected corps.

Relative to the sons and daughters of non-commissioned and warrant officers who served in Vietnam (for example, corporals, sergeants and warrant officers), the sons and daughters of enlisted men (for example, privates, gunners, sappers and signalmen) were more likely to have used marijuana or hashish.

Compared with the sons and daughters of commissioned officers who were deployed to Vietnam (for example, lieutenants, captains and majors), the sons and daughters of enlisted men (for example, privates, gunners, sappers and signalmen) were more likely to:

- have completed less education
- be neither married nor in a cohabiting relationship
- have thought about committing suicide.

Exposure to Agent Orange

There was no evidence that exposure to Agent Orange and other chemicals had harmful effects on the sons and daughters of veterans. In particular, the sons and daughters of veterans who were exposed to Agent Orange and other chemicals were no more likely than the sons and daughters of veterans not exposed to Agent Orange to have trouble conceiving children or to have had a miscarriage.

These findings are consistent with those of other studies that failed to find evidence of intergenerational effects of exposure to Agent Orange and related chemicals (Institute of Medicine 2012). We were unable to determine whether sons and daughters whose fathers were exposed to Agent Orange had higher rates of spina bifida or cleft lip or palate—the medical condition for which there is

suggestive evidence of an intergenerational impact (Institute of Medicine 2012)—because so few respondents in the sample had the condition.

Strengths of the study

This study had a number of strengths:

- The sons and daughters of Vietnam-era personnel constitute the best available comparison group when estimating the impact of deployment.
- The two groups were matched on 39 variables (including deployment service and employment history, parenting in the veteran’s own family of origin, and the health of the veteran’s parents) to ensure comparability using a statistical technique called propensity score weighting.
- Based on comparisons of demographic variables in the Nominal Roll of Vietnam Veterans, the Vietnam veterans in our study are broadly representative of the total population of Vietnam veterans.
- Although the sons and daughters of Vietnam veterans were more likely to participate than those of the Vietnam-era personnel, differences in their participation rates were not associated with whether they had any health problems as reported by their fathers.

Concluding comments

The major finding from this study is that the sons and daughters of Australia’s Vietnam veterans are worse off than the sons and daughters of other men who served in the Australian Army during the war but who were not deployed to Vietnam. These differences were not attributable to pre-deployment differences between the Vietnam veterans and their counterparts (that is, the fathers of the sons and daughters) who were assigned to other areas during the war, including the employment histories and school records of the servicemen, their relationships with their parents (that is, the grandparents of the sons and daughters of the servicemen) or even the health of their parents. The most plausible explanation for the results, therefore, is that the higher rates of emotional, social and physical problems found among the sons and daughters of

Vietnam veterans are among the intergenerational effects of military service in the Vietnam War. It is important, however, to note that sons and daughters of Vietnam veterans were not worse off in all respects: in particular, there were few differences in terms of physical health outcomes, and there was no evidence of greater problems in conceiving or of birth defects in their own children.

In addition, this report identified several factors that might explain the intergenerational effects of military service in the Vietnam War. These were as follows:

- whether the veteran suffered from posttraumatic stress disorder
- his sons' or daughters' experience of harsh parenting
- whether his sons or daughters had problems at school.

1 Introduction

Forty years after the last Australian troops left Vietnam many veterans remain concerned about how their service in the war affected them and their families. Vietnam veterans are more likely to die from cancers, heart disease and suicide than other Australian men of a similar age, while veterans who were conscripted are more likely to die from lung cancer and cirrhosis of the liver than non-deployed National Servicemen (Crane et al. 1997). Of particular concern, the apparent impact of service in the Vietnam War might not be limited to the men and women who were deployed to the conflict but might also extend to their families. For example, one study published in 2000 reported that suicide rates among the sons and daughters of Australia's Vietnam veterans were higher than they were among people of comparable age in the general population (Department of Veterans' Affairs & Australian Institute of Health and Welfare 2000).

Despite several studies investigating the health and welfare of Vietnam veterans, there have been few large-scale Australian studies examining the emotional, physical and social wellbeing of their sons and daughters. Those that have been conducted have often been unable to rule out rival explanations for the apparently detrimental impacts of service in the Vietnam War on the sons and daughters of Australia's Vietnam veterans. The men and women who were deployed to the Vietnam War may have led very different lives from other members of their generation, even before they were sent overseas. This means that some discrepancies between the emotional, physical and social wellbeing of veterans and other Australian men of similar age, including other military personnel who were not deployed to the war, might not necessarily result from their service in the war.

In response to these concerns, and the knowledge gaps surrounding them, the Department of Veterans' Affairs commissioned the Vietnam Veterans Family Study, a comprehensive survey of Vietnam veterans and Australian Defence Force personnel and their families. The survey, which is part of a larger research program funded by DVA that aims to improve our understanding of the impact of military service on the families of military personnel, was intended to enable an

assessment of the impact of service in the Vietnam War on the sons and daughters of Australia's veterans. It is based on a research design in which the families of veterans of the war in Vietnam were intended to be compared to the families of other men who served in the Australian military during the Vietnam War (1962 to 1975) but were not deployed to Vietnam—referred to here as Vietnam-era personnel. With this approach, differences between the experiences of sons and daughters of Vietnam veterans and Vietnam-era personnel can be used to estimate the impact of service in the Vietnam War, provided that rival explanations can be excluded.

After the completion of all survey fieldwork and the initial analysis, the Australian Institute of Family Studies was engaged to further analyse the results of the survey. Specifically, AIFS was commissioned to answer two research questions:

- What effect, if any, has active Vietnam service had on the physical, mental and social wellbeing of the sons and daughters of Australian Vietnam veterans?
- Which risk, protective and mediating factors might account for those effects that also have implications for service delivery?

2 A brief review of the literature

This chapter offers a brief and selective review of research into the intergenerational effects of military service in Vietnam on the sons and daughters of veterans. A more extensive review, *The Intergenerational Health Effects of Service in the Military* prepared by the Centre for Military and Veterans' Health (now the Centre for Australian Military and Veterans' Health), was published in 2007.

Research on the intergenerational effects of active duty military service can be categorised according to the nature of the family's exposure to the consequences of military service. In broad terms, families can be affected by a parent's military deployment in addition to that parent's exposure to combat and its associated harms. The main distinction between deployment-related harms and combat-related harms is that the former are often observed among the families of active duty service members even in the absence of any exposure to combat. In this review, therefore, we outline the evidence for the impact of military deployment, exposure to combat and posttraumatic stress disorder, and exposure to herbicides on sons and daughters of veterans. Where there is sufficient evidence that sons and daughters are affected, we also discuss possible mechanisms by which these three factors influence sons' and daughters' outcomes.

2.1 Deployment: educational achievement, parenting and psychological distress

Even in the absence of exposure to combat, military deployment can have adverse consequences for military personnel and their families. Far from being a discrete event, deployment is a cyclical process comprising three distinct stages:

- pre-deployment—that is, families prepare for an impending deployment and the separation of family members
- deployment—that is, in which the deployment of military personnel results in separation

- post-deployment—that is, in which veterans and their families have to readjust to family life after the veteran’s extended absence. Some of the harms associated with combat exposure (such as PTSD) can also exacerbate the effects of post-deployment readjustment. Post-deployment readjustment can, however, still be a challenge even if veterans were not exposed to combat (MacDermid Wadsworth 2010).

Each of the phases of deployment can present military personnel and their families with unique challenges that could affect several child outcomes. Following are some of the findings on the impacts of deployment on different child outcomes.

2.1.1 Educational achievement

Parental absences induced by military deployment have been shown to negatively affect educational achievement among sons and daughters across a range of subject areas (Lyle 2006; Engel et al. 2010). These effects, which seem most pronounced among younger sons and daughters, those whose parents who are less academically able, and sons and daughters whose mothers were serving in the military, may continue beyond the period of deployment (Lyle 2006; Engel et al. 2010). The studies did not examine the mechanisms through which parental deployment affects the educational outcomes. It is not clear whether these effects are symptomatic of the psychological problems for sons and daughters often associated with deployment, such as changes to family routines (for example, the need for older sons and daughters to assume greater responsibility for their younger siblings); greater strain on the non-deployed parent; or the reduced capacity of non-deployed parents to engage in their child’s education. Regardless of the potential mechanism of influence, negative impacts on educational achievement have the potential to affect the capacity of sons and daughters to go on to further study and obtain employment throughout their life.

2.1.2 Harsh parenting

Given the observed links between parental stress and harsh parenting, it is possible that military deployment could lead to harsh parenting and even trigger maltreatment episodes in some families. Harsh parental behaviours are generally less evident among military families than among the general population; nonetheless, there is some evidence that rates of child neglect and physical abuse

were generally higher during periods of deployment on active duty among families that had maltreated their children (Gibbs et al. 2007). Rates of neglectful or abusive parental behaviour in military families are also higher at times when larger numbers of personnel are deployed to, or returning from, active military service (Rentz et al. 2007; McCarroll et al. 2008). The long-term consequences of harsh parenting have been found to include heightened risk of depression and anxiety, and children who experienced harsh parenting often show difficulties in acceptance of life, autonomy, identity clarity, and planning (Price-Robertson et al. 2010).

2.1.3 Psychological distress

Several studies indicate that the military deployment of one or both parents is associated with heightened psychological distress among children in comparison to both general population norms and children in non-deployed military families (Flake et al. 2009). A review of nine published studies from 2003 to 2010 focused on the impact of deployment among American military personnel deployed to the recent conflicts in Iraq and Afghanistan—Operations Iraqi Freedom and Enduring Freedom (White et al. 2011). The review found that children had increases in emotional and behavioural problems when at least one parent was deployed. Similarly, a large US study of 642,397 children aged 3 to 8 years reported higher rates of anxiety and behavioural and stress disorders when their parents were deployed than when they were at home (Gorman et al. 2010). The children of deployed parents also had more frequent visits to outpatient mental and behavioural health services. Older children, the sons and daughters of married parents, and children whose fathers were deployed had larger increases in health visits during deployments (Gorman et al. 2010). One study also reported that children of deployed parents had higher levels of physiological arousal indicative of stress. Barnes et al. (2007) reported that children with deployed parents had higher blood pressure scores than the daughters and sons of both non-deployed military and civilian parents. The life-course literature on the continuity of depression and anxiety in the general population suggests that the experience of early problems in this regard is a risk factor for ongoing problems in adulthood (Letcher et al. 2012). With respect to antisocial behaviour in the general population, early onset of antisocial behavioural problems has been found to be a

risk factor for persistent antisocial behaviour and criminality in adulthood (DeLisi & Piquero 2011; Loeber & Farrington 2000).

2.2 Deployment: mechanisms of influence

The military deployment of a parent may have negative psychosocial consequences. The main candidates that have been discussed in the research literature are as follows.

2.2.1 Parent–child separation

Separation from a parent as a result of military deployment can be especially stressful for sons and daughters. Even if temporary separation from a parent as a result of his or her military service may adversely affect young sons and daughters, it may not necessarily have any long-term consequences. Some studies find that adults who as children were separated from both parents as a result of war (for example, British sons and daughters evacuated to temporary accommodation) had poorer mental health than other adults who had not experienced separation from parents as children (Foster et al. 2003; Pesonen et al. 2007), although those whose fathers were deployed to the military during war were not disadvantaged relative to other adults (Pesonen et al. 2007).

2.2.2 Stress of the non-deployed caregiver

Parents whose partners were deployed and who had young children had higher levels of self-reported stress than is typically observed in the general population or among parents in military families in the absence of deployment (Chartrand et al. 2008). There is some evidence that the psychological status of the parent who is not deployed and is caring for a child or children seems to be important to the wellbeing of children and may even account for much of the apparent impact of deployment on children (Centre for Military and Veterans' Health 2007). For example, a recent review of nine published studies examining the impact of deployment in Iraq and Afghanistan found that the higher emotional and behavioural problems observed among the children of deployed military personnel were due to the higher rates of mental health problems and stress and lower levels of coping and social support among their non-deployed caregivers (White et al. 2011). Differences in stress levels among non-deployed parents may

also account for differences in externalising and internalising and attention problems among the sons and daughters of deployed military personnel (Flake et al. 2009; Rosen et al. 1993).

2.2.3 Divorce and relationship separation

The results of research studies on the consequences of military service for marital stability have been inconsistent (Pavalko & Elder 1990; Ruger et al. 2002; Karney & Crown 2007). There is some evidence that the risk of divorce among military personnel increases in proportion to the length of their deployment (Negrusa et al. 2013). Divorce rates have been shown to increase in the years following mobilisation for the second World War (Gimbel & Booth 1994; Pavalko & Elder 1990; South 1985). In one of the more robust studies to date, however, Heerwig and Conley (2013) estimated the effect of war service on divorce rates for the US population using data from the long form of the US Census (over 500,000 cases) and the American Community Survey (over 50,000). They concluded that war service had little impact on marital dissolution overall and even reduced the probability of marital dissolution among some men. Based on the evidence from the United States, therefore, there is little reason to think that divorce and relationship dissolution as a result of deployment would have played a major role in undermining the wellbeing of the sons and daughters of Australian Vietnam veterans.

2.2.4 Smoking and substance use

Deployment is associated with the initiation of smoking and smoking recidivism (Smith et al. 2008). Since parental smoking is associated with an increased likelihood of smoking by sons and daughters (Gilman et al. 2009; Kandel et al. 1994), it is possible that deployment contributes indirectly to smoking and related health consequences (for example, respiratory illnesses) among sons and daughters. Smoking, in turn, has been associated with higher rates of miscarriage (Mishra et al. 2000).

2.3 Exposure to combat: posttraumatic stress disorder

Much of the literature on the intergenerational effects of military service is concerned with the effects of exposure to combat, including trauma and related

psychological harms and physical injury. Veterans who experience combat while deployed are often exposed to a range of dangers and traumatic events, such as being injured, being knocked over or moved by an explosion, engaging in hand-to-hand combat, witnessing serious injury or the death of others, seeing or smelling dead or decomposing bodies, and being responsible for the death of others, including civilians (Tanielian 2009). These events can cause psychological harm as well as physical injuries, which continue to affect the veterans and their families well after the veterans have left the combat zone (Chatterjee et al. 2009).

The Morbidity of Vietnam Veterans Study found that veterans have consistently reported high levels of mental health problems, with around 30 per cent reporting panic attacks, anxiety disorder, depression and PTSD (Department of Veterans' Affairs 1998). The study was based on self-report questionnaires from 40,030 veterans who had served in Vietnam. Based on the self-reports, the prevalence of PTSD in the male veteran population was 31 per cent, indicating that there was a significant proportion of sons and daughters of veterans exposed to a parent with this condition (Department of Veterans' Affairs 1998).

In *The Intergenerational Health Effects of Service in the Military* the Centre for Military and Veterans' Health (2007) reported that the one of the most consistent findings of that review of the literature was the association between PTSD and poorer child outcomes. However, unpacking the precise mechanisms of influence over the life course was difficult due to the limited longitudinal studies in the area. In the studies of sons and daughters of veterans that were reviewed, nine out of 11 indicated that there were adverse effects on the mental health of sons and daughters in terms of emotional distress and PTSD. At that time studies investigating psychosocial outcomes, cognitive outcomes and physical outcomes of sons and daughters of veterans were inconclusive or showed no adverse outcomes. The review found the veteran's PTSD had a clear impact on the spouse, but the degree to which this is transmitted to sons and daughters was less clear due to the quality of the studies at that time. A recent meta-analysis found that there was an association between parents' symptoms of posttraumatic stress and those of their children, although the association was more pronounced when mothers had experienced these symptoms rather than fathers (Morris et al. 2012).

2.4 Posttraumatic stress disorder mechanisms of influence

The research literature suggests that suffering from PTSD as a result of combat exposure may affect the sons and daughters of veterans in a number of ways.

2.4.1 Effects on partners

Gavlovski and Lyons (2003) found that spouses of PTSD-affected veterans were more likely to have psychological and emotional distress (for example, anxiety, loneliness), increased living pressures (for example, financial, needing to take full responsibility for sons and daughters) and problems within the spousal relationship (for example, violence, separation) compared to spouses of combat-exposed veterans who did not develop PTSD. The Centre for Military and Veterans' Health (2007) also reported that PTSD was consistently related to spouses' poorer mental health.

2.4.2 Effects on the relationship between partners

Numerous articles discuss the difficulty returned veterans have with relationships with others, particularly their spouses, due to changes in the way they relate to others—for example, by being more withdrawn (Caselli & Motta 1995). The Centre for Military and Veterans' Health (2007) reported findings from a number of high-quality studies that couples' relationships were affected by PTSD and that there was more marital instability in the relationships of veterans suffering from PTSD. Rates of interpersonal violence were also reported to be higher among couples in which one partner suffered from PTSD as a result of combat exposure.

2.4.3 Effects on family functioning and parenting behaviour

Family functioning^{*} has been found to be worse in families of Vietnam veterans, particularly those experiencing PTSD (Davidson & Mellor 2001). The PTSD symptoms of anger in particular have been directly associated with worse family functioning in Australian Vietnam veterans (Evans et al. 2003). A number of reviews have also found that veterans with PTSD are more likely to use violence to attempt to solve personal problems, with obvious deleterious impacts on sons

^{*} The McMaster Model of Family Functioning was used in this instance. The Family Assessment Device operationalises the six dimensions and includes a global measure. The dimensions are problem solving, communication, roles, behaviour control, affective responsiveness and affective involvement, and there is an additional composite subscale—global functioning. In general terms, the Family Assessment Device measures relationship dynamics.

and daughters (Dekel & Goldblatt 2008; Gavlovski & Lyons 2003). Irrespective of the use of harsh parenting practices such as violence, the parenting style of PTSD-affected veterans is often described as being controlling and over-protective or withdrawn and distant (Caselli & Motta 1995; Dekel & Goldblatt 2008; Gavlovski & Lyons 2003).

2.4.4 Effects of knowledge of father's experience

Knowledge of their father's war experiences can have a number of effects on sons and daughters. Sons and daughters have been found to constantly monitor and modify their behaviour to protect their father from known triggers for distress. Moreover, sons and daughters may be over-exposed to details of the trauma, with the child identifying with their father's trauma and adopting or mimicking the parent's symptoms (Dekel & Goldblatt 2008; Gavlovski & Lyons 2003).

2.5 Exposure to herbicides

Many Australian veterans of the Vietnam War were exposed to herbicides, pesticides and other chemicals during their deployment, the most notorious of these being Agent Orange (a 50:50 mixture of 2, 4-dichlorophenoxyacetic acid and 2, 4, 5-trichlorophenoxyacetic acid). A thorough review of the impact of Agent Orange and other herbicides on veterans is beyond the scope of this report; but the Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides (Eighth Biennial Update) provides the most up-to-date account of the impact of these herbicides on veterans (Institute of Medicine 2012). The committee reported that there was sufficient evidence of an association between herbicide exposure and a range of health conditions including soft tissue sarcoma (including heart), non-Hodgkin lymphoma, chronic lymphocytic leukaemia, Hodgkin lymphoma and chloroacne. There were also some health outcomes for which there was suggestive evidence of the effects of chemical exposure among veterans, although alternative explanations for these health conditions could not be ruled out. These included laryngeal cancer, cancer of the lung, bronchus or trachea, prostate cancer, multiple myeloma, AL amyloidosis, early onset peripheral neuropathy, Parkinson's disease, porphyria cutanea tarda, hypertension, ischaemic heart disease and type 2 diabetes.

Evidence of the intergenerational effects of exposure to Agent Orange and other chemicals is less straightforward. The Institute of Medicine concluded there was only one condition for which there was suggestive evidence of health outcomes on the sons and daughters of veterans—spina bifida. The evidence was of ‘insufficient quality, consistency and statistical power’ (Institute of Medicine 2012, p. 9) to determine associations for numerous other health conditions among the offspring of veterans exposed to chemicals, including neonatal or infant death and stillbirth, low birth weight, birth defects (other than spina bifida) and childhood cancers (including acute myeloid leukaemia).

3 Survey data and statistical methodology

This chapter describes the Main Survey of the Vietnam Veterans Family Study and the differences between Vietnam veterans and Vietnam-era personnel. It shows that after propensity score analysis the differences can be adjusted for, compares the analytical sample of Vietnam veterans in the Main Survey to the population of Vietnam veterans using the Nominal Roll of Vietnam Veterans, and tests whether there were systematic differences in the rates of participation in the survey of sons and daughters of Vietnam veterans compared to sons and daughters of Vietnam-era personnel.

3.1 Sample characteristics

The Vietnam Veterans Family Study is a multi-generational study of the physical, mental and social welfare of men who served in the Australian military during the Vietnam era (1962 to 1975) and their families. It is based on a survey of Australian military personnel and their families, who were recruited to participate by the military personnel who comprised the original sample (that is, the study members). Once registered, family members were contacted directly by the fieldwork agency (Colmar Brunton Social Research) and asked to complete the relevant self-report questionnaire, depending on their relationship to the serviceman of interest (that is, spouses and sons and daughters).

The study is based on a research design in which the families of veterans of the Vietnam War are compared to the families of other men who served in the Australian military during that war but were not deployed—referred to here as Vietnam-era personnel. Using this approach, differences between the experiences of sons and daughters of Vietnam veterans and 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.

The study was based on two samples:

- a random-select sample comprising 3,940 Vietnam veterans and 3,967 Vietnam-era personnel. These men registered to participate in the study after

being selected at random from the Nominal Roll of Vietnam Veterans and from a combination of Department of Veterans' Affairs client lists and the Australian Electoral Roll (in the case of the Vietnam-era personnel). All of them had served in the Australian Army at some point between 1962 and 1975

- a self-select sample consisting of 2,569 Vietnam veterans and 418 Vietnam-era personnel who contacted Department of Veterans' Affairs and volunteered to participate.

Registered servicemen were asked to invite their family members to participate in the survey. Names and addresses of family members who were registered to participate were then provided to Colmar Brunton. Colmar Brunton then contacted family members in the same way as it had contacted the servicemen and mailed questionnaires to all registered participants. Follow-up reminders were mailed. Non-respondents were then contacted a second time by telephone. The survey was administered using a self-completed hard-copy questionnaire mailed to registered survey participants. In addition, participants who had provided an email address were emailed a link to complete an online version of the survey. In some cases survey interviews were also completed by telephone. Service members and their families were asked a range of questions relating to aspects of their social, emotional and physical welfare.

Overall, 70 per cent of registered members of the randomly selected sample took part in the survey. The response rate was substantially higher for the Vietnam veterans (76 per cent) than it was for the Vietnam-era personnel (64 per cent). Moreover, 64 per cent of the registered sons and daughters of veterans participated in the survey compared to 53 per cent of the registered sons and daughters of the Vietnam-era personnel. These response rates are based on the numbers of registered sons and daughters and do not take account of differences in registration rates.

For this report the Australian Institute of Family Studies restricted the analyses to the families of servicemen who:

- were members of the randomly selected sample
- and

- had at least one child who had participated in the survey.

Table 3.1 shows the response rates among registered families of Vietnam veterans and Vietnam-era personnel (a family is considered ‘registered’ if at least one member of the family participated) and response rates among families with servicemen, servicemen’s spouses and at least one serviceman’s offspring who participated in the analysis.

We restricted the analyses to the randomly selected sample for two reasons: the self-select sample was disproportionately made up of Vietnam veterans and included relatively few Vietnam-era personnel; and the Vietnam veterans who volunteered to participate in the survey were less representative of the larger population of Vietnam veterans than those who were selected at random. We limited our attention to those families in which at least one of the serviceman’s sons or daughters had participated in the survey because the focus of the report is the emotional, physical and social wellbeing of the sons and daughters.

3.2 Propensity score analysis: estimating the impact of Vietnam War service

A key feature of the survey was the inclusion of a control group consisting of the families of military personnel who served in the Australian Army during the Vietnam War but were not deployed to Vietnam on active service. Comparisons between the families of Vietnam veterans and those of Vietnam-era personnel may provide a basis for estimating the effects of war service relative to non-Vietnam military service provided the two samples did not differ systematically from one another prior to the Vietnam veterans’ service in Vietnam.

Table 3.1 Response rates for registered family members

| Category | No. of observations | | | |
|--|---------------------|-------|-------------|-----|
| | Random | | Self-select | |
| | VV | VEP | VV | VEP |
| Total of 'registered' servicemen's families | 3,633 | 2,751 | 3,339 | 409 |
| Serviceman | | | | |
| Participated | 3,012 | 2,529 | 2,204 | 341 |
| Did not participate | 621 | 222 | 1,135 | 68 |
| Serviceman's spouse/partner | | | | |
| Participated (at least 1 spouse) | 1,765 | 978 | 1,102 | 88 |
| Did not participate or did not have a spouse | 1,868 | 1,773 | 2,237 | 321 |
| Serviceman's offspring | | | | |
| Participated (at least 1 offspring) | 1,688 | 858 | 1,381 | 56 |
| Did not participate or did not have any sons and daughters | 1,945 | 1,893 | 1,958 | 353 |
| Family members who took part in the study ^a | | | | |
| Only serviceman | 1,100 | 1,352 | 1,364 | 288 |
| Only serviceman's offspring | 314 | 98 | 322 | 25 |
| Only serviceman's spouse/partner | 167 | 97 | 624 | 35 |
| Serviceman + serviceman's offspring | 1,234 | 733 | 568 | 23 |
| Serviceman + serviceman's spouse | 1,458 | 854 | 591 | 45 |
| Serviceman's offspring + serviceman's spouse | 920 | 410 | 508 | 23 |
| Serviceman + serviceman's offspring + serviceman's spouse ^b | 780 | 383 | 319 | 15 |

a. Categories below are not mutually exclusive.

b. Numbers in this category are also included in the three categories above (serviceman + serviceman's offspring, serviceman + serviceman's spouse, and serviceman's offspring + serviceman's spouse).

Notes: VV = Vietnam veteran; VEP = Vietnam-era personnel. 'Registered' family—if at least one member of the family took part in the study.

Source: Vietnam Veterans Family Study.

It should be noted, however, that veterans were not assigned randomly to serve in Vietnam. Instead, they were assigned to specific corps and units, sometimes on the basis of individual characteristics that were thought to affect their suitability for specific roles in the military. These corps and units then became the basis for deployment decisions. This means that differences observed between the families

of veterans and their Vietnam-era counterparts may not necessarily be due to their service in the Vietnam War; instead, they could be due to any number of factors that also influenced their deployment to Vietnam. A direct comparison between those who were deployed and Vietnam-era personnel may therefore be biased by other variables. An empirical strategy to address these differences is required to accurately estimate the impact of deployment to Vietnam. We used propensity score analysis for that purpose. Specifically, we estimated the probability of belonging to the Vietnam veterans subsample for each serviceman in the sample based on a number of pre-deployment characteristics.

3.2.1 Variables included in the propensity score analysis

We began by searching the Main Survey to identify factors that might have affected the chances of being deployed to Vietnam. Deployment was based on the corps and the units to which servicemen were assigned rather than their individual characteristics or prior experiences. That said, we used individual factors in our analyses for two reasons:

- It is likely that individual characteristics influenced the units to which personnel were assigned and their chances of being deployed to Vietnam. This means that some individual-level factors may have indirectly influenced the chances of being deployed to Vietnam, although the influence of those factors might have varied across the population.
- Given that our samples were drawn retrospectively from two larger samples of Defence Force personnel, in identifying factors that differentiate those who went to Vietnam from those who did not our model effectively estimates the probability of belonging to either the subsample of Vietnam veterans or the subsample of Vietnam-era personnel (conditional on having participated in the Main Survey). Thus, the analytical approach may also help control for possible differences between Vietnam veterans and Vietnam-era personnel in terms of their likelihood of participating in the study.

In total, 39 variables were identified for inclusion in the propensity score analysis. Table 3.2 provides a description of these variables, how they were coded and the questions they contained.

Table 3.2 Variables included in the propensity score analysis

| Variable | Coding |
|---|---|
| Age of serviceman | Binary variables corresponding to ages 60, 61, 62, 63, 64, 65, 66, and 67. Servicemen aged 68 and over or 59 and below form the reference category. |
| Military service | |
| Year entered military | Binary indicators x 21 of year military service began (1950–70). Servicemen who began military service before 1950 or after 1970 form the reference category. |
| Serviceman’s parent served in military | Binary indicator of whether serviceman’s mother or father had military experience, including as full-time personnel or as a reservist (Yes=1, Otherwise=0). |
| Serviceman’s grandparent served in military | Binary indicator of whether serviceman’s grandmother or grandfather had military experience, including as full-time personnel or as a reservist (Yes=1, Otherwise=0). |
| National Serviceman (1965–1973) | Binary indicator of whether serviceman was conscripted into the ADF (Yes=1, otherwise=0). Missing cases were classified as national servicemen if they were born on a day selected in the national service ballot. |
| Education | |
| Year 9 or above | Binary indicator of whether serviceman completed his highest level of education, to the level of at least Year 9, before he joined the ADF (Yes=0, Otherwise=0). Servicemen who earned additional qualifications after the military form the reference category along with those who did not complete Year 9. |
| Disciplinary problems | Binary indicator of whether serviceman was suspended or expelled from primary or high school (Yes=1, Otherwise=0). |
| Behavioural problems | Binary indicator of whether serviceman was absent for more than 10 per cent of days in a school year or was bullied at school or institution? (Yes=1, Otherwise=0). |
| Gifted and talented | Binary indicator of whether serviceman jumped ahead a year or placed in a gifted class in primary or high school (Yes=1, Otherwise=0) |
| Learning problems | Binary indicator of whether serviceman repeated a year (including failing exams); worked with a psychologist, counsellor, or specialist teacher to assist with a learning difficulty; was placed in a remedial class; or dropped out of a course (Yes=1, Otherwise=0). |
| Prior employment | |
| | Binary indicators x 4 of the number of jobs held prior to joining the military: None (Yes=1, 0=Otherwise); One (Yes=1, 0=Otherwise); Two (Yes=1, 0=Otherwise); Three or more (Yes=1, 0=Otherwise). None formed the reference category. |
| Family characteristics | |
| Single-parent household | Binary indicator of whether serviceman reported not having either a mother or father figure (Yes=1, Otherwise=0). |
| Parenting (serviceman’s mother) | |

| Variable | Coding |
|--|---|
| Affectionate | Binary indicators x 4 of 'How affectionate was your mother towards you?' Not at all (Yes=1, o=Otherwise); A little (Yes=1, o=Otherwise); Somewhat (Yes=1, o=Otherwise); Very (Yes=1, o=Otherwise). Servicemen who did not have a mother figure coded 0 on all indicators. 'Not at all' formed the reference category. |
| Caring | Mean score of 3 items: 'My mother seemed emotionally cold to me' (reverse coded); 'My mother appeared to understand my problems and worries'; and 'My mother could make me feel better when I was upset'. Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high parental warmth. |
| Overprotective | Mean score of 4 items: 'My mother liked me to make my own decisions' (reverse coded); 'My mother tried to control everything I did'; 'My mother tended to baby me and tried to protect me from everything'; 'My mother gave me as much freedom as I wanted' (reverse coded). Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high protectiveness. |
| Parenting (serviceman's father) | |
| Affectionate | Binary indicators x 4 of 'How affectionate was your father towards you?' Not at all (Yes=1, o=Otherwise); A little (Yes=1, o=Otherwise); Somewhat (Yes=1, o=Otherwise); Very (Yes=1, o=Otherwise). Servicemen who did not have a father figure coded 0 on all indicators. 'Not at all' formed the reference category. |
| Caring | Mean score of 3 items: 'My father seemed emotionally cold to me' (reverse coded); 'My father appeared to understand my problems and worries'; and 'My father could make me feel better when I was upset'. Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high parental warmth. |
| Overprotective | Mean score of 4 items: 'My father liked me to make my own decisions' (reverse coded); 'My father tried to control everything I did'; 'My father tended to baby me and tried to protect me from everything'; 'My father gave me as much freedom as I wanted' (reverse coded). Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high protectiveness. |
| Mother or father of serviceman had alcohol problem | Binary indicator of whether mother or father of serviceman had trouble with alcohol or other drug use (Yes=1, Otherwise=0). |
| Pre-existing medical conditions of serviceman | |
| Mental and behavioural | Binary indicator of whether the serviceman was diagnosed with or treated for Depression, Anxiety, or PTSD before he joined the ADF (Yes=1, Otherwise=0). |
| Musculoskeletal system | Binary indicator of whether the serviceman was diagnosed with or treated for Arthritis; Osteoporosis; or Other joint disorders) before he joined the ADF (Yes=1; Otherwise=0) |
| Circulatory system | Binary indicator of whether the serviceman was diagnosed with or treated for: Stroke; Angina; Hypertension (or high blood pressure); Heart condition (coronary heart disease); or Heart attack (myocardial infarction) before he joined the ADF (Yes=1; Otherwise=0). |

| Variable | Coding |
|--------------------------------------|---|
| Neoplasms | Binary indicator of whether the serviceman was diagnosed with or treated for: Skin cancer (excluding melanoma); Melanoma; Soft tissue/organ cancer; Blood/bone cancers (other than acute myeloid leukaemia); Acute myeloid leukaemia (AML); or Tumour (cancerous or benign) |
| Endocrine, nutritional and metabolic | Binary indicator of whether the serviceman was diagnosed with or treated for: Type 1 Diabetes (childhood onset); Type 2 Diabetes (adult onset) before he joined the ADF (Yes=1; Otherwise=0). |
| Respiratory system | Binary indicator of whether the serviceman was diagnosed with or treated for Asthma or Chronic lung disease (e.g. emphysema, chronic bronchitis) before he joined the ADF (Yes=1; Otherwise=0). |
| Genitourinary system | Binary indicator of whether the serviceman was diagnosed with or treated for Kidney disease before he joined the ADF (Yes=1; Otherwise=0). |
| Digestive system | Binary indicator of whether the serviceman was diagnosed with or treated for Liver disease before he joined the ADF (Yes=1; Otherwise=0). |
| Nervous system | Binary indicator of whether the serviceman was diagnosed with or treated for Epilepsy; Motor Neurone Disease; or Neurological disorders before he joined the ADF (Yes=1; Otherwise=0). |

Health conditions of serviceman's parents

| | |
|---|--|
| Musculoskeletal system diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for Arthritis; Osteoporosis; or Other joint disorders) (Yes=1; Otherwise=0) |
| Mental and behavioural disorders | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for Depression, Anxiety, PTSD, or Other psychological disorders (Yes=1, Otherwise=0). |
| Circulatory system diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for: Stroke; Angina; Hypertension (or high blood pressure); Heart condition (coronary heart disease); or Heart attack (myocardial infarction) (Yes=1; Otherwise=0). |
| Neoplasms | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for: Skin cancer (excluding melanoma); Melanoma; Soft tissue/organ cancer; Blood/bone cancers (other than acute myeloid leukaemia); Acute myeloid leukaemia (AML); or Tumour (cancerous or benign) |
| Endocrine, nutritional and metabolic diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for: Type 1 Diabetes (childhood onset); Type 2 Diabetes (adult onset) (Yes=1; Otherwise=0). |
| Respiratory system diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for Asthma or Chronic lung disease (e.g. emphysema, chronic bronchitis) (Yes=1; Otherwise=0). |
| Digestive system diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for Liver disease (Yes=1; Otherwise=0). |
| Nervous system diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for Epilepsy; Motor Neurone Disease; or Neurological disorders (Yes=1; Otherwise=0). |

| Variable | Coding |
|-----------------------------------|--|
| Genitourinary system diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for Kidney disease (Yes=1; Otherwise=0). |
| Infectious and parasitic diseases | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for Polio, Tuberculosis, Herpes zoster (Yes=1, Otherwise=0). |
| War-related health conditions | Binary indicator of whether the serviceman's mother or father was diagnosed with or treated for any medical condition connected to their exposure to war (Yes=1, Otherwise=0). |

Source: Vietnam Veterans Family Study.

3.2.2 Comparability of Vietnam veterans and Vietnam-era personnel subsamples

Table 3.3 compares the subsamples of Vietnam veterans and Vietnam-era personnel on a range of pre-deployment characteristics. Although the VEP subsample contains the youngest and oldest survey respondents (at 54 and 97 years), the VEP respondents were younger than the VV by approximately two years. On average, both subsamples first entered the military around the age of 20, although the VV were marginally younger at the time they entered than were their VEP counterparts. These differences are mostly due to the disproportionate number of National Servicemen in the VEP subsample. Whereas just under half of the VV sample was conscripted, almost three in four of the VEP entered the Army through the National Service scheme.

These patterns are broadly consistent with actual patterns of service given that less than one-third of National Servicemen served in the Vietnam War and that the majority of VV entered the military voluntarily. Nonetheless, they raise some potential challenges to any assessment of the intergenerational effects of war service:

- First, it is likely that a larger percentage of the VV had served in conflicts prior to their deployment to Vietnam (for example, in Malaya, Korea and the Second World War). In fact, whereas members of the VEP subsample were more likely to have joined the military during the Vietnam War, one in 10 VV joined the military during the Malayan Emergency (compared to only one in 25 VEP respondents).
- Second, given that National Servicemen were selected at random from the registered population of 20-year-old men, the population of conscripts is

likely to have been more representative of the population from which it was drawn than those who entered the military by other means. In other words, if there were more National Servicemen in the VEP sample we would expect to find differences between the VEP and VV samples even if service in the Vietnam War did not contribute to those differences.

In addition, Table 3.3 reports other differences between the VV and VEP subsamples:

- VV reported having had more jobs prior to their entry into the military than did VEP.
- VV were less likely to describe either of their parents as being affectionate and less likely to have had parents who were caring. They were also more likely to have had overprotective fathers.
- Thirty per cent of VV indicated that at least one of their parents had had a drinking problem, compared with 21 per cent of VEP.
- More than half of the VV and VEP respondents had a parent who had served in the military, but members of the VV sample were slightly more likely to come from a family in which a parent had been in the armed services.
- VV were less likely to have had a parent with cancer.

These pre-existing differences mean that any comparison of these two groups is likely to be biased unless we are able to take account of these differences. Otherwise, this could cause us to overestimate the impact of service in the Vietnam War on these men and their families—not to mention misattribute some of the effects of service in these prior conflicts to the Vietnam War. Multivariate statistical methods may be able to control for some of those differences between the two subsamples, but even then estimates of the impact of being deployed to the war in Vietnam may be biased. The most appropriate solution to this problem is to try to model the deployment process and to use the results of those analyses when estimating the effect of war service.

Table 3.3 Comparability of Vietnam veterans and Vietnam-era personnel subsamples before propensity score weighting

| | Means | | Difference between means |
|---|-------|-------|--------------------------|
| | VV | VEP | |
| Serviceman's age | 66.92 | 64.77 | 2.16*** |
| Military service | | | |
| Serviceman's age when entered military | 20.54 | 20.78 | -0.24* |
| Serviceman's timing of entry into military | | | |
| Second World War | 0.00 | 0.01 | -0.01** |
| Korean War | 0.02 | 0.01 | 0.01 |
| Malayan Emergency | 0.10 | 0.04 | 0.06*** |
| Vietnam War | 0.85 | 0.91 | -0.06*** |
| Serviceman's parent served in military | 0.60 | 0.55 | 0.05* |
| Serviceman's grandparent served in military | 0.31 | 0.30 | 0.01 |
| National Serviceman (1965-1973) | 0.49 | 0.71 | -0.22*** |
| Serviceman's education | | | |
| Highest level of schooling | 0.48 | 0.47 | 0.00 |
| Disciplinary problems | 0.06 | 0.04 | 0.02 |
| Behavioural problems | 0.29 | 0.28 | 0.01 |
| Gifted and talented | 0.09 | 0.11 | -0.03 |
| Learning problems | 0.39 | 0.39 | -0.00 |
| Serviceman's prior employment | 1.64 | 1.39 | 0.25*** |
| Family characteristics during serviceman's childhood | | | |
| Growing up in a single-parent household | 0.06 | 0.05 | 0.01 |
| Parenting (serviceman's mother) | | | |
| Affectionate | 3.09 | 3.20 | -0.11* |
| Caring | 2.02 | 2.20 | -0.18*** |
| Overprotective | 0.93 | 0.89 | 0.04 |
| Parenting (serviceman's father) | | | |
| Affectionate | 2.17 | 2.33 | -0.16** |
| Caring | 1.54 | 1.72 | -0.19*** |
| Overprotective | 0.92 | 0.84 | 0.08* |
| Mother or father had alcohol problem | 0.30 | 0.21 | 0.09*** |
| Pre-existing medical conditions of serviceman | | | |
| Mental and behavioural | 0.02 | 0.01 | 0.00 |
| Musculoskeletal system | 0.02 | 0.03 | -0.01 |
| Circulatory system | 0.01 | 0.02 | -0.01 |
| Neoplasms | 0.01 | 0.01 | -0.00 |

| | Means | | Difference between means |
|--|-------|------|-----------------------------|
| | VV | VEP | |
| Endocrine, nutritional and metabolic | 0.00 | 0.01 | -0.00 |
| Respiratory system | 0.03 | 0.04 | -0.00 |
| Genitourinary system | 0.00 | 0.00 | -0.00 |
| Digestive system | 0.00 | 0.00 | -0.00 |
| Nervous system | 0.06 | 0.06 | -0.00 |
| Health conditions of serviceman's parents | | | |
| Musculoskeletal system diseases | 0.49 | 0.49 | -0.00 |
| Mental and behavioural disorders | 0.23 | 0.21 | -0.03 |
| Circulatory system diseases | 0.71 | 0.75 | -0.04 |
| Neoplasms | 0.49 | 0.55 | -0.06* |
| Endocrine, nutritional and metabolic diseases | 0.12 | 0.11 | 0.01 |
| Respiratory system diseases | 0.28 | 0.25 | 0.04 |
| Digestive system diseases | 0.07 | 0.05 | 0.02 |
| Nervous system diseases | 0.42 | 0.41 | 0.01 |
| Genitourinary system diseases | 0.07 | 0.08 | -0.01 |
| Infectious and parasitic diseases | 0.01 | 0.01 | -0.02 |
| War-related health conditions | 0.00 | 0.01 | -0.00 |

Notes: *** $p < 0.01$; ** $p < 0.01$; * $p < 0.05$.

Source: Vietnam Veterans Family Study.

3.2.3 Propensity score analysis

Propensity score analysis aims to overcome the selection biases commonly encountered in observational research by estimating and taking into account the conditional probability of experiencing an event or intervention of interest. The method is used to match or pair cases with similar chances of experiencing an event (for example, being deployed to Vietnam) based on the factors that might have influenced the chances of experiencing that event. This ensures that people who actually experienced the event are then compared to similar people who did not (Rosenbaum & Rubin 1983). An alternative approach involves weighting cases by the probability of experiencing the event prior to conducting other multivariate analyses. That approach also enables comparisons to be made between samples that are broadly similar to one another. We used the latter approach to weight cases. In contrast to propensity score matching, in which only directly comparable pairs of cases are analysed, propensity score weighting makes use of all cases for which the chances of experiencing the event can be estimated. Thus, by using

propensity score weighting we were able to maximise the size of the estimation sample and use information from as many participating servicemen as possible.

Estimating the probability of belonging to the Vietnam veterans subsample

We conducted a series of statistical analyses on both the randomly selected sample and the full sample (including self-select sample members) and used the results of those analyses to estimate the probability of belonging to the Vietnam Veterans Family Study sample for each serviceman.* We concentrated analyses on the randomly selected sample for two reasons:

- The randomly selected sample was likely to be more representative of the general populations of interest.
- The Vietnam veterans and Vietnam-era personnel who joined the self-select sample were far less similar to each other than the Vietnam veterans and Vietnam-era personnel from the randomly selected sample. Although we were able to use the propensity score analyses to identify comparable VV and VEP servicemen from the randomly selected sample, we were not able to pair the VV from the self-select sample with similar VEP. In other words, we were not able to identify a self-select sample of VEP respondents that was equivalent to the self-select VV sample that participated (in terms of pre-deployment characteristics).

The dependent variable, Vietnam veteran, was binary (coded 1 if the respondent was a member of the VV sample, 0 otherwise). Just over half of the randomly selected sample members (54.34 per cent) were deployed to the war. Despite the fact that the Main Survey asked respondents whether or not they served in Vietnam, we chose to measure deployment based on whether respondents had been selected into the VEP or VV samples because more than 300 respondents (in the full sample) did not complete the question about deployment to Vietnam and because the VV sample was selected from the Nominal Roll of Vietnam Veterans, which provides the most accurate record of veterans who served in the conflict.

* The analyses were conducted using logistic regression. Details of the analytical method and results are reported in Appendix A.

Estimating propensity scores

We used the results of the logistic regression analyses to estimate the predicted probability of belonging to the VV subsample for both Vietnam veterans and Vietnam-era personnel. We then used these results to create propensity score weights for each respondent equal to the inverse probability of belonging to the VV subsample for the Vietnam veterans and the inverse probability of belonging to the VEP subsample for the Vietnam-era personnel. In effect, this scoring method gives more weight to VV whose deployments or membership seemed less likely given their circumstances prior to deployment (for example, they were National Servicemen or their parents had not served in the Army) than it does to those who had high chances of being deployed. In similar respects, it weights VEP whose pre-deployment characteristics might have made them likely candidates for deployment (for example, they volunteered for the Army and entered before the conflict began) higher than those for whom the chances of being sent to Vietnam were very low. At the same time, VV and VEP with equal probabilities of experiencing the alternative outcome (that is, deployment for VEP and non-deployment for VV) are weighted equally. These weights were then applied in subsequent analyses to estimate the average intergenerational effects of deployment on the sons and daughters of the VV and VEP.

Balancing

Table 3.4 compares the VV and VEP subsamples on a range of pre-deployment characteristics after propensity score weighting. Despite some significant pre-existing differences between the VEP and VV samples, the two groups differed on only one pre-deployment characteristic following the application of propensity score weights. The VEP remained marginally older than the servicemen who were deployed to the war; nonetheless, the difference was small (just over one year). These results imply that any differences that emerge between the physical, social and emotional wellbeing of the VV and VEP subsamples and their families are not easily attributable to differences in their pre-deployment circumstances and characteristics.

Table 3.4 Comparability of Vietnam veterans and Vietnam-era personnel subsamples after propensity score weighting

| | Means | | Difference between means |
|---|-------|-------|--------------------------|
| | VV | VEP | |
| Serviceman's age | 66.16 | 66.61 | -0.54 |
| Military service | | | |
| Serviceman's age when entered military | 20.38 | 21.61 | -1.23*** |
| Serviceman's timing of entry into military | | | |
| Second World War | .. | .. | .. |
| Korean War | 0.02 | 0.02 | 0.00 |
| Malayan Emergency | 0.08 | 0.08 | 0.00 |
| Vietnam War | 0.90 | 0.89 | 0.01 |
| Serviceman's parent served in military | 0.58 | 0.60 | -0.01 |
| Serviceman's grandparent served in military | 0.29 | 0.29 | 0.01 |
| National Serviceman (1965-1973) | 0.56 | 0.58 | -0.01 |
| Serviceman's education | | | |
| Highest level of schooling | 0.48 | 0.49 | -0.01 |
| Disciplinary problems | 0.05 | 0.05 | 0.00 |
| Behavioural problems | 0.28 | 0.28 | 0.00 |
| Gifted and talented | 0.11 | 0.10 | 0.01 |
| Learning problems | 0.39 | 0.43 | -0.03 |
| Serviceman's prior employment | 1.60 | 1.59 | 0.01 |
| Family characteristics during serviceman's childhood | | | |
| Single-parent household | 0.01 | 0.01 | 0.00 |
| Parenting (serviceman's mother) | | | |
| Affectionate | 3.24 | 3.24 | -0.02 |
| Caring | 2.12 | 2.13 | 0.00 |
| Overprotective | 0.91 | 0.93 | -0.02 |
| Parenting (serviceman's father) | | | |
| Affectionate | 2.37 | 2.41 | -0.05 |
| Caring | 1.61 | 1.65 | -0.03 |
| Overprotective | 0.87 | 0.89 | -0.02 |
| Serviceman's mother or father had alcohol problem | 0.28 | 0.27 | 0.02 |
| Pre-existing medical conditions of serviceman | | | |
| Mental and behavioural | 0.00 | 0.01 | 0.00 |
| Musculoskeletal system | 0.01 | 0.01 | 0.00 |
| Circulatory system | 0.00 | 0.01 | 0.00 |
| Neoplasms | 0.00 | 0.00 | 0.00 |

| | Means | | Difference between means |
|--|-------|------|-----------------------------|
| | VV | VEP | |
| Endocrine, nutritional and metabolic | .. | .. | .. |
| Respiratory system | 0.03 | 0.03 | 0.00 |
| Genitourinary system | 0.00 | 0.00 | 0.00 |
| Digestive system | .. | .. | .. |
| Nervous system | 0.05 | 0.05 | 0.00 |
| Health conditions of serviceman's parents | | | |
| Musculoskeletal system diseases | 0.53 | 0.54 | 0.00 |
| Mental and behavioural disorders | 0.22 | 0.20 | 0.02 |
| Circulatory system diseases | 0.75 | 0.77 | -0.01 |
| Neoplasms | 0.52 | 0.53 | -0.01 |
| Endocrine, nutritional and metabolic diseases | 0.11 | 0.12 | 0.00 |
| Respiratory system diseases | 0.28 | 0.29 | 0.00 |
| Digestive system diseases | 0.06 | 0.07 | -0.01 |
| Nervous system diseases | 0.41 | 0.44 | -0.02 |
| Genitourinary system diseases | 0.08 | 0.08 | 0.00 |
| Infectious and parasitic diseases | 0.02 | 0.01 | 0.00 |
| War-related health conditions | 0.01 | 0.01 | 0.00 |

.. Not tested: too few cases.

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10.

Source: Vietnam Veterans Family Study.

It should be noted, however, that the usefulness of propensity score analysis in this context depends on the extent to which genuinely comparable VEP and VV sub-populations can be identified. Unless all known and pre-existing differences between the VV and their VEP counterparts are eliminated, any subsequent differences between groups cannot be attributed entirely to the effects of deployment. That said, propensity score analysis enables a substantially more rigorous test of the intergenerational effects of service in the Vietnam War than would be possible using standard multivariate analytical techniques with control variables.

3.3 Representativeness of the veterans subsample

Despite the inclusion of the randomly selected sample of veterans in the study, the final sample of VV and VEP and their families was not chosen at random. Although various factors might have influenced which families and which family members took part in the survey, many might have chosen to participate or not

for reasons connected to their social, physical and mental wellbeing. For example, fathers who experienced posttraumatic stress disorder may have had more troubled relationships with their sons and daughters, and this could have either increased or decreased the willingness of their children to participate in the survey. In that case, the estimates of the effects of war service on the outcomes of veterans and their adult children could be biased. This, combined with non-random response patterns among registered participants, raises the possibility that the survey might not be able to capture the intergenerational effects of service in the Vietnam War.

To respond to these concerns, the Australian Institute of Family Studies investigated two potential sources of selection bias among study members and their families:

- the extent to which the subsample of veterans was representative of the larger population of men who were in the Army and served in the Vietnam War (see Section 3.3.1)
- whether non-participation by the sons and daughters of servicemen might lead us to either under- or over-estimate the impact of war service on veterans and their families (see Section 3.3.2).

In the absence of an independent source that provides information about the full population of VV and VEP families, we relied on the information provided by study participants (servicemen) and their sons and daughters, in addition to the Nominal Roll, to address these sources of selection bias.

3.3.1 Are the Vietnam veterans in Vietnam Veterans Family Study representative compared to the Nominal Roll?

We matched all but one of the 1,058 veterans in the estimation sample to the Nominal Roll, mostly by using the confidential identification numbers provided by the Department of Veterans' Affairs.

The initial linkage with confidential identification numbers was successful in matching all but four survey respondents. Their identification numbers were not on the Nominal Roll. This group formed part of a larger number of respondents the Department of Veterans' Affairs had been unable to match to the Nominal

Roll. In three of these four cases, we were able to identify matches in the Nominal Roll using additional information reported in both the Vietnam Veterans Family Study and the Nominal Roll—sex; date of birth; branch of the military (that is, Army); rank (enlisted, non-commissioned officer or commissioned officer); National Service; and correspondences between their primary roles during their deployment (for example, engineer) and the corps in which they served (for example, Royal Australian Engineers). Only one of the 1,058 respondents could not be matched in this manner. The final estimation sample of 1,057 veterans comprises roughly 2.6 per cent of the surviving male Army veterans listed on the Nominal Roll.*

In order to evaluate the selectivity of our estimation sample, we compared this sample with the larger population of male Army veterans on the Nominal Roll.† Table 3.5 reports some basic descriptive statistics for both the estimation sample and the larger population of male veterans. The table also reports t-statistics for difference of means tests for the two samples. Comparisons are restricted to male veterans who served in the Army during the Vietnam War to reflect the intended focus of the Vietnam Veterans Family Study sample.

On average, the Main Study estimation sample of Vietnam veterans is younger than the population of Vietnam veterans. At 66 years, the mean age of the estimation sample is approximately two years younger than the average age of Vietnam veterans. Although some of this difference may be due to the fact that the names of deceased veterans are not removed from the Nominal Roll, when comparison is limited to the age range of respondents in the estimation sample (that is, 60–86 years) the average age of each of the two groups differs by a little less than two years.

This difference is most likely due to the over-representation of National Servicemen in the study sample. Whereas only 46 per cent of Vietnam veterans were conscripted, 54 per cent of the estimation sample joined the military via the National Service scheme. Given that all conscripts were born between 1945 and

* The Nominal Roll probably overestimates the number of surviving veterans.

† Non-response by Vietnam-era personnel is of less concern because the VEP and their family members are included in the study to provide a comparison (or control) group for the Vietnam veterans and their sons and daughters. Given that the VEP included in the estimation sample are chosen because they are comparable to the VV, it is not necessary that they be representative of the total population of VEP.

1953, the large number of National Servicemen in the study sample may account for the apparently younger age composition of the sample.

Despite the over-representation of conscripts in the study sample, the sample and the larger population of Vietnam veterans did not differ in terms of their service in the war:

- There were as many respondents who served as privates, non-commissioned officers and officers in the study sample as there are on the Nominal Roll of Vietnam Veterans.
- On average, study respondents were deployed to Vietnam for roughly the same length of time as the rest of the veteran population.
- Study respondents were just as likely to have been honoured for their service (for example, mentioned in despatches) as those veterans who were not included in the study.
- The numbers of respondents from each of the major Army corps (for example, Royal Australian Infantry, Royal Australian Engineers and Royal Australian Artillery) were proportional to their numbers in the larger population of veterans.

These patterns suggest that the study sample is broadly representative of the total population of Vietnam veterans. They also suggest that survey respondents were just as likely as other Vietnam veterans to have served in combat roles and to have been exposed to combat-related harms. In fact, Table 3.5 also compares the study sample to the larger veteran population on a rough measure of combat-related harm—the percentage of casualties sustained by each corps. As can be seen, the average (wartime) corps-specific death rate for the Vietnam Veterans Family Study sample, conditional on corps membership, was similar to that of the general Vietnam veteran population—11.9 compared to 11.7 per 1,000.

Table 3.5 Vietnam veterans in the study sample compared to Vietnam veterans on the Nominal Roll

| Characteristics of serviceman | Means | | Difference between means |
|--|----------------------------------|--------------------------|--------------------------|
| | Vietnam veterans on Nominal Roll | Veterans in study sample | |
| Age | 68.15 | 66.76 | 1.39*** |
| Place of birth | | | |
| ACT | 0.00 | 0.00 | 0.00 |
| New South Wales | 0.34 | 0.30 | 0.04* |
| Northern Territory | 0.00 | 0.00 | 0.00***a |
| Queensland | 0.18 | 0.16 | 0.02* |
| South Australia | 0.10 | 0.14 | -0.04*** |
| Tasmania | 0.04 | 0.03 | 0.01* |
| Victoria | 0.23 | 0.27 | -0.04* |
| Western Australia | 0.10 | 0.10 | 0.00 |
| Overseas | 0.17 | 0.15 | -0.02 |
| Service record | | | |
| National Serviceman | 0.45 | 0.54 | -0.09*** |
| Enlisted | 0.53 | 0.55 | -0.02 |
| NCO | 0.37 | 0.35 | 0.02 |
| Officer | 0.09 | 0.10 | 0.00 |
| Corps mortality rate (per 1,000) | 11.7 | 11.9 | 0.2 |
| Honoured | 0.02 | 0.02 | 0.00 |
| Duration of deployments | 309.85 | 314.04 | -4.20 |
| Army corps | | | |
| Royal Australian Infantry | 0.39 | 0.39 | 0.00 |
| Royal Australian Engineers | 0.13 | 0.12 | 0.01 |
| Royal Australian Army Service Corps | 0.09 | 0.08 | 0.01 |
| Royal Australian Artillery | 0.08 | 0.09 | -0.01 |
| Royal Australian Electrical and Mechanical Engineers | 0.07 | 0.08 | -0.02 |
| Royal Australian Corps of Signals | 0.07 | 0.06 | 0.00 |
| Royal Australian Army Ordnance Corps | 0.05 | 0.04 | 0.00 |
| Royal Australian Armoured Corps | 0.04 | 0.05 | -0.01 |
| Australian Army Catering Corps | 0.03 | 0.02 | 0.01 |
| Royal Australian Army Medical Corps | 0.03 | 0.03 | 0.00 |

a. Difference between the proportion of Northern Territorians in the study sample and on the Nominal Roll is negligible but statistically significant due to the size of the Vietnam veteran sample.

Notes: *** $p < 0.01$; ** $p < 0.01$; * $p < 0.05$. Descriptive statistics and the difference of means tests were based on the unweighted estimation sample because weighted estimates are likely to exaggerate differences between the estimation sample and the total veteran population. Propensity score weights amplify the influence of respondents who served in Vietnam but who were less likely to serve given their pre-deployment characteristics (for example, age, National Service).

Source: Vietnam Veterans Family Study.

3.3.2 Representativeness of the subsample of sons and daughters

Family members who participated in the Vietnam Veterans Family Study were recruited via the serviceman with whom they were affiliated. After registering, Vietnam veterans and Vietnam-era personnel were asked to nominate family members who would also be prepared to participate. Those family members were then contacted and invited to participate. Given this method of recruitment, there were at least three potential sources of selection bias in the study sample:

- non-response and/or non-participation by the Vietnam veterans or Vietnam-era personnel
- failure by the Vietnam veterans or Vietnam-era personnel to nominate a family member—that is, non-registration of family members
- non-response and/or non-participation by a registered family member.

As described, the Vietnam veteran subsample is broadly representative of the larger population of Vietnam veterans. Nonetheless, non-response by the Vietnam veterans may have affected the extent to which the study is representative of Vietnam veterans with children. In turn, it may have affected the representativeness of the subsample of sons and daughters if the veterans with children were in any way less likely to participate in the survey than others. In the absence of information about veterans and their families in the broader population, we are unable to assess the degree to which the child subsample may have been affected by the non-response of servicemen.

In order to estimate the impact of service in Vietnam, the more important question is whether the two groups—Vietnam veterans and their Vietnam-era counterparts—differ in their capacity to recruit their adult children to the study. If they do, this may introduce bias into the estimates of the impact of deployment on the sons and daughters of veterans. Table 3.6 shows the average number of (living) sons and daughters per serviceman as reported by the VEP and VV respondents, the average number of sons and daughters who were registered for the study, and the average number of sons and daughters who actually participated. Even though the Vietnam veterans had slightly fewer children than their VEP counterparts, they had roughly the same numbers of sons and daughters register and take part in the survey. As these results might imply, the

percentage of eligible sons and daughters who actually took part in the survey was higher for the Vietnam veterans than for the Vietnam-era personnel.

Table 3.6 Average number of sons and daughters participating in the Main Survey

| | Vietnam-era personnel | Veterans in study sample | Difference |
|--|-----------------------|--------------------------|------------|
| Number of sons and daughters | | | |
| Living | 2.87 | 2.65 | -0.22* |
| Registered | 1.80 | 1.80 | 0.00 |
| Participated | 1.38 | 1.44 | 0.06 |
| Average percentage of service members' sons and daughters who responded to the survey* | 52.42*** | 57.20 | 4.79 |

Note: *** $p < 0.01$; ** $p < 0.01$; * $p < 0.05$.
Source: Department of Veterans' Affairs

That a higher percentage of the sons and daughters of Vietnam veterans took part in the survey raises the possibility that some of the differences that might be observed between the VV and VEP sons and daughters may not be due to differences in the military service records of their fathers. They could be due to other factors that are also related to the differences in their willingness to participate in the survey. Within the families of VV, for example, it is possible that sons and daughters who were experiencing health problems may have participated in the study to a greater degree than their counterparts—the sons and daughters of the VEP. In that case, the survey might indicate that the VV sons and daughters had more extensive health problems merely because those suffering such problems were more likely to take part.

While we cannot test directly for the possibility that differences between the sons and daughters of veterans and non-deployed personnel were due to differences in their tendencies to participate in the survey, we were able to conduct some indirect tests of the effects of any potential selection bias on the results of the main analyses. In particular, we undertook a series of analyses to determine whether a greater proportion of sons and daughters of servicemen participated in the survey if their father reported that one or more of his sons and daughters had experienced a significant health problem. We tested whether the sons and daughters of VV were more likely to participate than VEP sons and daughters if their fathers said that at least one of their children had a health condition. The

results indicate that differences between the participation rates of the sons and daughters of the VV and VEP were much the same in families in which one or more sons and daughters had been diagnosed with any of the health conditions as they were in families in which none of the sons and daughters had those conditions. In other words, any differences that might emerge in the main analyses between the sons and daughters of VEP and VV are not attributable to their differential rates of recruitment.

3.4 Summary

This chapter does the following:

- describes differences between Vietnam veterans and Vietnam-era personnel and shows that after propensity score analysis these differences can be controlled
- compares the analytical sample of Vietnam veterans in the survey to the population of Vietnam veterans using the Nominal Roll of Vietnam Veterans
- tests whether there were systematic differences in the rates of participation in the Main Survey between the sons and daughters of Vietnam veterans and of Vietnam-era personnel.

3.4.1 Differences between Vietnam veterans and Vietnam-era personnel

We tested whether there were differences on 39 variables that may have affected the probability of deployment that were contained in the Main Survey. The 39 variables included military service history, education, prior employment, family characteristics and childhood experiences, pre-existing medical conditions, and the veteran's own parents' health conditions.

There were statistically significant differences on a number of these variables. On average, Vietnam veterans were just over a year older than the Vietnam-era personnel. They were also more likely to have:

- entered the military during prior conflicts—for example, in Malaya, Korea and the Second World War
- been in National Service

- been employed previously
- reported less affectionate and caring parents
- reported more overprotective fathers
- had at least one parent with a drinking problem
- had a parent in the armed services
- no parent diagnosed with cancer.

After adjusting for the probability of belonging to the VV subsample using propensity score weighting, there were no differences between VV and VEP on any of these variables. Any subsequent differences observed between the sons and daughters of VV and VEP, therefore, cannot be attributed to these pre-existing differences.

3.4.2 Comparison of the Vietnam veterans in the study with the population of Vietnam veterans

Using the Nominal Roll we compared Vietnam veterans in the study's analytical sample with the population of Vietnam veterans on a number of relevant variables, and there were few differences. The only exceptions were that, compared with the population of Vietnam veterans, Vietnam veterans in the Vietnam Veterans Family Study were:

- more likely to be National Servicemen
- marginally younger, by just over one year
- more likely to have been born in South Australia or Victoria and less likely to have been born in New South Wales or Queensland.

These patterns suggest that the Vietnam Veterans Family Study sample is broadly representative of the total population of Vietnam veterans.

3.4.3 Differences in the rates of participation in the Main Survey between Vietnam veterans and Vietnam-era personnel

Compared with the sons and daughters of Vietnam-era personnel, the sons and daughters of Vietnam veterans were more likely to take part in the survey (52 per

cent compared with 57 per cent). The key issue, however, is whether the sons and daughters of VV were more likely to participate if they had a health or medical condition. Of 10 mental and physical health conditions, we found no evidence to indicate that the sons and daughters of VV were more likely to participate in the survey if one or more children in their family had been diagnosed with a health condition. Any differences that might be observed between the sons and daughters of VV and VEP, therefore, in terms of their physical and mental health, are unlikely to be due to the higher rates of participation among the sons and daughters of Vietnam veterans.

4 Estimating differences between the sons and daughters of Vietnam veterans and Vietnam-era personnel

This chapter explores whether the sons and daughters of Vietnam veterans experience more adverse mental health, physical health, social functioning and economic wellbeing outcomes compared to the sons and daughters of Vietnam-era personnel. Note that we use ‘serviceman’ and ‘father’ interchangeably, as well as ‘sons and daughters’, ‘children’ and ‘offspring’. When we refer to outcomes for sons and daughters we always refer to outcomes of servicemen’s offspring.

To respond to this question about differences, we estimated the effect of military service in the Vietnam War (relative to military service in the Vietnam era) on sons and daughters using the propensity score weights described in Chapter 3. The total sample size was 2,200, comprising 1,509 sons and daughters of 1,407 VV fathers and 691 sons and daughters of 505 VEP fathers. In the analysis we account for pre-existing differences between the servicemen by using the propensity score weights. We also control for the tendency for most families to include multiple children and the likelihood that children from the same family may have had similar outcomes.*

4.1 Outcome measures

On the basis of the literature review and the availability of the measures collected in the Main Survey, we focused on 34 outcomes from five broad categories. A description of these measures, how they were coded and the questions they consisted of is presented in Table 4.1. All outcome measures were derived from sons’ and daughters’ responses to the Main Survey.

* Results are based on standard errors that are adjusted to reflect possible similarities between children in the same families.

Table 4.1 Outcome measures and prevalence rates among the offspring of VV and VEP fathers

| Variable | Coding and notes |
|---|--|
| Mental health of offspring | |
| Depression | Binary indicator of whether the son/daughter was ever diagnosed with or treated for depression (Yes=1, Otherwise=0). |
| Anxiety | Binary indicator of whether the son/daughter was diagnosed with or treated for anxiety (Yes=1, Otherwise=0). |
| PTSD | Binary indicator of whether the son/daughter was diagnosed with or treated for PTSD (Yes=1, Otherwise=0). |
| Drug use ever | Binary indicator of whether the son/daughter has ever tried marijuana/hashish (Yes=1, Otherwise=0). |
| Drug use last 12 months | Binary indicator of whether the son/daughter has ever used marijuana/hashish in the past 12 months (Yes=1, Otherwise=0). |
| Alcohol use | Current alcohol risk was derived according to National Health and Medical Research Council guidelines separately for sons and daughters. For sons (daughters): up to 4 (2) standard drinks per day were considered as low risk; 5 to 6 (3 to 4) standard drinks per day were considered as risky, and 7 (5) or more drinks were considered as high risk. |
| Low risk | |
| Risky | |
| High risk | |
| Suicidal ideation | Measure of suicidal ideation was derived from five items of the Psychiatric Symptom Frequency Scale (Lindelov, Hardy & Rogers 1997): (1) Have you ever felt that life is hardly worth living? (2) Have you ever thought that you would really be better off dead? (3) Have you ever thought about taking your own life? (4) Have you ever made plans to take your own life? (5) Have you ever attempted to take your own life? |
| No suicidal thoughts | |
| Suicidal thoughts | |
| Suicidal plans/actions | |
| | These five items were reformulated into a composite Guttman-type scale, ranging from never feeling that life was hardly worth living through to attempting to take one's own life, yielding a 0 to 5 rating, respectively. The total score was calculated as a sum of all items and categorised as follows: 0=no suicidal ideation, 1-3=suicidal thoughts, 4 or more =suicidal plans/actions. The reference period was suicidal ideation ever in the lifetime. |
| Pregnancy and birth defects of offspring | |
| Problems conceiving a baby | Binary indicator of whether the son/daughter or a son/daughter's partner has ever experienced difficulties in conceiving a baby (Yes=1, Otherwise=0). |
| Miscarriage | Binary indicator of whether the son/daughter or the son/daughter's partner has ever experienced a pregnancy that ended with miscarriage (Yes=1, Otherwise=0). |
| Stillborn | Binary indicator of whether the son/daughter or the son/daughter's partner has ever had a child who was stillborn (Yes=1, Otherwise=0). |
| Spina bifida | Binary indicator of whether the son/daughter of serviceman had any biological children born with Spina Bifida (Yes=1, Otherwise=0). |

| Variable | Coding and notes |
|--------------------------------------|---|
| Cleft lip/palate | Binary indicator of whether the son/daughter of serviceman had any biological children born with cleft lip/palate (Yes=1, Otherwise=0). |
| Physical health of offspring | |
| Musculoskeletal system | Binary indicator of whether the son/daughter was ever diagnosed with or treated for Arthritis; Osteoporosis; or Other joint disorders) (Yes=1; Otherwise=0) |
| Circulatory system | Binary Indicator Of Whether The Son/Daughter Was Ever Diagnosed With Or Treated For: Stroke; Angina; Hypertension (Or High Blood Pressure); Heart Condition (Coronary Heart Disease); Or Heart Attack (Myocardial Infarction) (Yes=1; Otherwise=0). |
| Neoplasms | Binary indicator of whether the son/daughter was ever diagnosed with or treated for: Skin cancer (excluding melanoma); Melanoma; Soft tissue /organ cancer; Blood/bone cancers (other than acute myeloid leukaemia); Acute myeloid leukaemia (AML); or Tumour (cancerous or benign) |
| Endocrine, nutritional and metabolic | Binary indicator of whether the son/daughter was ever diagnosed with or treated for: Type 1 Diabetes (childhood onset); Type 2 Diabetes (adult onset) (Yes=1; Otherwise=0). |
| Respiratory system | Binary indicator of whether the son/daughter was ever diagnosed with or treated for Asthma or Chronic lung disease (e.g. emphysema, chronic bronchitis) (Yes=1; Otherwise=0). |
| Genitourinary system | Binary indicator of whether the son/daughter was ever diagnosed with or treated for Kidney disease (Yes=1; Otherwise=0). |
| Digestive system | Binary indicator of whether the son/daughter was ever diagnosed with or treated for Liver disease (Yes=1; Otherwise=0). |
| Hearing problems | Binary indicator of whether the son/daughter was ever diagnosed with or treated for hearing problems excluding age-related hearing loss (Yes=1; Otherwise=0). |
| Skin conditions | Binary indicator of whether the son/daughter was diagnosed with or treated for skin conditions (e.g., eczema, psoriasis) (Yes=1; Otherwise=0). |
| Migraines | Binary indicator of whether the son/daughter was ever diagnosed with or treated for migraines (persistent conditions) (Yes=1; Otherwise=0). |
| Sleep disturbance | Binary indicator of whether the son/daughter was ever diagnosed with or treated for sleep condition (e.g., sleep disturbance/insomnia, sleep apnoea) (Yes=1; Otherwise=0). |
| Neurological problems | Binary indicator of whether the son/daughter was ever diagnosed with or treated for neurological disorders including epilepsy or motor neurone disease (Yes=1; Otherwise=0). |

| Variable | Coding and notes |
|--|---|
| Social functioning of offspring | |
| Relationship status | The son/daughter was asked about their current relationship status. |
| Married | |
| De facto | |
| Divorced/separated/widowed | |
| Single | |
| Number of relationships | The son/daughter was asked how many married/de facto relationships he/she has had (any relationship that lasted for 6 months or more). The responses were categorised as follows: none, one, more than one. |
| None | |
| One | |
| More than one | |
| Convict | Binary indicator of whether the son/daughter was ever convicted of criminal offence (Yes=1; Otherwise=0). |
| Victim | Binary indicator of whether the son/daughter was ever a victim of personal violence (Yes=1; Otherwise=0). |
| Economic wellbeing of offspring | |
| Education | The son/daughter was asked about their highest education qualification obtained. |
| School or below | |
| Certificate/diploma | |
| University degree | |
| Employment | Binary indicator of whether the son/daughter was currently employed (Yes=1; Otherwise=0). The indicator was derived from the following question: 'Which of the following best describe the MAIN type of work you currently do?' with the following response options: 1=Working for pay as an employee; 2=Self-employed in own business; 3=Currently unemployed; 4=Studying; 5=Household duties; 6=Caring for a family member (including aged parents or disabled family member); 7=Living with a disability; 8=Retired; 9=I have never worked for pay; 11=Volunteer; 12=Compensation payment; 13=Semi retired; 17=Unclassified. Due to a very small variation across categories 3–13, the responses were dichotomised as follows: responses 1–2 were grouped together (employed) and responses 3–13 were grouped together (not employed). |
| Employment instability | Employment instability was measured by a number of jobs the respondent has held since starting work. The responses were categorised as follows: 1–4 jobs, 5–9 jobs, 10 or more jobs. |
| 1–4 jobs | |
| 5–9 jobs | |
| 10 or more jobs | |

| Variable | Coding and notes |
|--|---|
| Financial stress in the past | Binary indicator of whether the son/daughter has ever experienced a financial stress. Financial stress was defined as shortage of money so he/she could not keep up with payments for water, electricity, etc.; or got behind with the rent or mortgage; or had to pawn or sell something or borrow money from a money lender; or had to ask a welfare agency for food, clothes, etc. (Yes=1; Otherwise=0). |
| Financial stress in the last 12 months | Binary indicator of whether the son/daughter was in financial stress as defined above in the last 12 months (Yes=1; Otherwise=0). |
| Homeless in the past | Binary indicator of whether the son/daughter has ever been homeless. A person was considered homeless if he/she was sleeping in a public place or park or in a vehicle, or was staying in crisis or emergency accommodation because had nowhere else to go, or was living in a hostel or boarding house (Yes=1; Otherwise=0). |
| Currently homeless | Binary indicator of whether the son/daughter was homeless (as defined above) at the time of the interview (Yes=1; Otherwise=0). |

Source: Vietnam Veterans Family Study.

4.2 Results

In order to estimate the impact of service in Vietnam on sons' and daughters' health and wellbeing, we estimated a number of logistic (in the case of a binary outcome) or multinomial (in the case of an outcome with multiple categories) regressions. For every outcome a single model was estimated and all cases were weighted using propensity score weights prior to analysis. Since some fathers may have had more than one child participate in the study, the estimates were also adjusted for sample clustering. Additionally, in every model we accounted for the age and sex of the sons and daughters. The results of the analyses are presented using marginal effects, which we call 'adjusted difference' in the tables. These represent the change in the predicted probability for each outcome associated with a specified change in the explanatory variable while holding all other variables at their average value.

4.2.1 Mental health

Table 4.2 presents the prevalence rate for different mental health outcomes among the sons and daughters of Vietnam veterans and Vietnam-era personnel along with the estimates of the adjusted differences. Among VEP sons and daughters, 14 per cent were ever diagnosed with or treated for depression, 13 per cent for anxiety and 1 per cent for PTSD. The corresponding percentages among

VV sons and daughters were 21 per cent, 22 per cent and 4 per cent. More than 50 per cent of sons and daughters reported having tried marijuana or hashish, although the rate was higher among VV sons and daughters (68 per cent) compared to VEP sons and daughters (56 per cent). Sons and daughters of VV fathers had also reported higher rates of suicidal thoughts as well as specific suicidal plans and/or actions. In particular, 41 per cent of VV sons and daughters reported suicidal thoughts and 12 per cent reported suicidal plans and/actions compared to 31 per cent and 7 per cent of VEP sons and daughters respectively. The majority of sons and daughters had low-risk alcohol intake (62 per cent of VEP sons and daughters and 57 per cent of VV sons and daughters), with around 12 per cent of VEP and 15 per cent of VV sons and daughters having high-risk alcohol intake. The differences between VEP and VV sons and daughters in terms of levels of alcohol use were not statistically significant. There was also no difference in the current level of drug use between VV and VEP sons and daughters.

The prevalence rates of depression, anxiety, PTSD, lifetime drug use and lifetime suicidal ideation were significantly greater among sons and daughters of VV fathers compared to sons and daughters of VEP fathers, even after taking into account the gender and age of sons and daughters. In particular, relative to the sons and daughters of Vietnam-era personnel, the predicted probability of sons and daughters of Vietnam veterans of:

- being diagnosed with or treated for depression was 7 per cent higher
- being diagnosed with or treated for anxiety was 8 per cent higher
- being diagnosed with or treated with PTSD was 3 per cent higher
- engaging in suicidal plans or actions was 5 per cent higher
- having no suicidal ideation was 15 per cent lower.

Table 4.2 Prevalence of mental health outcomes among sons and daughters and adjusted differences, by father’s deployment

| Mental health outcome | VEP (%) | VV (%) | Adj. difference ^a | Sig. | <i>N</i> |
|----------------------------|---------|--------|------------------------------|------|----------|
| Depression | 13.6 | 21.1 | 7.4 | *** | 2,199 |
| Anxiety | 12.9 | 21.8 | 8.7 | *** | 2,199 |
| PTSD | 1.3 | 4.3 | 2.9 | *** | 2,199 |
| Drug use | 55.9 | 68.4 | 12.6 | *** | 2,031 |
| Drug use last 12 months | 17.6 | 18.4 | 1.2 | ns | 1,321 |
| Alcohol use | | | | | 1,847 |
| Low risk | 62.1 | 56.7 | -5.1 | ns | |
| Risky | 26.4 | 28.1 | 1.7 | ns | |
| High risk | 11.5 | 15.1 | 3.4 | ns | |
| Suicidal ideation | | | | | 2,014 |
| No suicidal thoughts | 62.1 | 47.5 | -14.6 | *** | |
| Suicidal thoughts | 31.3 | 40.9 | 9.7 | *** | |
| Suicidal plans and actions | 6.7 | 11.6 | 4.9 | *** | |

ns Not significant.

a. Differences were adjusted for gender and age of sons and daughters.

Notes: Total number of observations varies across models due to missing values. *** $p < .001$; ** $p < .01$; * $p < .05$.

Source: Vietnam Veterans Family Study.

4.2.2 Pregnancy-related outcomes and birth defects

The prevalence rates of pregnancy-related problems and birth defects are presented in Table 4.3. There were no statistically significant differences between the rates of reproductive problems and birth defects among the sons and daughters of Vietnam veterans and Vietnam-era personnel. Around 29 per cent of VEP offspring and 27 per cent of VV offspring experienced problems conceiving a baby, and around 28 per cent of VEP and 32 per cent of VV sons and daughters had had a miscarriage. Approximately 2 per cent of VEP and VV offspring had a stillborn child, and less than 0.4 per cent had a child born with spina bifida or cleft lip or palate.

Table 4.3 Prevalence of pregnancy-related outcomes and birth defects among sons and daughters and adjusted differences, by father's deployment

| Outcome | VEP (%) | VV (%) | Adj. difference ^a | Sig. | N |
|-----------------------------|---------|--------|------------------------------|------|-------|
| Pregnancy and birth defects | | | | | |
| Problems conceiving a baby | 28.6 | 26.7 | -1.7 | ns | 1,385 |
| Miscarriage | 28.3 | 32.4 | 4.0 | ns | 1,385 |
| Stillborn | 2.4 | 1.7 | -0.7 | ns | 1,375 |
| Spina bifida | 0.3 | 0.3 | -0.0 | ns | 1,378 |
| Cleft lip/cleft palate | 0.2 | 0.2 | -0.0 | ns | 1,382 |

ns Not significant.

a. Differences were adjusted for gender and age of sons and daughters.

Notes: Total number of observations varies across models due to missing values. *** $p < .001$; ** $p < .01$; * $p < .05$.

Source: Vietnam Veterans Family Study.

4.2.3 Physical health outcomes

Table 4.4 presents the prevalence rates for different physical health outcomes among the sons and daughters of Vietnam veterans and Vietnam-era personnel. For the majority of the outcomes there were no statistically significant differences between the sons and daughters of Vietnam veterans and Vietnam-era personnel.

The most prevalent diseases were problems of the musculoskeletal system such as arthritis, osteoporosis and other joint disorders (16 per cent of VEP and 19 per cent of VV sons and daughters); the second most common diseases were respiratory illnesses such as asthma, emphysema and chronic bronchitis (14 per cent of VEP and 15 per cent of VV). Around 9 per cent of VEP sons and daughters and 7 per cent of VV sons and daughters had been diagnosed with or treated for a circulatory system disease, and around 7 per cent of VEP and VV sons and daughters had been diagnosed with or treated for cancer. Five per cent of VEP sons and daughters and 7 per cent of VV sons and daughters reported having had hearing problems (other than age-related hearing loss). Less than 5 per cent had diseases of the endocrine, nutritional and metabolic systems (4 per cent of VEP and 3 per cent of VV sons and daughters) and less than 2 per cent reported having been treated for or diagnosed with a disease of the genitourinary (2 per cent of VEP and 1 per cent of VV sons and daughters) or digestive systems (1 per cent of VEP and 0.5 per cent of VV sons and daughters).

There were statistically significant differences observed for the following outcomes: skin problems (14 per cent of VEP sons and daughters; 21 per cent of VV sons and daughters), migraines (7 per cent of VEP sons and daughters; 13 per cent of VV sons and daughters) and sleep disturbances (9 per cent of VEP sons and daughters; 15 per cent of VV sons and daughters). In particular, relative to the sons and daughters of Vietnam-era personnel, the predicted probability of sons and daughters of Vietnam veterans of:

- reporting being diagnosed with or treated for skin problems was 7 per cent higher
- reporting being diagnosed with or treated for migraines was 6 per cent higher
- reporting being diagnosed with or treated for sleep disturbance was 6 per cent higher.

Table 4.4 Prevalence of physical outcomes among sons and daughters and adjusted differences, by father’s deployment

| Physical health outcome | VEP (%) | VV (%) | Adj. difference ^a | Sig. | N |
|--------------------------------------|---------|--------|------------------------------|------|-------|
| Musculoskeletal system | 15.7 | 19.0 | 3.4 | ns | 2,199 |
| Circulatory system | 8.5 | 7.1 | -1.1 | ns | 2,199 |
| Neoplasms | 6.5 | 7.2 | 0.7 | ns | 2,199 |
| Endocrine, nutritional and metabolic | 4.1 | 2.6 | -0.9 | ns | 2,199 |
| Respiratory system | 14.0 | 14.8 | 0.8 | ns | 2,199 |
| Genitourinary system | 1.8 | 0.7 | -0.9 | ns | 2,199 |
| Digestive system | 0.7 | 0.5 | -0.2 | ns | 2,199 |
| Hearing problems | 5.4 | 7.0 | 1.6 | ns | 2,199 |
| Skin problems | 13.9 | 20.5 | 6.5 | *** | 2,199 |
| Migraines | 6.7 | 12.8 | 5.8 | *** | 2,199 |
| Neurological problems | | | 0.7 | ns | 2,199 |
| Sleep disturbance | 8.9 | 14.9 | 6.0 | *** | 2,199 |

ns Not significant.

a. Differences were adjusted for gender and age of sons and daughters.

Notes: Total number of observations varies across models due to missing values. *** p < .001; ** p < .01; * p < .05.

Source: Vietnam Veterans Family Study.

4.2.4 Social functioning

The prevalence rates for social functioning are presented in Table 4.5. The majority of sons and daughters were in married or de facto relationships, although a greater proportion of Vietnam veterans' offspring were in de facto relationships rather than in married relationships. Among VV sons and daughters 57 per cent were married and 19 per cent were in a de facto relationship, whereas among VEP sons and daughters 63 per cent were married and 11 per cent in a de facto relationship. Around 6 per cent of VEP and 8 per cent of VV offspring were divorced or separated. About one-fifth of VEP and VV offspring were single (21 per cent of VEP and 17 per cent of VV sons and daughters). Even though the majority of sons and daughters reported having had only one long-term relationship (62 per cent of VEP and 53 per cent of VV offspring), a greater proportion of VV sons and daughters reported having had more than one long-term relationship (30 per cent of VEP and 36 per cent of VV offspring). Around 10 per cent of sons and daughters reported not having had any long-term relationships (8 per cent of VEP and 11 per cent of VV offspring).

Around one-fifth of the sons and daughters reported being the victim of personal violence at some point in their lives (19 per cent and 22 per cent of the sons and daughters of VEP and VV respectively). The proportions convicted of a criminal offence were 4 per cent among the adult children of Vietnam-era personnel and 7 per cent among those of Vietnam veterans.

The differences were statistically significant with respect to interpersonal relationships but not in terms of experiences of victimisation or conviction of criminal offences. In particular, relative to the sons and daughters of Vietnam-era personnel, the predicted probability of the sons and daughters of Vietnam veterans:

- being in an unmarried cohabiting relationship was 7 per cent higher
- having had more than one marital or cohabiting relationship was 7 per cent higher
- having had only one marital or cohabiting relationship was 10 per cent lower.

Table 4.5 Prevalence of social functioning outcomes among sons and daughters and adjusted differences, by father’s deployment

| Social functioning outcome | VEP (%) | VV (%) | Adj. difference ^a | Sig. | <i>N</i> |
|----------------------------|---------|--------|------------------------------|------|----------|
| Relationship status | | | | | 2,170 |
| Married | 62.5 | 57.0 | -4.9 | ns | |
| De facto | 10.9 | 18.6 | 7.3 | *** | |
| Divorced/separated/widowed | 5.8 | 7.5 | 1.8 | ns | |
| Single | 20.8 | 16.8 | -4.2 | ns | |
| Number of relationships | | | | | 1,859 |
| None | 8.0 | 11.1 | 2.7 | ns | |
| One | 62.4 | 53.2 | -9.6 | ** | |
| More than one | 29.6 | 35.7 | 6.9 | * | |
| Been convicted | 4.1 | 6.7 | 2.3 | ns | 2,011 |
| Been a victim | 19.4 | 21.9 | 2.7 | ns | 2,010 |

ns Not significant.

a. Differences were adjusted for gender and age of sons and daughters.

Notes: Total number of observations varies across models due to missing values. *** $p < .001$; ** $p < .01$; * $p < .05$.

Source: Vietnam Veterans Family Study.

4.2.5 Economic wellbeing

The prevalence rates and marginal effects for economic wellbeing are presented in Table 4.6. Almost a quarter of sons and daughters had only school education or below (23 per cent of VEP and 24 per cent of VV sons and daughters), 28 per cent of VEP sons and daughters and 35 per cent of VV sons and daughters had a certificate or diploma, and 49 per cent of VEP and 41 per cent of VV sons and daughters had a university degree. The majority of sons and daughters (males and females) were employed. Among VEP sons and daughters 74 per cent of females and 95 per cent of males were employed; among VV sons and daughters 77 per cent of females and 91 per cent of males were employed. Around 50 per cent of VEP and 44 per cent of VV sons and daughters have had no more than four jobs since they started working, whereas around 14 per cent of VEP and 17 per cent of VV sons and daughters have had 10 or more jobs. A large proportion of sons and daughters reported ever experiencing financial stress, although VV sons and daughters reported higher rates compared to VEP sons and daughters (33 and 43 per cent respectively). Around 15 per cent of VEP sons and daughters and 18 per cent of VV sons and daughters reported experiencing financial stress in the last 12 months. Four per cent of VEP sons and daughters and 5 per cent of VV sons and

daughters reported being homeless in the past. These rates were considerably lower during the preceding 12 months, with less than 1 per cent of VEP and VV sons and daughters reporting experiences of homelessness.

The differences were statistically significant on several outcomes. Relative to the sons and daughters of Vietnam-era personnel, the predicted probability of sons and daughters of Vietnam veterans of:

- having a university degree was 9 per cent lower
- having a certificate or diploma was 8 per cent higher
- having been in financial stress in the past was 10 per cent higher.

Table 4.6 Prevalence of economic wellbeing outcomes among the sons and daughters and adjusted differences, by father’s deployment

| Economic wellbeing outcome | VEP (%) | VV (%) | Adj. difference ^a | Sig. | <i>N</i> |
|--|---------|--------|------------------------------|------|----------|
| Education | | | | | 2,038 |
| Year 12 or below | 23.3 | 23.9 | 0.9 | ns | |
| Certificate/diploma | 28.0 | 35.3 | 7.6 | ** | |
| University degree | 48.7 | 40.8 | -8.5 | ** | |
| Being employed (females) | 73.5 | 76.7 | 3.1 | ns | 1,322 |
| Being employed (males) | 94.9 | 90.6 | -4.4 | ns | 712 |
| Employment instability | | | | | 2,025 |
| 1-4 jobs | 49.6 | 44.2 | -5.7 | ns | |
| 5-9 jobs | 36.9 | 38.9 | 2.1 | ns | |
| 10 or more jobs | 13.5 | 16.9 | 3.6 | ns | |
| Financial stress in the past | 32.8 | 43.1 | 10.3 | *** | 1,824 |
| Financial stress in the last 12 months | 14.6 | 18.3 | 3.8 | ns | 1,993 |
| Homeless in the past | 3.7 | 5.4 | 1.8 | ns | 1,804 |
| Homeless in the last 12 months | 0.8 | 0.7 | -0.2 | ns | 2,007 |

ns Not significant.

a. Differences were adjusted for gender and age of sons and daughters.

Notes: Total number of observations varies across models due to missing values. *** $p < .001$; ** $p < .01$; * $p < .05$.

Source: Vietnam Veterans Family Study.

4.3 Summary

After adjustment was made for pre-existing differences among fathers, the sons and daughters of Vietnam veterans were found to have experienced poorer

outcomes on a number of health and wellbeing indicators compared to sons and daughters of Vietnam-era personnel. The main differences were observed in mental health outcomes (depression, anxiety, PTSD and suicidal ideation), stress-related physical health outcomes (skin conditions, migraines and sleep disturbance), ability to maintain intimate relationships, education, and the experiencing of financial stress. Note that in this analysis we accounted for the age and gender of sons and daughters but did not account for any other related covariates, such as sons' and daughters' problems at school, family environment when they were growing up, or other characteristics of their fathers (for example, PTSD or mental or physical health). These possible mechanisms of the intergenerational impact of deployment are discussed in Chapter 5.

5 Estimating the mechanisms of the intergenerational impact of deployment

Previous research (see the introduction to Chapter 2 for details) suggests that the effect of deployment on sons' and daughters' health and wellbeing is likely to be explained by the serviceman's own PTSD, which in turn can affect the servicemen's mental and physical health, sons' and daughters' childhoods, and family functioning after deployment. These can all have a long-term effect and lead to poor health and wellbeing outcomes for sons and daughters in adult life.

To understand the impact of possible mechanisms of deployment on sons' and daughters' health and wellbeing, in this chapter we examine a number of specific hypotheses regarding the intergenerational effects outlined in the literature. Figure 5.1 summarises the expected associations. We used the matched sample obtained in the propensity score matching analysis of 2,200 sons and daughters of 1,912 fathers.

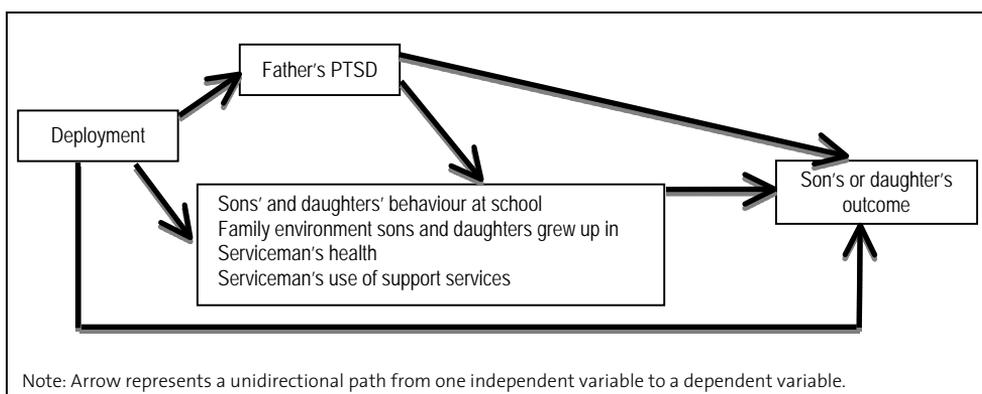


Figure 5.1 Theoretical model of the impact of deployment on offspring's outcome

It should be noted that the survey data were collected at a specific point in time and, although the information on explanatory variables was collected retrospectively, the timing of events and conditions cannot be ascertained. These results are, therefore, correlational and suggestive rather than implying causation.

5.1 Covariates

As in the analysis in Chapter 4, the explanatory measures for the current analysis were selected based on the literature review and the availability of these measures in the Main Survey. The selected covariates covered four broad areas:

- sons' and daughters' experiences at school
- family functioning when sons and daughters were growing up
- the serviceman's health
- support services used by servicemen.

Following is a description of these measures, how they were coded and the questions of which they consisted. We also briefly report on statistically significant differences on these measures between sons and daughters of Vietnam veterans and sons and daughters of Vietnam-era personnel after adjusting for sample selectivity only.

5.1.1 School experiences

The measures of child experiences at primary and secondary school, which are based on questions answered by the adult children of the servicemen, are presented in Table 5.1. The table shows that the sons and daughters of Vietnam veterans were more likely to have had disciplinary, behavioural and learning problems at school compared to the adult children of the Vietnam-era personnel. These differences were statistically significant. In particular, compared to VEP offspring, the VV sons and daughters were more likely to:

- report being suspended or expelled from primary or secondary school—33 versus 43 per cent
- report being absent for more than 10 per cent of days in a school year or being bullied at school—5 versus 10 per cent
- have repeated a year, been placed in a remedial class, dropped out of a course, or worked with a psychologist or counsellor to receive assistance with learning difficulties—31 versus 38 per cent.

There were no differences observed between VEP and VV sons and daughters in the proportion of sons and daughters who jumped ahead a year or were placed in a gifted class in primary or secondary school.

Table 5.1 Measures of VEP and VV sons’ and daughters’ experiences at school and corresponding prevalence rates

| Variable | Coding and notes | VEP offspring (%) | VV offspring (%) | N |
|-----------------------|--|-------------------|------------------|-------|
| Disciplinary problems | Binary indicator of whether the respondent was suspended or expelled from primary or high school (Yes=1, Otherwise=0). | 33.0 | 43.1** | 2,200 |
| Behavioural problems | Binary indicator of whether the respondent was absent for more than 10 per cent of days in a school year or was bullied at school or institution (Yes=1, Otherwise=0). | 4.9 | 10.3** | 2,200 |
| Learning problems | Binary indicator of whether the respondent repeated a year (including failing exams); worked with a psychologist, counsellor, or specialist teacher to assist with a learning difficulty; was placed in a remedial class; or dropped out of a course (Yes=1, Otherwise=0). | 30.8 | 38.1* | 2,200 |
| Gifted and talented | Binary indicator of whether the respondent jumped ahead a year or was placed in a gifted class in primary or high school (Yes=1, Otherwise=0) | 22.8 | 18.4 | 2,200 |

Notes: Total number of observations varies across models due to missing values. *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

5.1.2 Family functioning

The sons and daughters were asked about their experiences while they were growing up (0–16 years) (see Table 5.2). Around 12 per cent of VEP and 11 per cent of VV sons and daughters experienced parental separation before they reached 16 years. One in four of VEP (25 per cent) and VV (26 per cent) offspring reported growing up with a father who had alcohol and/or drug problems, and 6 per cent of VEP and 5 per cent of VV offspring reported growing up with a mother who had these problems, although these differences were not statistically significant. There were also no differences in mother’s parenting style between VEP and VV sons and daughters. The mean score on mother’s warm parenting was 2.23 for VEP sons and daughters and 2.20 for VV sons and daughters, and the mean score on mother’s overprotective parenting was 1.11 for VEP sons and daughters and 1.22 for VV sons and daughters.

Table 5.2 Measures of family functioning when son or daughter was growing up (0–16 years) and corresponding prevalence rates among VEP and VV sons and daughters

| Variable | Coding and notes | VEP offspring (%) | VV offspring (%) | N |
|---|---|-------------------|------------------|-------|
| Harsh parenting | Binary indicator of whether anything from the following applied to the respondent's childhood (0–16 years): | 9.1 | 23.0*** | 2,200 |
| | 'I was verbally abused by a parent.' | 2.7 | 13.5*** | |
| | 'I received too much physical punishment—hitting, smacking, etc.' | 4.9 | 11.9*** | |
| | 'I suffered humiliation, ridicule, bullying or mental cruelty from a parent.' | 3.5 | 9.9*** | |
| | 'I was physically abused by a parent—punched, kicked, hit or beaten with an object, or needed medical treatment.' | 3.1 | 5.2 | |
| | 'I witnessed physical or sexual abuse of others in my family.' | 3.8 | 6.3 | |
| Parental separation | Binary indicator of whether respondent's parents divorced or permanently separated while the respondent was growing up (Yes=1, Other=0) | 12.4 | 11.3 | 2,160 |
| Serviceman had alcohol problem | Binary indicator of whether the respondent's father had trouble with alcohol or other drug use (Yes=1, Otherwise=0). | 24.5 | 25.9 | 2,138 |
| Mother had alcohol problem | Binary indicator of whether the respondent's mother had trouble with alcohol or other drug use (Yes=1, Otherwise=0). | 6.1 | 5.0 | 2,156 |
| | | Mean (SE) | | |
| Serviceman caring | Mean score of 3 items: | 1.92 | 1.64* | 2,152 |
| | 'My father seemed emotionally cold to me.' (reverse coded) | (0.04) | (0.03) | |
| | 'My father appeared to understand my problems and worries.' 'My father could make me feel better when I was upset.' | | | |
| Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high parental warmth. | | | | |

| Variable | Coding and notes | VEP offspring (%) | VV offspring (%) | N |
|---------------------------|---|-------------------------|------------------------|-------|
| Mother caring | Mean score of 3 items: 'My mother seemed emotionally cold to me.' (reverse coded) 'My mother appeared to understand my problems and worries.' 'My mother could make me feel better when I was upset.' Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high parental warmth. | 2.23 (0.07) | 2.20 (0.03) | 2,150 |
| Serviceman overprotective | Mean score of 4 items: 'My father liked me to make my own decisions.' (reverse coded) 'My father tried to control everything I did.' 'My father tended to baby me and tried to protect me from everything.' 'My father gave me as much freedom as I wanted.' (reverse coded) Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high protectiveness. | 1.01 (0.03) | 1.14* (0.02) | 2,150 |
| Mother overprotective | Mean score of 4 items: 'My mother liked me to make my own decisions.' (reverse coded) 'My mother tried to control everything I did.' 'My mother tended to baby me and tried to protect me from everything.' 'My mother gave me as much freedom as I wanted.' (reverse coded) Items recorded on 4-point scale ranging from 0 to 3 and coded so that high scores reflect high protectiveness. | 1.11 (0.03) | 1.22 (0.02) | 2,151 |

Notes: Total number of observations varies across models due to missing values. *** $p < .001$; ** $p < .01$; * $p < .05$.
Source: Vietnam Veterans Family Study.

The main differences between the sons and daughters of Vietnam veterans and Vietnam-era personnel concerned their experiences of harsh parenting and the parenting styles of their fathers. Twenty-three per cent of VV sons and daughters reported that they experienced at least one of five indicators of harsh parenting during their childhood compared to 9 per cent of VEP sons and daughters. It is worth noting that, by examining the harsh parenting indicators separately, it can be seen that the sons and daughters of Vietnam veterans were likely to report

higher rates of verbal abuse, physical punishment, humiliation, bullying or mental cruelty by one of their parents, whereas rates of severe physical abuse (such as being punched, kicked, hit or beaten with an object or needing medical treatment) or witnessing physical or sexual abuse of others in the family were much lower and were not statistically different from those for the offspring of Vietnam-era personnel. In relation to the parenting styles of their fathers, the sons and daughters of Vietnam veterans reported lower levels of paternal warmth (mean=1.64) and higher levels of overprotectiveness (mean = 1.14) compared to the sons and daughters of Vietnam-era personnel (mean = 1.92 and 1.01 respectively).

5.1.3 Servicemen's health

Table 5.3 shows various indicators of health for the Vietnam veterans and their VEP counterparts. These measures were derived from survey questions that were answered by the fathers—the VV and VEP who agreed to participate in the study.

As can be seen, Vietnam veterans whose sons and daughters participated in the study were more likely to have been diagnosed with or treated for a number of health conditions than were the Vietnam-era personnel. Almost one in two VV offspring had a father diagnosed with or treated for depression or anxiety compared to around one in five of VEP offspring. Around 40 per cent of VV offspring also had their father experiencing PTSD symptoms compared to only 5 per cent of VEP offspring. A greater proportion of VV sons and daughters had fathers with skin conditions (32 per cent) and sleep disturbances (50 per cent) compared to VEP sons and daughters (20 per cent for both).

It is worth noting some of the factors associated with the measurement of PTSD. We used the PTSD Check List – civilian version (PCL-C) in our analyses, a standardised self-report measure consisting of 17 items that reflect standard PTSD symptoms (Blanchard et al. 1996). The PCL-C asks respondents to indicate the extent to which they experienced specific symptoms (for example, repeated disturbing memories, thoughts or images of a stressful experience) in the month prior to completion of the survey. We used the PCL-C to try to account for the effects of deployment on a range of child outcomes, many of which occurred long before the month prior to the interview (for example, 'Have you ever ... made plans to take your own life?'). It is possible that this violates an important criterion

for establishing causal relationships—that independent variables precede the outcome of interest. Whether it does depends on whether the onset of PTSD symptoms measured in the month prior to the survey was likely to have occurred prior to the other outcomes of interest.

Table 5.3 Measures of servicemen’s health and corresponding prevalence rates among VEP and VV sons and daughters

| Variable | Coding and notes | VEP offspring (%) | VV offspring (%) | N |
|-------------------|---|-------------------|------------------|-------|
| Depression | Binary indicator of whether the serviceman (as reported by serviceman himself) was diagnosed with or treated for depression (Yes=1; Otherwise=0). | 17.8 | 47.0*** | 2,200 |
| Anxiety | Binary indicator of whether the serviceman father (as reported by serviceman himself) was diagnosed with or treated for anxiety (Yes=1; Otherwise=0). | 19.5 | 47.4*** | 2,200 |
| PTSD | Binary indicator of whether the serviceman (as reported by serviceman himself) has a PTSD (Yes=1 (score 50–85); Otherwise=0 (score 1–49)). A PTSD was assessed using the Post-Traumatic Stress Disorder Check List – Civilian version (PCL-C)—a standardised self-report measure for symptoms of PTSD (Blanchard et al. 1996). The PCL comprises 17 items that correspond to the key symptoms of PTSD (anxiety, intrusive thoughts, etc.). Items recorded on 5-point scale from 1 to 5 and a total score is computed by adding the 17 items, with possible scores ranging from 17 to 85. A cut-off of 50 is used to identify those respondents who have a PTSD diagnosis. | 5.0 | 38.2*** | 2,176 |
| Skin conditions | Binary indicator of whether the serviceman (as reported by serviceman himself) was diagnosed with or treated for skin conditions (e.g., eczema, psoriasis) (Yes=1; Otherwise=0). | 20.2 | 31.8*** | 2,200 |
| Migraines | Binary indicator of whether the serviceman (as reported by serviceman himself) was diagnosed with or treated for migraines (persistent conditions) (Yes=1; Otherwise=0). | 5.7 | 9.5 | 2,200 |
| Sleep disturbance | Binary indicator of whether the serviceman (as reported by serviceman himself) was diagnosed with or treated for sleep condition (e.g., sleep disturbance/insomnia, sleep apnoea) (Yes=1; Otherwise=0). | 19.9 | 50.1*** | 2,200 |

Notes: Total number of observations varies across models due to missing values. *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

There is some evidence that the prevalence of posttraumatic stress disorder changes over time. Some people experience the first onset of symptoms months or even years after an event, while others may find that their symptoms abate over time (Long et al. 1996; Schlosberg & Strous 2005). In a recent review of studies examining the progression of PTSD Santiago and colleagues (2013) suggested that the progression of PTSD could vary in accordance with the nature of the traumatic events that precipitated it. In particular, they found that studies examining PTSD symptomology following non-intentional events (for example, traffic accidents, natural disasters) were more likely to report declines in the prevalence of PTSD among untreated populations. By contrast, studies that examined the progression of PTSD in the aftermath of intentional events (for example, combat exposure, criminal victimisation) were more likely to report increases in its prevalence over time (Santiago et al. 2013). Long-term prospective longitudinal studies of PTSD among survivors of intentional events are rare, but those studies that have been conducted indicate that individual trajectories of PTSD are highly variable and may reflect patterns of remission, remission followed by relapses, and late onset even 20 years after the event (Horesh et al. 2013; Solomon & Mikulincer 2006; Schlosberg & Strous 2005). Although most sufferers develop the condition within a year of experiencing an intentional traumatic event, up to one-fifth of those who initially escape symptoms may still develop them years later (Solomon & Mikulincer 2006; Horesh et al. 2013).

Using the PCL-C to measure posttraumatic stress disorder symptoms, therefore, may not provide an accurate estimate of which veterans were suffering from PTSD when their sons and daughters were younger. Some veterans who were classified as having PTSD may have first experienced symptoms only recently, while others who had experienced few symptoms in the month before they completed the survey may have had severe symptoms for years previously. One consequence is that our estimates may not reflect the full effects of PTSD on the sons and daughters of veterans because, first, in the case of late-onset PTSD, sons and daughters whose fathers were classified as having PTSD would not have been exposed to the condition and, second, in the case of remission, sons and daughters who were exposed to their father's symptoms may not have been recognised as having been exposed. This makes our tests of the effects of PTSD on the life outcomes of the veterans' sons and daughters conservative and implies

that some of the apparent effects of deployment could still reflect some of the traumas experienced by servicemen.

The Main Survey asked respondents whether they had ever been diagnosed with PTSD at some time in their lives, but that measure is unlikely to overcome this problem. First, diagnosis of PTSD was not included in the *Diagnostic and Statistical Manual* in 1980, which means that few veterans would have been diagnosed with PTSD at the time they first began to experience its symptoms. This is confirmed by the Main Survey, which shows that less than 5 per cent of respondents ever diagnosed with PTSD were diagnosed before they turned 30. Second, whether and when a veteran is diagnosed with a psychiatric disorder can reflect his decision to seek help as well as the ability of the mental health professionals he consults to recognise the condition. As knowledge of PTSD among the community has grown, it is likely that the accuracy of diagnosis has improved markedly. For these reasons, having previously been diagnosed with PTSD is not necessarily a more accurate measure of whether a veteran was experiencing PTSD symptoms at the times he was living with his sons and daughters and therefore whether his sons and daughters were exposed to it. It is useful, however, as a source of indirect evidence of both change and stability in the prevalence of PTSD among the veterans sample, which could be the result of both remission (temporary or complete) and late-onset PTSD. Two-thirds of Vietnam veterans stated that they had been diagnosed with PTSD at some point in their life; of them, only 51.1 per cent were classified as having PTSD using the PCL-C, while 6.0 per cent of respondents classified with PTSD at the time of the survey had not received any such diagnosis.

5.1.4 Servicemen's use of support services

A description of support services that were used by servicemen is provided in Table 5.4. It can be seen that, while there were no differences in the proportions of VEP and VV offspring with fathers who used the support of extended family or friends, a greater proportion of VV sons and daughters had fathers who used military-related and health-related support services. Around 80 per cent of VV sons and daughters had fathers who ever used the Veterans and Veterans Families Counselling Service, DVA websites and resources or ex-service organisations, and 86 per cent had fathers who used the services of a general

practitioner or medical services compared to 29 and 66 per cent of VEP sons and daughters respectively.

5.1.5 Control variables

There were no statistically significant differences in gender and age distribution between offspring of Vietnam veterans and Vietnam-era personnel (see Table 5.5). The average age of VV sons and daughters was 37.4 years compared to 37.7 years of VEP sons and daughters.

5.2 Analytical approach

The best way to test for mediation with multiple mediators would be to use a structural equation modelling (SEM) technique that has been implemented in a number of statistical packages (for example, the structural equation modelling module in LISREL, lavaan or mediation modules in R, sem or gsem modules in Stata or AMOS in SPSS). However, due to the specific characteristics of the data and variables of interest, none of these packages was easily adaptable for the purpose of the proposed analysis. First, the majority of SEM modules are developed only for continuous mediators and dependent variables. In our case all the mediators and dependent (outcome) variables are either binary or categorical measures. Second, those SEM modules that do allow binary mediators and outcome measures do not allow the use of probability weights. In our analysis the use of probability weights is essential as it accounts for the pre-existing differences between Vietnam veterans and Vietnam-era personnel (see Section 3.2.2). As a result, we decided to employ the classic Baron and Kenny mediation approach and test for mediation in steps using a series of logistic regressions (Baron & Kenny 1986; Mackinnon et al. 2002).

Table 5.4 Measures of services used by servicemen and corresponding prevalence rates among VEP and VV sons and daughters

| Variable | Coding and notes | VEP offspring (%) | VV offspring (%) | N |
|---------------------------|---|-------------------|------------------|-------|
| Social support | Binary indicator of whether the serviceman (as reported by serviceman himself) has ever used support of extended family and/or support of social networks (friends, mates) (Yes=1; Otherwise=0). | 83.8 | 85.4 | 2,200 |
| Military-related services | Binary indicator of whether the serviceman (as reported by serviceman himself) has ever used any of the following services: (1) Veterans and Veterans Families Counselling Service; (2) DVA websites (e.g., the <i>At Ease</i> website) and resources (e.g. fact sheets); or (3) Ex-service organisations (Yes=1; Otherwise=0). | 28.5 | 77.6*** | 2,200 |
| Health-related services | Binary indicator of whether the serviceman (as reported by serviceman himself) has ever used any of the following services: (1) General Practitioner (GP) or/and (2) Medical service(s) other than a GP (Yes=1; Otherwise=0). | 66.0 | 86.0*** | 2,200 |

Notes: Total number of observations varies across models due to missing values. *** p < .001; ** p < .01; * p < .05. Source: Vietnam Veterans Family Study.

Table 5.5 Gender and age distribution among VEP and VV sons and daughters

| | VEP offspring (%) | VV offspring (%) | N |
|------------------|-------------------|------------------|-------|
| Gender | | | 2,200 |
| Female | 63.4 | 63.1 | |
| Male | 36.6 | 36.9 | |
| Age | | | 2,200 |
| 20–29 years | 10.3 | 8.9 | |
| 30–39 years | 57.8 | 53.7 | |
| 40–49 years | 27.9 | 34.5 | |
| 50–59 years | 3.7 | 2.7 | |
| 60 years or more | 0.4 | 0.1 | |

Notes: Total number of observations varies across models due to missing values. *** p < .001; ** p < .01; * p < .05. Source: Vietnam Veterans Family Study.

There were a number of core steps to the analysis presented in this section:

Step 0. This is a preliminary step that examines the relationship between an outcome measure and every single covariate without adjusting for any relationship other than age and gender.

Step 1. The aim of the first step was to examine whether the father's PTSD mediated the effect of deployment on sons' and daughters' outcomes using the Baron and Kenny mediation approach.

Step 2. The aim of the second step was to examine whether the effect of the father's PTSD on sons' and daughters' outcomes was mediated by any of the following covariates: sons' and daughters' behaviour at school, family functioning, father's health, and father's service use.

Step 3. The aim of the third step was to examine whether the father's PTSD mediated the effect of deployment on any of the explanatory covariates of interest.

Step 4. The aim of the fourth step was to examine the effect of deployment on sons' and daughters' outcomes while controlling for all significant paths identified in the three previous steps.

The preliminary, first, second and third steps represent the supplementary exploratory analysis. The aim was to identify the direct and indirect influences of different factors on sons' and daughters' outcomes. A series of logistic (in the case of binary outcomes) or multinomial (in the case of outcomes with multiple categories) regressions was performed and all significant indirect relationships were tested using the Sobel test, which was adapted for binary mediator and outcome measures by Nathaniel Herr (n.d.). As these are supplementary analyses, the results are omitted from the detailed discussion in this section and are presented in Appendix B.

In the fourth step we included all the significant direct paths from independent variable (deployment) and mediators (father's PTSD and other covariates) to dependent variable (outcome) from previous models (fitted at steps 0 to 3) and examined whether these relationships held after controlling for deployment and all mediators together. The significant results of these models for every outcome

are presented in the figures that follow. The results of full models are presented in Appendix B. This step-wise approach was used to explore whether the association between deployment and sons' and daughters' outcomes alters following the inclusion of different groups of factors.

The four-step analysis was run for every outcome of interest (that is, 11 outcomes, as identified in the stage 1 analysis), although step 3 was identical for all outcomes. In every model we controlled for sons' and daughters' age and gender and adjusted for probability weights and interdependence between sons and daughters of the same fathers.

5.3 Results

5.3.1 Mental health

For mental health we examined the mechanisms of deployment for the following outcomes: depression, anxiety, sons' and daughters' PTSD, lifetime drug use and suicidal ideation.

Depression

To estimate whether the effect of father's deployment on sons' and daughters' depression was fully or partially influenced, the following variables were included in the full model (inclusion of variables was based on the results of steps 0 to 3):

- deployment and father's PTSD
- sons' and daughters' problems at school—behavioural, disciplinary and learning problems
- family environment—father's and mother's warm parenting, mother being overprotective and harsh parenting
- father's health—depression, anxiety, sleeping problems, migraines and skin conditions
- services used by the serviceman—social support, military-related services and health-related services.

Figure 5.2 presents the results of the full model, with only the significant paths included. We also controlled for the child's age and gender. While there was no age effect, females were more likely than males to be diagnosed with or treated for depression.

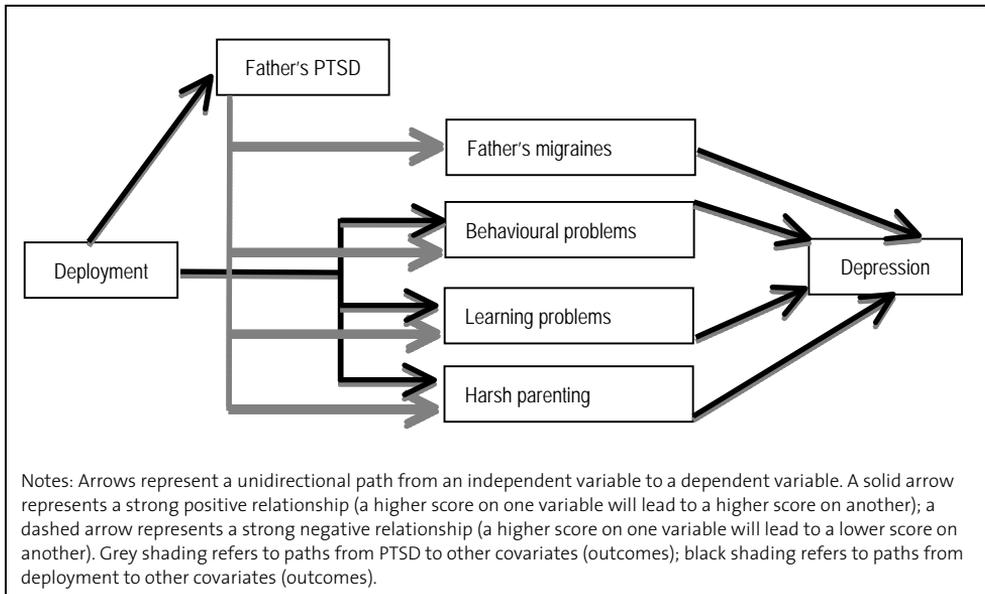


Figure 5.2 Model of depression among sons and daughters: significant paths

One of the relationships of substantive interest was the relationship between the father's deployment and the child's depression. While there was no direct effect between father's deployment and child's depression, the deployment effect was fully mediated by a number of different paths. Consistent with previous research, the impact of father's deployment was mediated by father's PTSD (strong positive relationship between father's deployment and PTSD), which, in turn, was mediated by the child's learning and behavioural problems at school, whether the father had migraines, and the child's experiences of harsh parenting (strong positive relationships between father's PTSD and other covariates). The effect of father's deployment was not only explained through PTSD but also directly through sons' and daughters' behavioural problems and experience of harsh parenting. To sum up, fathers who were deployed were more likely to develop PTSD. In turn, sons and daughters of fathers with PTSD were more likely

to have learning and behavioural problems at school and experience harsh parenting; as a result, these sons and daughters were more likely to be diagnosed with or treated for depression.

Now we consider the relationship between father's PTSD and sons' and daughters' depression. As for deployment, there was no direct relationship between the father's PTSD and his offspring's depression; rather, the effect of the father's PTSD was fully explained by a number of pathways (father's PTSD → father's migraine → depression; father's PTSD → behavioural problems → depression; father's PTSD → harsh parenting → depression).

Anxiety

Based on the results of steps 0 to 3, the following variables were included in the full model:

- deployment and father's PTSD
- sons' and daughters' problems at school—behavioural, disciplinary and learning problems
- family environment—father's and mother's warm parenting, father being overprotective, and harsh parenting
- father's health—depression, anxiety, sleeping problems and skin conditions
- services used by serviceman—social support and military-related services.

The results of the full model, with only significant paths included, are presented in Figure 5.3. There was no influence of gender or age in this model.

The pathways from deployment to anxiety were similar to the ones described for depression, the only difference being whether the father was diagnosed with or treated for migraines. This was not associated with sons' and daughters' anxiety.

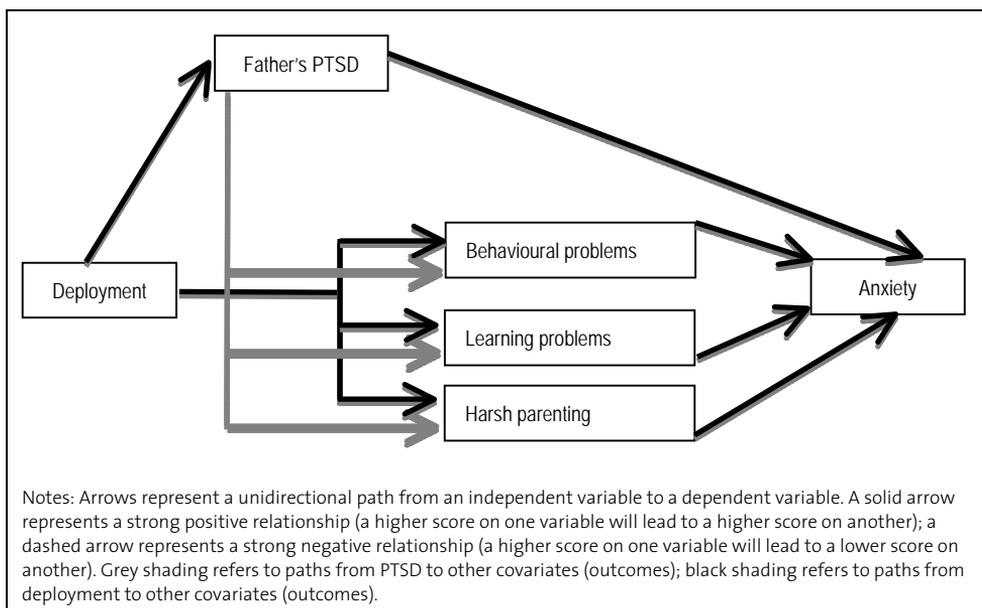


Figure 5.3 Model of anxiety among sons and daughters: significant paths

In addition to these indirect influences, a significant positive relationship was observed between PTSD among the servicemen and whether their sons and daughters had been diagnosed with or treated for anxiety. These results suggest that the effect of fathers' PTSD on anxiety among their sons and daughters was only partially explained by their offspring's behavioural and learning problems or childhood experiences of harsh parenting.

Posttraumatic stress disorder

To estimate whether the effect of deployment on sons' and daughters' PTSD was explained by other variables, the following variables were included in the full model (the inclusion of variables was based on the results of the steps 0 to 3 analyses):

- deployment and father's PTSD
- sons' and daughters' problems at school—behavioural, disciplinary and learning problems
- family environment—father's and mother's warm parenting, father and mother being overprotective, and harsh parenting

- father’s health—depression, anxiety and skin conditions
- services used by serviceman—military-related services.

The results of the full model, with only significant paths included, are presented in Figure 5.4. There were no differences in PTSD between sons and daughters or between offspring of different ages. The effect of deployment was fully explained by other factors. In particular, the main pathways of deployment influence on sons’ and daughters’ PTSD were through PTSD and sons’ and daughters’ behavioural problems and their experience of harsh parenting. There was also no direct effect of father’s PTSD on offspring’s PTSD. This effect was also fully explained by sons’ and daughters’ behavioural problems and their experience of harsh parenting.

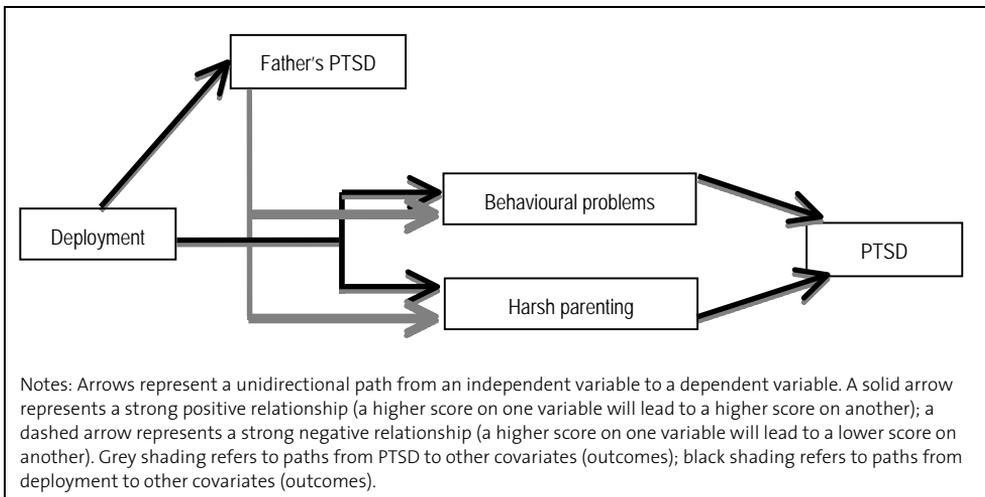


Figure 5.4 Model of PTSD among sons and daughters: significant paths

Lifetime drug use

To estimate whether the effect of deployment on lifetime drug (marijuana, hashish) use was explained by other variables, the following variables were included in the full model (the inclusion of variables was based on the results of the steps 0 to 3 analyses):

- deployment
- sons’ and daughters’ problems at school—behavioural, disciplinary and learning problems

- family environment—father’s and mother’s warm parenting, father being overprotective, and harsh parenting
- father’s health—depression, anxiety, sleeping problems and skin conditions
- services used by serviceman—social support and military-related services.

The following mechanisms of the impact of deployment were observed when modelling whether sons and daughters ever tried marijuana or hashish (see Figure 5.5). The impact of father’s deployment on increased lifetime drug use among sons and daughters was only partially explained by problems at school and experience of harsh parenting. There were no direct or indirect influences of father’s PTSD on their sons’ and daughters’ drug use. There was also no influence of gender or age on offspring’s lifetime drug use.

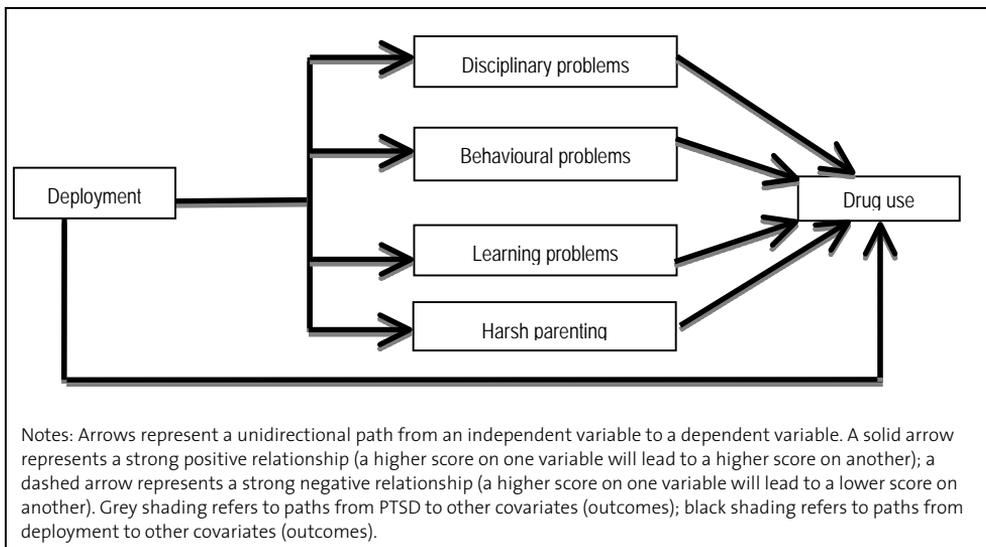


Figure 5.5 Model of lifetime drug use among sons and daughters: significant paths

Suicidal ideation

To estimate whether the effect of deployment on suicidal ideation was explained by other variables, the following variables were included in the full model (the inclusion of variables was based on the results of the steps 0 to 3 analyses):

- deployment and father’s PTSD

- sons' and daughters' problems at school—behavioural, disciplinary and learning problems
- family environment—father's and mother's warm parenting, father and mother being overprotective, harsh parenting, parental separation and mother's alcohol/drug abuse
- father's health—depression, anxiety, migraines and sleeping problems
- services used by serviceman—military-related services.

The results of the full model are presented in Figure 5.6. Since suicidal ideation was an outcome measure with multiple categories, 'no suicidal ideation' was the reference category. We also took into account the age and gender of offspring. While there was no difference between males and females, younger offspring were less likely to report suicidal thoughts or engage in suicidal plans and/or actions.

There was no direct effect of father's deployment on suicidal ideation: it was fully explained by father's PTSD and other factors. Father's deployment was strongly and positively related to experience of harsh parenting and behavioural and learning problems at school and strongly and negatively related to whether fathers were caring when the child was growing up. This suggests that sons and daughters of fathers who were deployed were more likely to experience harsh parenting and behavioural and learning problems at school and less likely to have a father who was caring of them. Those factors, in turn, had a strong relationship with suicidal ideation. In particular, experience of harsh parenting was related to a greater likelihood of suicidal ideation, whereas behavioural and learning problems at school were strongly and positively related to suicidal plans and/or actions. There was a strong and negative relationship between father's parenting (being caring) and suicidal plans and/or actions. These results indicate that sons and daughters who had problems at school and experienced harsh parenting were more likely to be engaged in suicidal plans and/or actions, whereas sons and daughters of fathers who were caring of their offspring were less likely to be engaged in suicidal plans and/or actions.

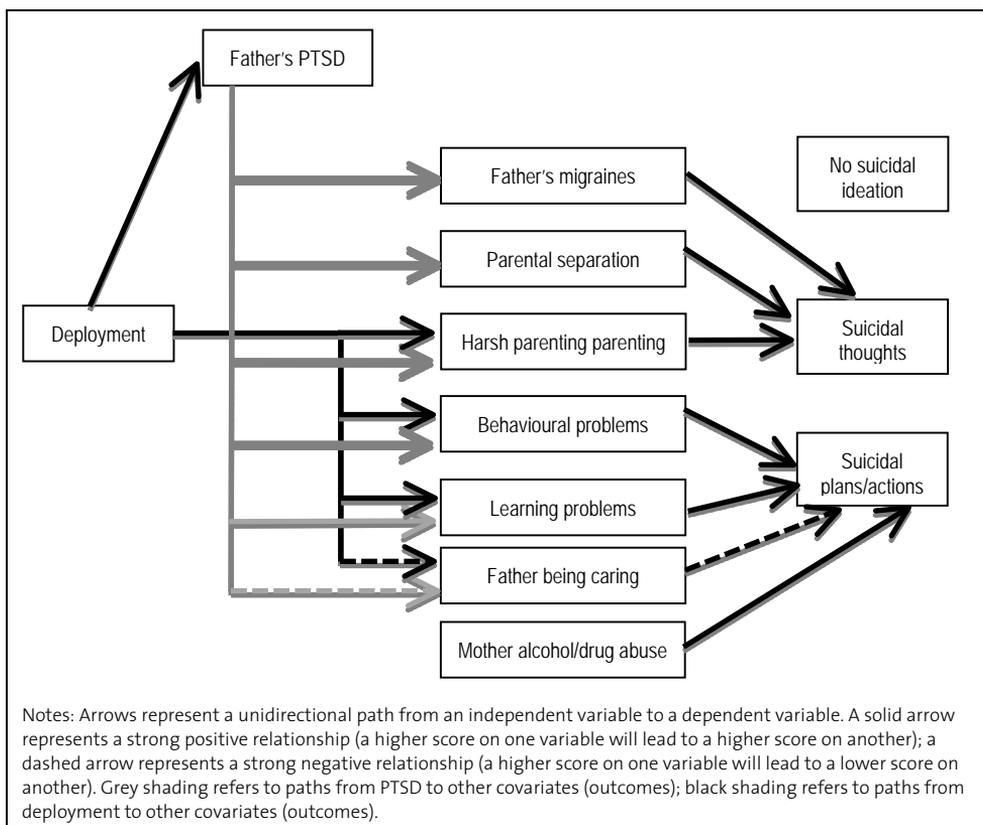


Figure 5.6 Model of suicidal ideation among sons and daughters: significant paths

The influence of father’s PTSD was also fully explained by the following factors: father’s migraines; parental separation; experience of harsh parenting; behavioural and learning problems; and father’s parenting (being caring). There were strong and positive relationships between father’s PTSD and father’s migraines and parental separation, which, in turn, were strongly and positively related to suicidal thoughts among sons and daughters. The relationships between father’s PTSD and other variables were the same as between father’s deployment and corresponding variables. In particular, sons and daughters of fathers with PTSD were likely to develop behavioural and learning problems as well as experience harsh parenting during childhood, which, in turn, had a strong and positive relationship with suicidal plans and/or actions among sons and daughters. Additionally, father’s PTSD was negatively and strongly related to

father's warm parenting, and father's warm parenting had a strong and negative relationship with experience of suicidal plans/actions.

Further, having a mother who had engaged in alcohol or drug abuse when the child was growing up had an independent, strong and positive association with sons' and daughters' experience of suicidal plans and/or actions; that is, sons and daughters were more likely to be involved in suicidal plans and/or actions if their mother had alcohol or drug problems when they were growing up.

5.3.2 Physical health

For physical health we examined the mechanisms of deployment for sons' and daughters' skin conditions, migraines and sleep problems.

Skin conditions

Based on the results of the steps 0 to 3 analyses, the full model for child's skin conditions included the following variables:

- deployment
- sons' and daughters' problems at school—behavioural problems
- family environment—mother being overprotective and harsh parenting
- father's health—skin problems
- services used by serviceman—military-related services.

The effect of deployment on sons' and daughters' skin conditions was fully explained by their behavioural problems at school and whether their father was diagnosed with or treated for a skin condition (see Figure 5.7). Thus, sons and daughters of deployed fathers were likely to have behavioural problems and have fathers being diagnosed with or treated for skin problems, which in turn, were associated with offspring having skin problems. Note that there was no direct or indirect effect of father's PTSD on whether sons and daughters were diagnosed with or treated for skin problems.

Additionally, females were more likely to be diagnosed with or treated for skin problems. There were no age differences observed.

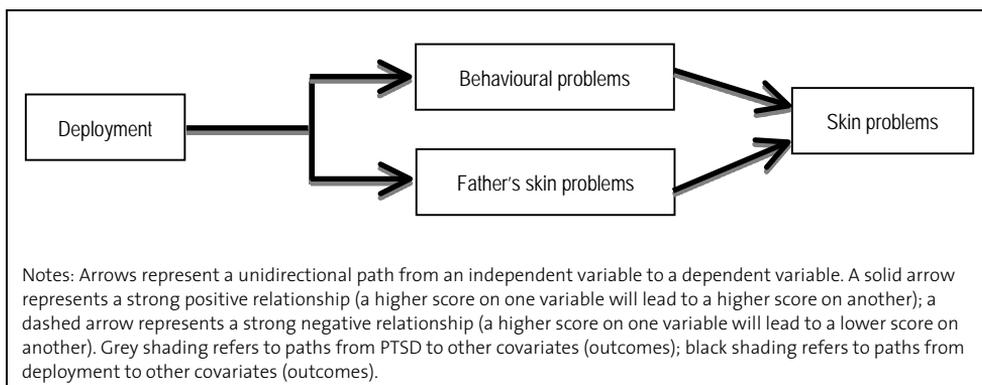


Figure 5.7 Model of skin problems among sons and daughters: significant paths

Migraines

The following variables were included in the full model for sons' and daughters' migraines:

- deployment and father's PTSD
- sons' and daughters' problems at school—behavioural and learning problems
- family environment—father's warm parenting, mother and father being overprotective, harsh parenting and father's alcohol or drug abuse
- father's health—migraines
- services used by serviceman—military-related services.

There was no direct effect of deployment on the likelihood of sons and daughters being diagnosed with or treated for migraines, although there was a direct influence of father's PTSD on sons' and daughters' migraines (see Figure 5.8). The effect of deployment was fully explained by father's PTSD and sons' and daughters' behavioural problems at school. The effect of father's PTSD was also partially explained by sons' and daughters' behavioural problems.

In addition, having a father who had abused alcohol or drugs when the child was growing up had an independent strong and positive influence on the child's experience of being diagnosed with or treated for migraines. These results suggest that sons and daughters of fathers with drug or alcohol problems during

the sons' and daughters' childhood were more likely to be diagnosed with or treated for migraines.

While there was no relationship between the age of offspring and the experience of migraines, female offspring were more likely than male offspring to be diagnosed with or treated for migraines.

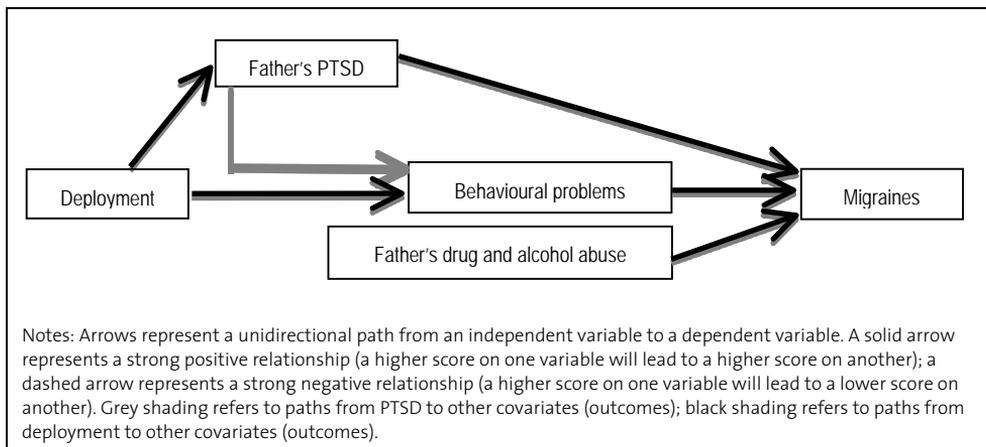


Figure 5.8 Model of migraines among sons and daughters: significant paths

Sleep problems

The following variables were included in the full model for sons' and daughters' sleep problems:

- deployment and father's PTSD
- sons' and daughters' problems at school—behavioural, disciplinary and learning problems
- family environment—mother's and father's warm parenting, mother and father being overprotective, harsh parenting and parental separation
- father's health—depression, anxiety and sleeping problems
- services used by serviceman—social support, military-related services and health-related services.

After taking into account these variables, there was no direct effect of father's deployment on sons' and daughters' experience of sleep problems; that is, the

effect of deployment was fully explained by the father's PTSD, the child's behavioural problems at school, and experience of harsh parenting when the child was growing up (see Figure 5.9).

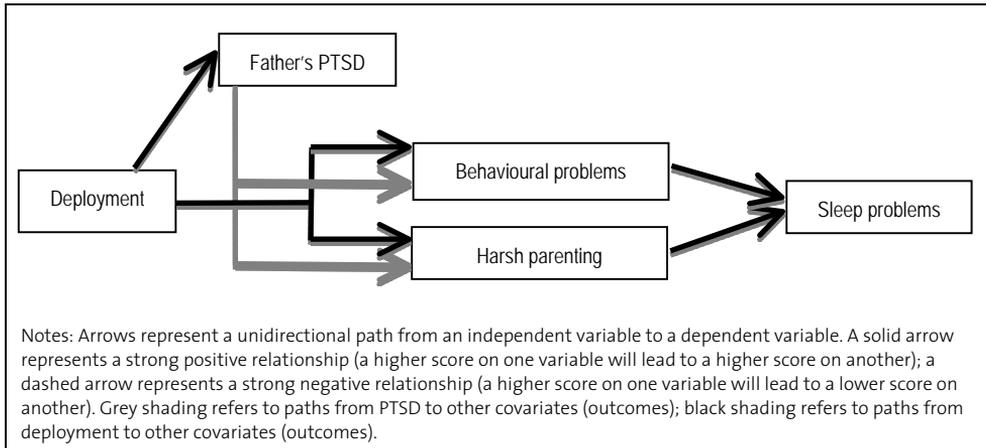


Figure 5.9 Model of sleep problems among sons and daughters: significant paths

Further, there was no direct influence of father's PTSD on sons' and daughters' sleep problems. The relationship between father's PTSD and sons' and daughters' sleep problems was fully explained by sons' and daughters' experiences when they were growing up—that is, behavioural problems and harsh parenting.

The differences in sleep problems were observed by age but not gender. Older offspring were more likely to report being diagnosed with or treated for a sleep disturbance compared to younger offspring.

5.3.3 Social wellbeing

For social wellbeing we examined the mechanisms of deployment for sons' and daughters' current relationship status and the number of long-term relationships they had had.

Relationship status

Based on the results of the steps 0 to 3 analyses, the full model for sons' and daughters' relationship status included the following variables:

- deployment

- child’s problems at school—disciplinary and learning problems and being smart or gifted
- family environment—mother’s and father’s warm parenting, mother and father being overprotective, harsh parenting and parental separation.

Figure 5.10 presents the results of the full model, with only significant paths included. The reference category was ‘married sons and daughters’. After taking into account a number of factors, there was no direct effect of deployment on the sons’ and daughters’ relationship status. This relationship was fully explained by sons’ and daughters’ disciplinary and learning problems at school. Sons and daughters who had disciplinary problems were more likely to be in a de facto or partnered relationship or separated or divorced but not to be single compared to sons and daughters who did not report any disciplinary problems at school. Sons and daughters who experienced learning problems at school were more likely to be in a de facto or partnered relationship or separated or divorced or single, rather than married. Not surprisingly, sons and daughters who experienced parental separation when they were growing up (0–16 years) were also more likely to be single than in a relationship.

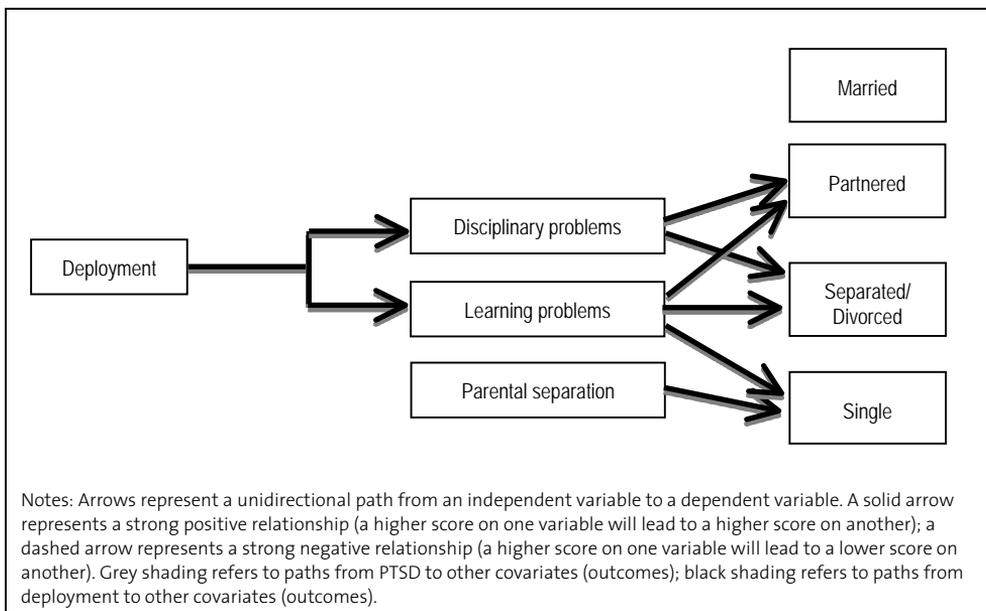


Figure 5.10 Model of sons’ and daughters’ relationship status: significant paths

There was no link between gender and relationship status, but younger offspring were less likely to be married and more likely to be single compared to older offspring.

Number of long-term relationships

Based on the results of the steps 0 to 3 analyses, the full model for the number of long-term relationships for sons and daughters included the following variables:

- deployment
- sons' and daughters' problems at school—behavioural, disciplinary and learning problems
- family environment—mother's and father's warm parenting, mother and father being overprotective, harsh parenting and parental separation
- father's health—depression, anxiety and sleeping problems
- services used by serviceman—social support, military-related services and health-related services.

Note that in this analysis having only one long-term relationship was the reference category.

The results of the full model are presented in Figure 5.11. After accounting for covariates, the effect of deployment on the number of long-term relationships for sons and daughters was explained by mother's parenting style and father's skin condition. Sons and daughters of Vietnam veterans were likely to have a mother who was less caring and a father who had been diagnosed with or treated for skin conditions. In turn, sons and daughters with mothers who were more caring were less likely to have had more than one long-term relationship, and sons and daughters with fathers who had skin problems were less likely not to have had any relationships.

In addition, independently of other factors, sons and daughters who experienced parental separation during their childhood were likely to have had more than one long-term relationship, whereas sons and daughters who were advanced in their school studies were less likely to have had any long-term relationships.

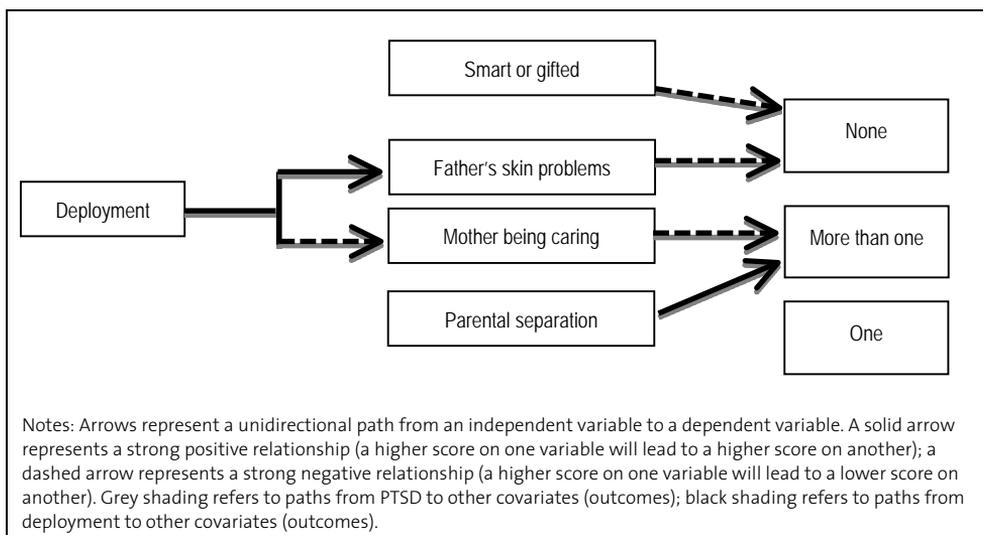


Figure 5.11 Model of number of long-term relationships among sons and daughters: significant paths

As for relationship status, men and women had comparable numbers of long-term relationships, but younger respondents were more likely to have never had a long-term relationship and older offspring were more likely to have had multiple relationships.

5.3.4 Economic wellbeing

For economic wellbeing we examined the mechanisms of deployment for sons' and daughters' highest level of education obtained and experience of financial stress in the past.

Education

The following variables were included in the full model for sons' and daughters' highest level of education:

- deployment and father's PTSD
- sons' and daughters' problems at school—behavioural, disciplinary and learning problems, and a child being smart or gifted
- family environment—mother's and father's warm parenting, father being overprotective, parental separation and harsh parenting

- father’s health—depression, anxiety, and skin and sleeping problems
- services used by serviceman—military-related services and health-related services.

Note that in this analysis a university degree was the reference category.

After accounting for these variables there was no direct effect of either the father’s deployment or the father’s PTSD on sons’ and daughters’ highest level of education (see Figure 5.12). Father’s PTSD, sons’ and daughters’ disciplinary and learning problems at school and father’s parenting style fully explained the effect of deployment. Sons’ and daughters’ disciplinary and learning problems at school and father’s parenting also fully explained the influence of father’s PTSD on sons’ and daughters’ highest level of education. Sons and daughters who experienced problems at school or had a father who was not caring were more likely to obtain a certificate or diploma or have a school or below qualification than to obtain a university degree.

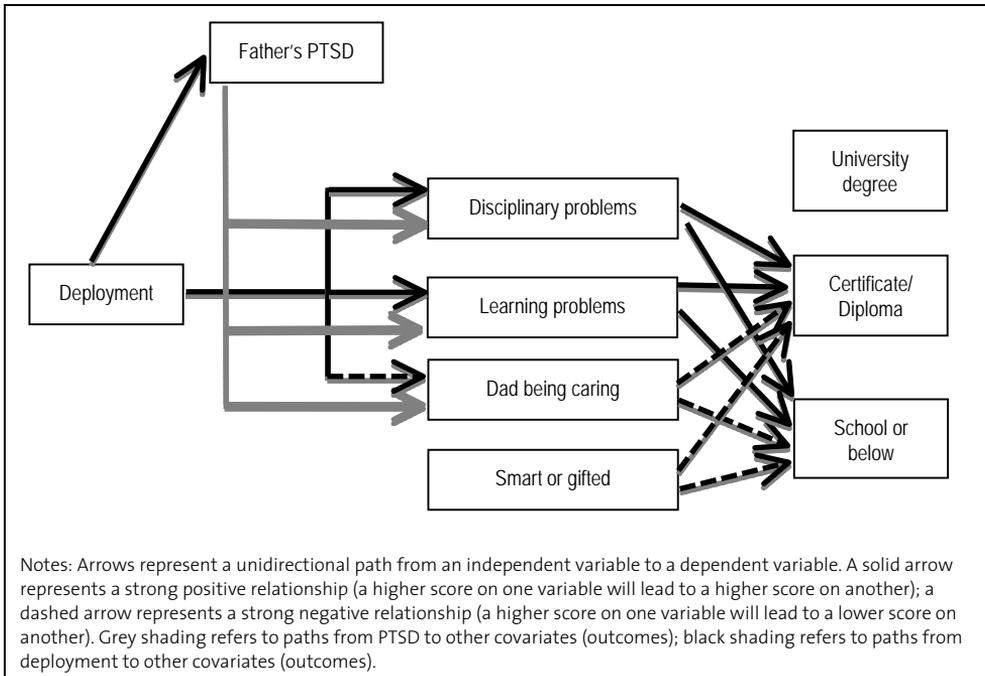


Figure 5.12 Model of education among sons and daughters: significant paths

In addition, sons and daughters who were advanced in their studies at school (jumped a year or placed in an advanced class) were less likely to have only a certificate or diploma or school education and more likely to have a university degree.

There were no differences in the highest level of education between males and females, but older offspring were less likely to have a university degree compared to younger offspring.

Financial stress

The following variables were included in the full model of financial stress:

- deployment and father's PTSD
- sons' and daughters' problems at school—behavioural, disciplinary and learning problems
- family environment—mother's and father's warm parenting, mother being overprotective, harsh parenting and parental separation
- father's health—depression, anxiety and sleep problems
- services used by serviceman—military-related services and health-related services.

Figure 5.13 presents the results of the full model with only significant paths included. As for many other outcomes discussed, the direct effect of the father's deployment and the father's PTSD disappeared after taking into account other covariates. Father's PTSD and father's depression, as well as sons' and daughters' experiences of behavioural problems at school and harsh parenting during their childhood, explained the effect of deployment. The relationship between father's PTSD and sons' and daughters' financial stress was explained through the same paths. Sons and daughters who had deployed fathers were therefore likely to have experienced behavioural problems and harsh parenting during their childhood, even after taking into account father's PTSD. These experiences, then, were strongly and positively related to the experience of financial stress at some time in life. Further, sons and daughters of deployed fathers were more likely to have fathers who were ever diagnosed with or treated for depression, and father's

depression was strongly and positively related to offspring’s experience of financial stress. These results suggest that sons and daughters were more likely to ever experience financial stress if they had behavioural problems at school, experienced harsh parenting and had a father with depression.

There were no relationships found between sons’ and daughters’ experience of financial stress and either their gender or age.

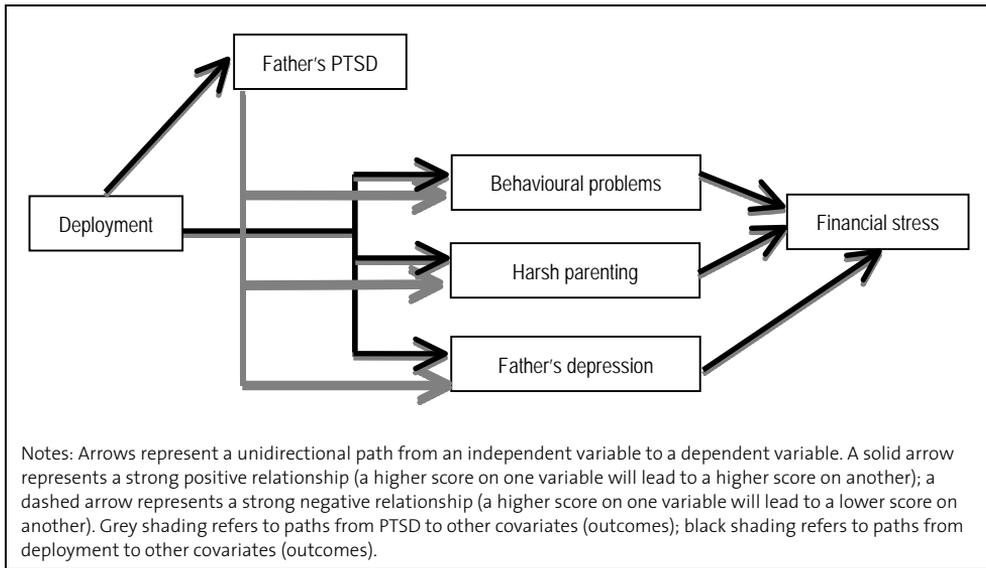


Figure 5.13 Model of financial stress among sons and daughters: significant paths

5.4 Summary

This analysis aims to identify the possible pathways by which deployment influenced the outcomes of servicemen’s sons and daughters. The list of the pathways discovered is presented in Table 5.6.

For the majority of outcomes the impact of deployment was explained by the inclusion of other covariates (10 out of 12 outcomes examined). Drug use (lifetime use) and relationship status were the only outcomes that were not fully explained by the variables in the model.

Although there were many pathways by which deployment influenced the outcomes for sons and daughters, these pathways usually consisted of a combination of a few key variables or groups of variables. For the majority of outcomes the most common pathway was through the serviceman's experience of PTSD. For eight out of 12 outcomes deployment appeared to affect the sons and daughters through its influence on the serviceman's experience of PTSD. That said, the serviceman's experience of PTSD was directly associated with only three out of these eight outcomes—sons' and daughters' anxiety, sons' and daughters' migraines, and sons' and daughters' education. For other outcomes the impact of PTSD was indirect, with the condition leading to higher rates of problems at school, a poorer family environment, and higher rates of depression, migraine or skin problems among fathers, which, in turn, led to more problematic outcomes for sons and daughters. Social wellbeing, sons' and daughters' sleeping problems and lifetime drug use were not associated with the father's PTSD.

The most common pathway of deployment across all outcomes was through sons' and daughters' behavioural problems at school, either through the father's PTSD or not. This pathway was evident across all mental and physical health outcomes and sons' and daughters' experience of financial stress.

The second most common pathway of deployment was through harsh parenting of the offspring of servicemen, also either through the father's PTSD or not. This pathway was observed across all mental health outcomes, sons' and daughters' sleeping problems, and sons' and daughters' experience of financial stress ever in their lifetime.

Learning problems constituted an important explanatory variable for the impact of deployment by way of veterans' PTSD for sons' and daughters' depression, anxiety, suicidal plans or actions, relationship status and education. Parental separation and lack of warmth during childhood were associated with suicidal ideation in sons and daughters. Notably, servicemen's mental health mediated the impact of deployment on only a small number of outcomes—sons' and daughters' depression, suicidal ideation, skin problems, number of long-term relationships and financial stress.

Table 5.6 Main mechanisms of deployment on outcomes

| Mechanism | Mental health | | | | | Physical health | | | Social wellbeing | | Economic wellbeing | |
|---|---------------|---------|------|----------|-------------------|-----------------|-------------------|------|---------------------|--------------------------------|--------------------|-----------|
| | Depression | Anxiety | PTSD | Drug use | Suicidal ideation | Migraines | Sleeping problems | Skin | Relationship status | No. of long-term relationships | Financial stress | Education |
| Deployment | | | | * | | | | | * | | | |
| Deployment: PTSD | * | | | | | * | | | | | | * |
| Problems at school | | | | | | | | | | | | |
| Deployment: PTSD—behavioural problems | * | * | * | | * | * | * | | | | * | |
| Deployment: behavioural problems | * | * | * | * | * | * | * | * | | | * | |
| Deployment: PTSD—learning problems | * | * | | | * | | | | | | | * |
| Deployment: learning problems | * | * | | | * | | | | * | | | |
| Deployment: PTSD—disciplinary problems | | | | | | | | | | | | |
| Deployment: disciplinary problems | | | | | | | | | * | | | |
| Family environment during childhood | | | | | | | | | | | | |
| Deployment: PTSD—harsh parenting | * | * | * | | * | * | * | | | | * | |
| Deployment: harsh parenting | * | * | * | * | * | * | * | | | | * | |
| Deployment: PTSD—parental separation | | | | | * | | | | | | | |
| Deployment: PTSD—parental warmth | | | | | * | | | | * | | | |
| Deployment: parental warmth | | | | | * | | | | | | | |
| Servicemen health | | | | | | | | | | | | |
| Deployment: PTSD—serviceman’s depression | | | | | | | | | | | * | |
| Deployment: serviceman’s depression | * | | | | | | | | | | * | |
| Deployment: PTSD—serviceman’s migraines | | | | | * | | | | | | | |
| Deployment: PTSD—serviceman’s skin problems | | | | | | | * | | * | | | |

Source: Vietnam Veterans Family Study.

6 Relationship between deployment characteristics and sons' and daughters' outcomes

This chapter looks at the specific impact of Vietnam veterans' military service on their sons' and daughters' outcomes. In particular, the analysis examines whether different exposures—total length of deployment, experience of trauma, conscription, being in different corps or being of different rank—were associated with different outcomes among sons and daughters of veterans, while taking into account offspring characteristics, family environment when the son or daughter was growing up (0–16 years) and other characteristics of Vietnam veterans. Given that we are specifically interested in the impact of different elements of deployment to the Vietnam War, we focus only on sons and daughters of Vietnam veterans and those outcomes that were associated with deployment directly or indirectly.

6.1 Sample and measures

6.1.1 Sample

As mentioned, the analysis used the sample of sons and daughters of Vietnam veterans only. We used the subsample of veterans' sons and daughters from the matched sample rather than the full sample of VV sons and daughters since it is shown in Section 3.3 that the matched subsample of VV sons and daughters was drawn from veteran fathers who were broadly representative of the VV population. The total sample size used in the analysis that follows was 1,509 sons and daughters of 1,046 fathers. In this chapter we use 'veteran' and 'father' interchangeably.

6.1.2 Outcome measures

The outcomes of interest were the 12 that are identified in Chapter 5 as being affected by deployment, concerning mental and physical health as well as the social and economic wellbeing of veterans' offspring. All the measures were derived in the manner described earlier.

Mental health outcomes included depression, anxiety, posttraumatic stress disorder, drug use and suicidal ideation. The reference period for these outcomes was ever in the lifetime. For mental health problems the reference period was whether the son or daughter was ever diagnosed with or treated for the problem.

Physical health included sleep problems, skin conditions (eczema, psoriasis) and migraines.

Social functioning measures included indicators of current relationship status of veterans' offspring and the number of long-term relationships sons and daughters of veterans had had.

The measures of economic wellbeing included experience of financial stress and highest educational qualification. The reference period for financial stress was ever in the offspring's lifetime.

6.1.3 Deployment characteristics

We tested the following deployment characteristics:

- total duration of deployment
- conscription
- corps
- rank
- deployment instability
- exposure to herbicides
- experience of trauma
- time of child's birth in relation to father's first deployment.

The Nominal Roll of Vietnam Veterans was used to derive the total duration of the father's deployment, conscription status, corps, rank and deployment instability.

The total duration of the father's deployment was calculated as the total number of months a father was deployed in different units and/or at different times. It was divided into three categories: bottom 25 per cent of the distribution of the total number of months deployed (less than one month to less than eight

months); middle 50 per cent of the distribution of the total number of months deployed (from eight to 12 months); and top 25 per cent of the distribution of the total number of months deployed (more than 12 months).

The measure of conscription used in this analysis was derived from the Nominal Roll and is different from the measure of conscription used in the propensity score analysis. The latter came from the Main Survey. The conscription variable from the Nominal Roll was used in this chapter because it is a more accurate indicator: it does not have missing values and refers only to conscription in the National Service scheme. Fifty-four per cent of sons and daughters of Vietnam veterans had a conscripted father.

There were three major army corps: the Royal Australian Infantry, the Royal Australian Engineers and the Royal Australian Artillery. Due to smaller numbers in other corps, these other corps were grouped together. About 40 per cent of sons and daughters had a father who served in the Royal Australian Infantry, 11 per cent had a father who served in the Royal Australian Engineers, and 10 per cent had a father who served in the Royal Australian Artillery. About 40 per cent of fathers served in other corps.

In the Main Survey classification three categories of rank were used: enlisted (private, musician, signaller, gunner, trooper, sapper, craftsman, patrolman, recruit); non-commissioned officer (lance-corporal, corporal, sergeant, warrant, bombardier); and officer (lieutenant, captain, major, colonel, brigadier, general, chaplain). In the Nominal Roll, warrant officer was considered as a separate category but for consistency with the Main Survey it was placed in the most appropriate category along with the non-commissioned ranks (for example, sergeant). In the sample used in this chapter 55 per cent were enlisted fathers, 35 per cent non-commissioned officers and 10 per cent officers.

Using the Nominal Roll it was possible to derive a binary indicator of deployment instability—that is, whether a servicemen was transferred from one unit to another during his deployment or had multiple deployments, as opposed to servicemen who had only one deployment in the same unit. Twenty-seven per cent of sons and daughters had a father who had multiple deployments or moved from one unit to another.

Using the Main Survey completed by Vietnam veterans themselves, we derived veterans' exposure to herbicides, experience of traumatic events, and the time of a child's birth in relation to father's first deployment.

Exposure to herbicides was derived using two questions. In the Main Survey Vietnam veterans were asked whether they believed they were exposed to Agent Orange and whether their belief had been confirmed. There were no details on how this information was confirmed. Thirty-one per cent of sons and daughters had fathers who believed they were exposed to Agent Orange and their belief was confirmed. Other veterans did not believe they were exposed to Agent Orange or their belief was not confirmed.

The experience of trauma was derived from eight items, with response options ranging from 1 (never) to 5 (very often—that is, 11 or more times), from the Main Survey filled in by Vietnam veterans themselves. The items were:

1. How often did you experience being in danger of being killed?
2. How often did you experience being in danger of being injured?
3. How often did you experience having to handle dead bodies?
4. How often did you experience seeing dead bodies?
5. How often did you experience hearing of a close friend, relative, or other service personnel who had been injured or killed?
6. How often did you experience being present when a close friend, relative, or other service personnel was injured or killed?
7. How often did you experience fear that you had been exposed to a contagious disease, toxic agent or other contaminant?
8. How often did you experience being a witness to a significant level of human degradation and misery?

The level of traumatic experience was calculated as the average score across the eight items, the higher scores indicating greater exposure to experience of trauma. The mean score was 2.8 with a standard deviation of 0.9.

Using the date of the serviceman's first deployment and his child's date of birth, we derived a binary indicator of a child being born before the father's first

deployment. Eighty-seven per cent of sons and daughters were born after their father's first deployment.

6.1.4 Statistical approach and empirical model

We estimated the individual associations between the deployment experiences of the Vietnam veterans and their sons' and daughters' experiences of social, physical and emotional problems by conducting a series of multivariate regression analyses. These analyses controlled for a number of rival explanatory variables, including the childhood characteristics of the sons and daughters and reports by the sons and daughters about the family environment when they were children. In addition, the analyses controlled for a number of the characteristics of the servicemen and a number of other characteristics specific to each model. Derivation of these measures is explained in detail in Section 5.1.

The childhood characteristics of the sons and daughters included age, sex, their experiences of behavioural, learning, and disciplinary problems at school, and whether they were identified as gifted or talented. These variables were derived from the sons' and daughters' Main Survey responses.

The family environment was measured when sons and daughters were growing up (0–16 years) and included the following measures: whether their mother and father (that is, the Vietnam veteran) were caring or overprotective; whether their mother and father (the Vietnam veteran) had alcohol or drug problems and whether their mother and father (the Vietnam veteran) had divorced or separated. These variables were derived from questions answered by the sons and daughters of the Vietnam veterans.

The characteristics of the serviceman (the Vietnam veteran) included his age, the age at which he had entered the military, his education, and whether he had PTSD symptoms. They also included aspects of the serviceman's relationships with his mother and father (that is, the grandparents of the sons and daughters) while he was growing up (0–16 years), such as whether his mother and father were caring and overprotective. These variables were derived from the veterans' Main Survey responses.

The model-specific characteristics included the relevant mental and physical health outcomes for the serviceman (the Vietnam veteran) and whatever

indicator of his social and economic wellbeing that corresponded to the sons' and daughters' outcome of interest.

For every outcome, we estimated an individual model. Depending on the outcome measure, we estimated either logistic regression (in the case of a binary outcome) or multinomial regression (in the case of an outcome with multiple categories). While we controlled for all child, family and father characteristics in estimating every single outcome, not all model-specific covariates were controlled for in every model. The general regression model we estimated can be written as follows:

$$\begin{aligned}
 \text{Outcome} = & \beta_0 + \beta_1 \text{Deployment} + \\
 & \frac{\beta_2 \text{Son}}{\text{daughter characteristics}} + \\
 & \beta_3 \text{Family characteristics} + \\
 & \beta_4 \text{Veteran characteristics} + \beta_5 \text{Specific characteristics}
 \end{aligned}$$

For every outcome we reported the marginal effects of deployment only. As explained, the marginal effects represent the change in the predicted probability for each outcome associated with one unit change in the explanatory variable while holding all other covariates at their average value. In the tables we refer to marginal effects as adjusted differences because they approximate the adjusted difference between the probability of each outcome between the sons and daughters of Vietnam veterans with different deployment experiences. Note that the total number of observations may vary across models due to missing cases on some of the outcomes and covariates. We adjusted estimates of the standard errors in all models to take into account the interdependence between observations (that is, sons and daughters of the same father) and control for the clustered nature of the data.

In the case of multinomial regression, the model validity is tested using the assumption of 'independence of irrelevant alternatives', or IIA, which implies that adding another outcome alternative or removing one of the existing outcome alternatives of the dependent variable does not affect the relative odds of the alternatives (Long & Freese 2006). Using the seemingly unrelated estimation for clustered data, it has been confirmed that this assumption was not violated across all multinomial models discussed here. Note that these results are correlational and suggestive, rather than implying causation.

The results of full models are presented in Appendix C.

6.2 Results

6.2.1 Mental health

To estimate the individual influences of deployment characteristics on a number of mental health outcomes we took into account some specific characteristics that were particular to the outcome that was examined. In particular, we took into account the following model-specific characteristics:

- Modelling the probability of depression, anxiety and PTSD in veterans' sons and daughters, we accounted for depression, anxiety and PTSD in the veteran.
- Modelling the probability of sons' and daughters' suicidal ideation, we accounted for their father's suicidal ideation.

The estimated adjusted differences of various deployment characteristics are shown in Table 6.1.

The results indicate that the mental health outcomes of the sons and daughters were not related to whether or not their father had been exposed to Agent Orange, his experience of trauma, whether or not he had been conscripted, the number of changes to his deployment, or the timing of the sons' and daughters' births relative to the serviceman's first deployment.

The total duration of deployment was related to depression and anxiety among the sons and daughters of the Vietnam veterans. Compared to the sons and daughters of veterans who were deployed for no more than eight months, men and women whose fathers were deployed from eight to 12 months and more than 12 months were 6 per cent and 8 per cent more likely to be diagnosed with anxiety respectively. Relative to the sons and daughters of Vietnam veterans who were deployed for no more than eight months, those whose fathers were deployed from eight to 12 months were 5 per cent more likely to be diagnosed with depression.

Table 6.1 Marginal effects of deployment for mental health outcomes

| Characteristic | Depression | Anxiety | PTSD | Drug use | Suicidal ideation | | |
|-----------------------------|--------------|--------------|--------------|--------------|-------------------|--------------|----------------|
| | | | | | No | Thoughts | Plans/ actions |
| Adjusted differences | | | | | | | |
| Total duration | | | | | | | |
| Up to 8 months | | | | Omitted | | | |
| 8–12 months | 5.2* | 5.8** | 1.1 | 3.4 | 0.3 | -0.7 | 0.6 |
| More than 12 months | 3.6 | 7.9** | -0.1 | 2.0 | -4.6 | 7.5 | -3.0 |
| Agent Orange | 4.0 | 4.3 | 0.5 | -4.0 | 3.3 | -3.8 | 0.5 |
| Experience of trauma | 2.9 | -2.2 | 0.2 | -1.7 | 5.8 | 4.7 | 1.0 |
| Conscript | -4.4 | -1.3 | -0.5 | -3.1 | 8.4 | -4.2 | -4.3 |
| Born after first deployment | 1.1 | 3.6 | 0.1 | -1.5 | 9.6 | -6.3 | -3.3 |
| Deployment instability | 2.0 | 1.4 | 0.8 | -0.4 | -5.0 | 0.7 | 4.3 |
| Corps | | | | | | | |
| Royal Australian Infantry | | | | Omitted | | | |
| Royal Australian Engineers | -4.5 | -3.1 | -2.2** | -0.6 | -7.4 | 11.1 | -3.8 |
| Royal Australian Artillery | -1.8 | -5.1 | -0.7 | -6.4 | -9.4 | 5.4 | -4.0 |
| Other | -1.8 | -8.3** | -1.3 | -5.0 | -4.2 | 5.9 | -1.7 |
| Rank | | | | | | | |
| Enlisted | | | | Omitted | | | |
| Non-commissioned officer | -2.0 | 0.8 | 1.1 | -8.6** | 6.2 | -5.8 | -0.4 |
| Officer | -10.4** | 0.7 | 1.1 | -0.9 | 35.2*** | -30.7*** | -4.5 |
| N | 1,134 | 1,134 | 1,134 | 1,052 | | 1,039 | |

Notes: Total number of observations varies across models due to missing values. *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

The corps and ranks of veterans were also related to a number of sons’ and daughters’ mental health outcomes. Compared to sons and daughters of veterans who served in the Royal Australian Infantry, sons and daughters of fathers from the ‘other’ category of major corps were 8 per cent less likely to experience anxiety. Further, compared to sons and daughters of veterans from the Royal Australian Infantry, sons and daughters of veterans from the Royal Australian Engineers were less likely to be diagnosed with or treated for PTSD. Rank was significantly associated with sons’ and daughters’ drug use and suicidal ideation. Compared to sons and daughters of enlisted fathers, sons and daughters of non-

commissioned officers were 9 per cent less likely to have tried drugs and sons and daughters of officers were 35 per cent more likely to not report any suicidal ideation and 31 per cent less likely to have suicidal thoughts.

6.2.2 Physical health

The adjusted differences of deployment for physical health outcomes are presented in Table 6.2. Modelling the probability of a specific health outcome among sons and daughters, we also controlled for whether the veteran had the same condition or not (for example, in the case of offspring migraines, adjusting for the veteran’s migraines).

Table 6.2 Marginal effects of deployment: physical health outcomes

| Characteristic | Skin conditions | Migraines | Sleep disturbance |
|-----------------------------|----------------------|--------------|-------------------|
| | Adjusted differences | | |
| Total duration | | | |
| No more than 8 months | | Omitted | |
| Between 8 to 12 months | 1.4 | 1.3 | 6.7*** |
| More than 12 months | -3.9 | -1.5 | 2.1 |
| Agent Orange | -0.1 | -2.5 | 1.6 |
| Experience of trauma | -2.3 | 2.6* | 2.2 |
| Conscript | -2.2 | -1.9 | -4.8 |
| Born after first deployment | 1.3 | -6.2 | 1.4 |
| Deployment instability | -0.8 | -2.9 | -3.0 |
| Corps | | | |
| Royal Australian Infantry | | Omitted | |
| Royal Australian Engineers | -3.9 | -4.8 | 0.2 |
| Royal Australian Artillery | -8.8* | -0.3 | -0.1 |
| Other | -6.3 | -0.2 | -0.2 |
| Rank | | | |
| Enlisted | | Omitted | |
| Non-commissioned officer | -1.4 | 3.1 | 0.9 |
| Officer | 8.5 | -2.9 | 3.4 |
| N | 1,134 | 1,135 | 1,135 |

Notes: Total number of observation varies across models due to missing values. *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

As with sons’ and daughters’ mental health outcomes, there were no statistically significant relationships between the physical health outcomes of sons and

daughters and the veteran's exposure to Agent Orange, deployment instability, the timing of the child's birth in relation to the veteran's first deployment, and the veteran's conscription status. The only significant correlates of sons' and daughters' physical health were the duration of the veteran's deployment, the veteran's experience of trauma, and the veteran's corps and rank during service.

The duration of the veteran's deployment was significantly correlated with sleep disturbance among sons and daughters. Sons and daughters of veterans who served from eight to 12 months were 7 per cent more likely to have sleep problems compared to sons and daughters of fathers who served up to eight months.

Veterans' experience of trauma was also significantly correlated with sons' and daughters' migraines. Sons and daughters of veterans who experienced greater levels of trauma were 3 per cent (on average) more likely to report being diagnosed with migraines compared to sons and daughters of veterans who experienced lower levels of trauma.

The veteran's corps was a significant correlate of sons' and daughters' skin problems. Sons and daughters of veterans who served in the Royal Australian Artillery were 9 per cent less likely to be diagnosed with or treated for a skin condition compared to sons and daughters of veterans from the Royal Australian Infantry.

6.2.3 Social functioning

Table 6.3 shows the adjusted differences of deployment characteristics for social functioning outcomes. To estimate the individual effects of deployment characteristics on social functioning outcomes of interest, we took into account the veteran's own level of social functioning. More specifically, when modelling the probability of:

- sons' and daughters' current relationship status, we took into account whether the veteran was currently in a married or partnered relationship
- the number of long-term relationships of sons and daughters, we took into account the number of long-term relationships of the veteran.

Table 6.3 Marginal effects of deployment: social functioning outcomes

| | Relationship status | | | | Number of married or de facto relationships | | |
|-----------------------------|---------------------|----------|----------|---------|---|------|------|
| | Married | De facto | Divorced | Single | None | One | >1 |
| Adjusted differences | | | | | | | |
| Total duration | | | | | | | |
| Up to 8 months | | | | Omitted | | | |
| Between 8 to 12 months | -2.0 | 1.2 | 0.6 | 0.2 | 4.1* | -3.9 | -0.2 |
| More than 12 months | -1.6 | -1.5 | 2.2 | 0.9 | 5.1* | -0.2 | -4.9 |
| Agent Orange | 0.2 | -2.0 | -1.1 | 2.9 | 1.1 | 3.5 | -4.6 |
| Experience of trauma | 4.3 | -1.5 | 0.2 | -2.8 | -0.2 | -2.4 | 2.6 |
| Conscript | 2.6 | 3.7 | 1.7 | -8.1** | -1.1 | -1.1 | 2.2 |
| Born after first deployment | 19.9** | -5.7 | 1.2 | -15.5* | 2.6 | 4.8 | -7.4 |
| Deployment instability | -8.7** | 1.5 | 1.8 | 5.3* | -0.4 | 2.9 | -2.5 |
| Corps | | | | | | | |
| Royal Australian Infantry | | | | Omitted | | | |
| Royal Australian Engineers | 8.1 | -2.5 | -2.0 | -3.6 | -2.1 | 5.4 | -3.3 |
| Royal Australian Artillery | 11.2* | -8.7** | 1.4 | -3.8 | -1.3 | 2.0 | -0.7 |
| Other | 2.8 | 2.5 | -1.4 | -4.7 | -2.5 | -0.0 | 3.5 |
| Rank | | | | | | | |
| Enlisted | | | | Omitted | | | |
| Non-commissioned officer | -1.4 | 0.8 | 2.3 | -1.8 | -2.6 | 2.3 | 0.3 |
| Officer | 5.0 | -1.4 | 5.2 | -8.8** | -9.3*** | 9.2 | 0.1 |
| N | 1,126 | | | | 931 | | |

Notes: Total number of observation varies across models due to missing values. *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

It can be seen from Table 6.3 that various aspects of veterans’ deployment were significantly associated with the social functioning of sons and daughters.

The total duration of a father’s deployment was related to the number of long-term relationships among sons and daughters. Sons and daughters of fathers who served eight to 12 months and more than 12 months were 4 per cent and 5 per cent more likely not to have any long-term relationships compared to sons and daughters of fathers who were deployed for up to eight months.

Father's conscription was significantly associated with sons' and daughters' relationship status. Sons and daughters of conscripted veterans were 8 per cent less likely to be single compared to sons and daughters of non-conscripted veterans.

The timing of sons' and daughters' birth in relation to a veteran's first deployment and deployment instability were significant correlates of a child's relationship status. Sons and daughters who were born after a veteran's first deployment were 20 per cent more likely to be married and 16 per cent less likely to be single compared to sons and daughters born before a veteran's first deployment. A different relationship was observed between deployment instability and sons' and daughters' relationship status. Sons and daughters of veterans who were transferred from unit to unit or had multiple deployments were 9 per cent less likely to be married and 5 per cent more likely to be single compared to sons and daughters of veterans who had only one deployment in the same unit.

As for other outcomes, corps and rank were significantly correlated with social wellbeing. Sons and daughters of fathers from the Royal Australian Artillery were 11 per cent more likely to be married and 9 per cent less likely to be in a de facto relationship compared to sons and daughters of veterans from the Royal Australian Infantry. Sons and daughters of officers were 9 per cent less likely to be single and 9 per cent less likely to have any long-term relationships in their life compared to sons and daughters of enlisted veterans.

6.2.4 Economic wellbeing

Table 6.4 shows the adjusted differences of deployment characteristics for economic wellbeing among veterans' offspring. To estimate the individual influences of deployment characteristics on a number of economic wellbeing factors, we controlled for veterans' own economic wellbeing. Specifically, when modelling:

- whether sons and daughters ever experienced financial stress, we took into account the veteran's experience of financial stress
- the highest educational qualification of offspring, we controlled for the veteran's highest level of education.

Table 6.4 Marginal effects of deployment: economic wellbeing

| | Financial stress | Education | | |
|-----------------------------|------------------|----------------------|---------------------|-------------------|
| | | Year 12 or below | Certificate/diploma | University degree |
| | | Adjusted differences | | |
| Total duration | | | | |
| Up to 8 months | | Omitted | | |
| Between 8 to 12 months | 4.8 | 6.5* | -1.6 | -4.8 |
| More than 12 months | 5.3 | 13.4** | -4.6 | -8.8 |
| Agent Orange | 5.1 | -1.5 | 8.0 | -6.6 |
| Experience of trauma | 0.3 | -4.5* | 0.3 | 4.2 |
| Conscript | -6.0 | -4.5 | -0.3 | 4.8 |
| Born after first deployment | 15.8** | -7.0 | -6.7 | 13.2* |
| Deployment instability | 0.9 | 2.5 | -1.1 | -1.4 |
| Corps | | | | |
| Royal Australian Infantry | | Omitted | | |
| Royal Australian Engineers | -8.2 | -3.8 | 10.2 | -6.4 |
| Royal Australian Artillery | 5.3 | -0.0 | -2.2 | 2.2 |
| Other | -2.0 | -1.1 | 4.3 | -3.1 |
| Rank | | | | |
| Enlisted | | Omitted | | |
| Non-commissioned officer | -1.6 | -4.1 | 3.2 | 1.0 |
| Officer | 2.2 | -12.7* | 0.6 | 12.1 |
| N | 718 | | 690 | 1,035 |

Notes: Total number of observation varies across models due to missing values. *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

Table 6.4 also shows that various characteristics of deployment—except for a veteran’s exposure to Agent Orange and the veteran’s corps—were associated with sons’ and daughters’ economic wellbeing.

The duration of the veteran’s deployment, experience of trauma and time of their sons’ and daughters’ birth were all related to sons’ and daughters’ highest level of education. The probability of having only school education (Year 12 or below) was 7 per cent and 13 per cent greater among sons and daughters of veterans who were deployed for eight to 12 months and longer than 12 months respectively

compared to sons and daughters of veterans who were deployed for up to eight months and 4.5 per cent less likely among sons and daughters of veterans who experienced trauma during their service in Vietnam compared to those sons and daughters whose fathers did not report any experience of trauma. Sons and daughters who were born after a veteran's first deployment were 13 per cent more likely to have a university degree compared to sons and daughters who were born before the veteran was deployed.

While corps was not related to the economic wellbeing of veterans' sons and daughters, veterans' rank was significantly associated with their sons' and daughters' education. Compared to sons and daughters of veterans who were enlisted, sons and daughters of veterans who were officers were 13 per cent less likely to have only school education.

6.3 The relationship between father's experience of trauma, father's PTSD and sons' and daughters' outcomes

The foregoing results provide little indication of a direct relationship between social, emotional and physical outcomes among the sons and daughters of Vietnam veterans and their father's experience of war-related trauma, even though we found clear evidence that veterans' experiences of posttraumatic stress disorder were related to the life outcomes of their children. That is not to say that the traumatic events experienced by the men who served in the war were unrelated to their children's outcomes; instead, it merely emphasises the complexity of the mechanisms through which the intergenerational effects of deployment might operate. Given that experience of traumatic events is likely to lead to PTSD, whether or not a serviceman has PTSD might fully or partially explain the links between his experience of trauma and the social, physical or emotional welfare of his sons and daughters.

Table 6.5 reports the percentages of sons and daughters of Vietnam veterans with and without PTSD by the veteran's level of relative exposure to traumatic events during the war. It shows that the children of veterans who did not experience PTSD symptoms were relatively evenly distributed across the four levels of traumatic exposure. For example, 28 per cent and 20 per cent of the children of servicemen who did not have PTSD had fathers who had experienced the lowest

and highest amounts of trauma. In contrast, among the sons and daughters of men who had PTSD symptoms the patterns were very different. Among veterans who experienced PTSD, the proportion of sons and daughters whose fathers had experienced a large number of traumatic events was substantially greater than the proportion whose fathers had been less exposed to such incidents. Specifically, only 8 per cent of the offspring of fathers with PTSD were the offspring of men with low levels of trauma exposure, whereas 43 per cent of sons and daughters whose fathers had PTSD were the offspring of men who experienced the highest levels of trauma possible. These results support the strong relationship between experience of traumatic events and the development of PTSD.

Table 6.5 Distribution of means of veterans’ traumatic experience, by experience of PTSD symptoms

| Distribution of means of veteran’s traumatic experience | Veterans did not experience PTSD symptoms | | Veterans experienced PTSD symptoms | | Total | |
|---|---|--------------|------------------------------------|--------------|--------------|------------|
| | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % |
| 1st quartile | 254 | 28.2 | 45 | 8.1 | 299 | 20.6 |
| 2nd quartile | 231 | 25.7 | 88 | 15.9 | 319 | 21.9 |
| 3rd quartile | 233 | 25.9 | 181 | 32.6 | 414 | 28.5 |
| 4th quartile | 182 | 20.2 | 241 | 43.4 | 423 | 29.1 |
| Total | 900 | 100.0 | 555 | 100.0 | 1,455 | 100 |

Source: Vietnam Veterans Family Study.

While veterans experienced high levels of trauma, our results suggest that fathers’ PTSD was the contributing factor to poorer outcomes for their children. Table 6.6 reports the percentage of offspring with a specific mental health problem (depression, anxiety or PTSD) among the children of veterans who experienced PTSD symptoms within the quartiles of the distribution of means of fathers’ traumatic experience. It shows that the proportions of children with specific mental health problems whose fathers also had PTSD do not depend on the extent of their father’s experience of traumatic events.

Table 6.6 Proportion of children with a specific outcome among children of veterans who experienced PTSD symptoms, by veterans' experience of traumatic events

| Mean of father's traumatic experience | Depression | | Anxiety | | Child's PTSD | | Total | |
|---------------------------------------|------------|-------------|------------|-------------|--------------|------------|------------|--------------|
| | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % | <i>N</i> | % |
| 1st quartile | 12 | 26.7 | 14 | 31.1 | 2 | 4.4 | 40 | 100.0 |
| 2nd quartile | 22 | 25.0 | 18 | 20.5 | 5 | 4.4 | 81 | 100.0 |
| 3rd quartile | 37 | 20.4 | 34 | 18.8 | 4 | 2.2 | 160 | 100.0 |
| 4th quartile | 68 | 28.2 | 71 | 29.5 | 16 | 6.6 | 232 | 100.0 |
| Total | 139 | 25.1 | 137 | 24.7 | 27 | 4.9 | 513 | 100.0 |

Source: Vietnam Veterans Family Study.

This brief and exploratory analysis revealed that the effect of deployment on sons' and daughters' outcomes is more likely to be explained by whether or not their fathers had PTSD than the degree to which their fathers were exposed to traumatic events. At the same time, the patterns strongly suggest that the experiencing of traumatic events is likely to be associated with the development of PTSD among veterans. It also suggests that the experiencing of traumatic events was significantly related to the development of PTSD among veterans, which, in turn, is likely to be contributing to the more negative outcomes observed among the sons and daughters of the Vietnam veterans.

6.4 Summary

This chapter examines the specific impact of deployment on the health and social and economic wellbeing of veterans' sons and daughters. A summary of the results is presented in Table 6.7. The main characteristics of deployment that were related to sons' and daughters' outcomes were the total duration of the veteran's deployment and the veteran's corps and rank.

The cumulative length of a veteran's deployment during the sons' and daughters' lifetime independently predicted increased levels of anxiety and sleep disturbance in a veteran's offspring, as well as poorer education and an inability to maintain a long-term relationship, after taking into account the number of related characteristics such as offspring's age and gender.

Conscription status was a protective factor for a number of sons' and daughters' outcomes. If the veteran was conscripted, his offspring were less likely to develop sleep disturbances or be engaged in suicidal plans or actions and more likely to have been in a long-term relationship during his or her life and more likely to have job stability.

The veteran's corps and rank were related to the largest number of sons' and daughters' outcomes. Sons and daughters of veterans who served in the Royal Australian Infantry were more likely to develop poor outcomes compared to sons and daughters of veterans from other corps. In particular, sons and daughters of veterans from the Royal Australian Infantry were more likely to develop PTSD, skin conditions and migraines and to be in de facto relationships compared to sons and daughters of veterans from the Royal Australian Engineers. They were also more likely to report being diagnosed with anxiety than sons and daughters of veterans from the Royal Australian Artillery and other corps. Sons and daughters of enlisted veterans were also more likely to experience poor outcomes compared to sons and daughters of veterans who served as non-commissioned officers or officers. Specifically, sons and daughters of enlisted veterans were more likely to have tried drugs compared to sons and daughters of veterans who were non-commissioned officers. They were also more likely to have a low level of education, to not be in a long-term relationship and to have suicidal thoughts compared to sons and daughters of veterans who were officers.

The timing of son's or daughter's birth in relation to the veteran's first deployment was related to the social and economic wellbeing of the veteran's sons and daughters. Sons and daughters who were born after the veteran's deployment were more likely to ever experience financial stress, to be married and to have a university degree compared to sons and daughters who were born before the veteran was deployed for the first time.

Overall, the social and economic wellbeing of veterans' sons and daughters was significantly related to a number of different aspects of veterans' deployment, while mental and physical health were mainly associated with the duration of a veteran's deployment and the corps and rank the veteran obtained.

Table 6.7 Impact of deployment on outcomes of veterans' offspring: a summary

| | Total duration | Agent Orange | Experience of trauma | Conscript | Born after deployment | Deployment instability | Corps | Rank |
|-------------------------|----------------|--------------|----------------------|-----------|-----------------------|------------------------|-------|------|
| Mental health | | | | | | | | |
| Depression | • | | | | | | | • |
| Anxiety | • | | | | | | • | |
| PTSD | | | | | | | • | |
| Drug use | | | | | | | | • |
| Suicidal ideation | | | | | | | | • |
| Physical health | | | | | | | | |
| Skin conditions | | | | | | | • | |
| Migraines | | | • | | | | | |
| Sleep disturbance | • | | | | | | | |
| Social wellbeing | | | | | | | | |
| Relationship status | | | | • | • | • | • | • |
| Number of relationships | • | | | | | | | • |
| Economic wellbeing | | | | | | | | |
| Financial stress | | | | | • | | | |
| Education | • | | • | | • | | | • |

Source: Vietnam Veterans Family Study.

7 Discussion

The Department of Veterans Affairs commissioned the Vietnam Veterans Family Study in order to develop a large-scale picture of the health and wellbeing of Vietnam veterans and Australian Defence Force personnel and their families. The study was designed to provide new information about the possible impact of service in the Vietnam War on the lives of the sons and daughters of Australia's veterans. It used a research design in which the functioning of family members of veterans deployed to the Vietnam War was to be compared to the functioning of family members of other veterans who served in the Australian military during the Vietnam War (1962 to 1975) but were not deployed to Vietnam (referred to as Vietnam-era personnel). Using this approach, differences between the experiences of sons and daughters of Vietnam veterans and Vietnam-era personnel can be used to estimate the impact of service in the Vietnam War, provided that rival explanations can be excluded.

Following the completion of all survey fieldwork, the Australian Institute of Family Studies was engaged to analyse the results of the Main Survey conducted for the study. Specifically, the institute was commissioned to answer two research questions:

- What effect, if any, has active Vietnam service had on the physical, mental and social wellbeing of the sons and daughters of Australian Vietnam veterans?
- Which risk, protective and mediating factors might account for those effects that also have implications for service delivery?

7.1 Features of the analyses that ensure that the findings are robust

Before turning to a discussion of the impacts of deployment in Vietnam on sons and daughters, it is worth noting three important features of these analyses that ensure that the findings are more robust than those of other similar studies of this population:

- First, the sons and daughters of Vietnam-era personnel constitute the best available comparison group for estimating the impact of the Vietnam War. The Vietnam veterans and Vietnam-era personnel were matched on 39 variables to ensure comparability using a statistical technique called propensity score analysis. The use of propensity score analysis was an important step since there were statistically significant differences between Vietnam veterans and Vietnam-era personnel on a large number of pre-deployment measures, including service and employment history (served in previous conflicts, been in National Service, had a parent in the armed services, been previously employed), the parenting the veteran was exposed to in their childhood, and the health of the veteran's parents (parental warmth, fathers being overprotective, parental drinking problems and having a parent diagnosed with cancer).
- Second, based on comparisons of demographic variables in the Nominal Roll of Vietnam Veterans, the Vietnam veterans in this study are broadly representative of the total population of Vietnam veterans.
- Third, although sons and daughters of Vietnam veterans were more likely to participate than sons and daughters of Vietnam-era personnel, these differences are unlikely to have biased the results. We tested whether the proportion of sons and daughters from each family who participated in the survey was higher if one or more of the children in that family had a health condition. None of the 10 conditions we examined was associated with the rate of participation or the extent to which the families of Vietnam veterans and Vietnam-era personnel differed in their rates of participation.

7.2 The impact of Vietnam War deployment on sons and daughters of veterans

This section summarises the findings of the study of the impact of Vietnam War deployment on sons and daughters of veterans. In total, we tested for statistically significant differences in 34 outcomes between sons and daughters of Vietnam veterans compared to Vietnam-era personnel after adjusting for pre-existing differences in the propensity to be deployed to Vietnam using the propensity score weighting technique. The outcome variables covered the areas of mental

health, pregnancy and birth defects, physical health, social functioning and economic wellbeing. Differences between sons and daughters of Vietnam veterans and Vietnam-era personnel are presented here as percentages, having been estimated from our statistical modelling that includes the propensity score weights. All differences presented were statistically significant at the 95 per cent level of confidence.

7.2.1 Mental health and substance use

In terms of mental health outcomes, we tested for whether sons and daughters of veterans had ever been diagnosed with or treated for depression, anxiety and posttraumatic stress disorder, whether they had ever tried marijuana or had tried it in the preceding 12 months, their levels of alcohol use, and for suicidal thoughts as well as specific suicidal plans and/or actions. Of all the areas we examined the greatest difference between sons and daughters of Vietnam veterans and Vietnam-era personnel was in the area of mental health and substance use. Relative to the sons and daughters of Vietnam-era personnel, sons and daughters of Vietnam veterans were more likely to:

- report being diagnosed with or treated for depression—21 versus 14 per cent
- report being diagnosed with or treated for anxiety—22 versus 13 per cent
- report being diagnosed with or treated for posttraumatic stress disorder—4 versus 1 per cent
- report having suicidal thoughts—41 versus 31 per cent
- report suicidal plans and/or actions—12 versus 7 per cent
- report having tried marijuana—68 versus 56 per cent.

These results are consistent with the research literature on more recent deployments to Iraq and Afghanistan (White et al. 2011), as well as previous studies of sons and daughters (Centre for Military and Veterans' Health 2007).

It is difficult to compare these results with the general population since the measures used in the Vietnam Veterans Family Study are not directly comparable with those used in other nationally representative surveys such as the National Survey of Mental Health and Wellbeing. It is likely that the Vietnam Veterans

Family Study survey has higher rates by virtue of the reliance on single items to identify lifetime occurrence of particular mental health problems, while the National Survey of Mental Health and Wellbeing relies on a composite international diagnostic interview, which has more stringent criteria for assessing whether someone has a particular mental health condition. Moreover, military families differ in significant ways from the general population. Any comparisons to be made should therefore be seen as indicative and may be subject to substantial error.

Given all these caveats, there are a few comparisons that can be made to provide an indication of the mental health of adult sons and daughters of veterans compared to the general population. For instance, the lifetime prevalence of a depressive disorder is 15 per cent, which is greater than that for sons and daughters of Vietnam-era personnel but lower than that for sons and daughters of Vietnam veterans. Rates of PTSD are much lower in sons and daughters of Vietnam veterans compared to the general population, with a lifetime prevalence rate of 12 per cent in the general population. Lifetime rates of suicidal ideation are, however, far lower in the general population (at 16 per cent) than in sons and daughters of Vietnam veterans. In this study those who had planned and attempted suicide had also had suicidal thoughts, so the rate in the sons and daughters of Vietnam veterans was 53 per cent and in the sons and daughters of Vietnam-era personnel was 38 per cent.

7.2.2 Pregnancy and birth defects

We tested for differences in problems conceiving a baby, miscarriage, having a child who was stillborn, having a child with spina bifida, and having a child with a cleft lip and/or palate.

There were no statistically significant differences in terms of pregnancy and birth defects when the rates for sons and daughters of Vietnam veterans were compared to those for sons and daughters of Vietnam-era personnel.

7.2.3 Physical health

For physical health of the offspring of the veterans we examined reports of ever being diagnosed with or treated for diseases in the following areas:

- musculoskeletal system—arthritis, osteoporosis or other joint disorders
- circulatory system—stroke, angina, hypertension, coronary heart disease, heart attack or myocardial infarction
- cancer—skin cancer, melanoma, soft tissue and organ cancer, blood and bone cancers, acute myeloid leukaemia or other tumours
- endocrine, nutritional and metabolic systems—type 1 or type 2 diabetes
- respiratory system—asthma or chronic lung disease (for example, emphysema, chronic bronchitis)
- genitourinary system—kidney disease
- digestive system—liver disease
- hearing problems—excluding age-related hearing loss
- skin conditions—eczema, psoriasis
- migraines
- neurological problems—epilepsy or motor neurone disease.

There were some statistically significant differences in the physical health of sons and daughters of Vietnam veterans compared to sons and daughters of Vietnam-era personnel. Relative to the sons and daughters of VEP, sons and daughters of VV were more likely to:

- report having skin conditions—21 versus 14 per cent
- report having migraines—13 versus 7 per cent
- report having sleep disturbances—15 versus 9 per cent.

The significant differences that were found in relation to physical health are consistent with the findings of significant mental health problems and high levels

of stress in sons and daughters of Vietnam veterans. Difficulty sleeping is a feature of depression, while psychological stress is associated with migraines (Maleki et al. 2012) and is a risk factor for eczema (Wright et al. 2005) and psoriasis (Huynh et al. 2013).

7.2.4 Social functioning

For social functioning a number of different areas were examined—differences in sons' and daughters' current relationship status as well as the number of marriages or de facto relationships, whether sons and daughters had ever been convicted of a criminal offence, and whether they had ever been a victim of personal violence.

There were some differences in relationships but not in terms of being a victim or being convicted of a criminal offence. More specifically, relative to the sons and daughters of Vietnam-era personnel, sons and daughters of Vietnam veterans were more likely to be in a de facto relationship (19 versus 11 per cent) but there were no statistically significant differences in the rates of being married (57 versus 63 per cent), being divorced, separated or widowed (8 versus 6 per cent) or being single (17 versus 21 per cent). Differences in the number of relationships were consistent with current relationship status, with sons and daughters of VV being more likely to have had more than one marriage or de facto relationship (36 versus 30 per cent) compared to sons and daughters of VEP, who were more likely to have had only one marriage or de facto relationship (62 versus 53 per cent). Taken together, these results suggest that sons and daughters of VV do not have any difficulty forming serious relationships, but maintaining relationships is somewhat more difficult for them compared to sons and daughters of VEP. This finding should also be interpreted in the context of the greater difficulties in the area of mental health since the onset of mental health problems has been found to lead to subsequently higher rates of separation and divorce (Bruce 1998).

7.2.5 Economic wellbeing

We tested for differences in the level of education achieved, employment, employment instability, financial stress in the past, financial stress in the last 12 months, ever being homeless and currently being homeless. There were some statistically significant differences for some variables in this area. Compared to sons and daughters of VEP, sons and daughters of VV were:

- more likely to have a certificate or diploma (35 versus 28 per cent)
but
- less likely to have a university degree (41 versus 49 per cent)
and
- more likely to have experienced financial stress in the past (43 versus 33 per cent) but not in the last 12 months.

These findings suggest that sons' and daughters' educational progress is hindered by their parents' deployment to Vietnam. The process by which this could occur is discussed in more detail in Chapter 5, but it is sufficient to say here that the indications from retrospective reports of schooling experiences from sons and daughters of veterans were that sons and daughters of VV had more difficulties at school than sons and daughters of VEP (that is, being suspended or expelled from school, being absent or being bullied, having learning problems).

While there were no differences in employment stability between the two groups, and the Main Survey did not collect information about occupational status of current or previous jobs, we do know that over the lifetime the return to a university education is significantly greater among adult sons and daughters of VV (Leigh 2008) and this may be one reason for the greater rates of the experience of financial stress.

7.3 Explaining the impact of deployment: comparisons between sons and daughters of Vietnam veterans and Vietnam-era personnel

7.3.1 Main findings in summary

Having established that there were 12 outcomes for which deployment to the Vietnam War had an impact on the sons and daughters of Vietnam veterans, in Section 3.2 we seek to explain these impacts using other information collected in the Main Survey. We tested a model, informed by previous research, suggesting that the intergenerational impact of deployment can be explained by several factors:

- the servicemen's own PTSD
- the sons' and daughters' experiences at primary and secondary school—being suspended or expelled; absenteeism or being bullied; learning problems such as repeating a year, working with a professional to address a learning difficulty, placement in a remedial class, dropping out of a course; placement in a gifted class or jumping ahead a year
- the family environment—harsh parenting, parental separation during childhood, warm parenting behaviour, overprotective parenting by mothers and fathers, and either parent having an alcohol or drug problem
- servicemen's health—ever diagnosed with or treated for depression, anxiety, skin conditions, migraines or a sleep condition (for example, sleep disturbance/insomnia, sleep apnoea)
- servicemen's use of social support from family and friends, service-related support services (Veterans and Veterans Families Counselling Service, the Department of Veterans' Affairs website and resources, ex-service organisations) and health-related supports (general practitioner or other medical service).

It should be noted that the survey was conducted at a specific point in time and also collected retrospective information, so the timing of events and conditions cannot be ascertained. Consequently, the results in this section are correlational and suggestive rather than implying causation.

A number of primary findings emerged:

- First, the models were able to explain the impact of deployment in most instances—10 of the 12 outcomes examined. The impacts of deployment on drug use (lifetime use) and relationship status were the only outcomes that were not fully explained by the variables in our model. In all other instances the explanatory variables accounted for the impact of deployment.
- Second, there were a large number of pathways by which deployment influenced the outcomes for sons and daughters—16 identified in total. Despite the large number of pathways that were implicated by our analyses, these pathways usually consisted of a combination of a few key variables or

groups of variables. The discussion focuses only on the variables that most consistently explained the impact of deployment (for more details on all 16 pathways see Table 5.6).

- Third, the explanatory variable that was most influential was servicemen's PTSD. Servicemen's PTSD was involved in explaining the impact of deployment on nine of 12 outcomes and in 10 of the 16 pathways. The influence of PTSD was often indirect, with the condition leading to higher rates of problems at school, poorer family environments, and higher rates of depression, migraine or skin problems in servicemen, which in turn led to more problematic outcomes for sons and daughters. Sections 5.3 and 5.4 discuss the implication of these findings.
- Fourth, the next most influential variable was the experience of harsh parenting in the childhood of the offspring of veterans. Harsh parenting was involved in mediating the impact of deployment for all measures of mental health as well as sleep problems and the experience of financial stress during the lifetime. It was also an important explanatory variable for the impact of deployment by way of veterans' PTSD for these same variables (except lifetime drug use). Section 5.1 discusses the implications of this and provides an explanation of how 'harsh parenting' was defined for the purposes of this study.
- Finally, the sons and daughters of veterans were asked whether they had problems at school, and these items were also important in explaining the intergenerational consequences of deployment. School absenteeism and being bullied at school were involved in explaining the impact of deployment on all the mental health and substance use measures, the three physical health measures, and the measure of lifetime financial stress. Deployment impacts, on PTSD and subsequently on these behavioural problems, were also evident for depression, anxiety, PTSD, suicidal plans or actions, migraines and sleep problems among the sons and daughters of the servicemen. Learning problems also helped account for the impact of deployment, mediated by the PTSD of the fathers, on depression, anxiety, suicidal plans and actions, and education among their sons and daughters.

In the following sections we discuss the implications of these findings with reference to previous research on military families and the broader research literature, as well as the possible implications for service delivery responses.

7.3.2 The role of posttraumatic stress disorder among veterans

Posttraumatic stress disorder may be one of the most important explanations for the effects of deployment on the sons and daughters of military personnel reported on here. Of all the outcomes on which the offspring of Vietnam veterans and Vietnam-era personnel differed, only three—relationship status, skin conditions and marijuana use—appeared unrelated to whether the respondent’s father had significant symptoms of PTSD.

These results imply that the intergenerational effects of Vietnam War service are largely due to the fact that Vietnam veterans were significantly more likely to develop PTSD as a result of their service. Roughly two in five such veterans were classified as having PTSD, compared to one in 25 Vietnam-era personnel, and many more may have suffered from the condition at some point since the completion of their military service: perhaps as many as three in five Vietnam veterans have been diagnosed with PTSD at some stage in their life. Not all survivors of combat will necessarily develop PTSD, but supplementary analyses indicate that the experience of potentially traumatic events such as feeling in danger of being killed, being present when a close friend or relative was killed, or handling dead bodies is associated with significantly elevated risks of developing PTSD. This finding is consistent with previous studies that find PTSD sufferers are more likely to have sustained combat injuries, been in close proximity to an explosion, engaged in hand-to-hand combat, witnessed the serious injury or death of others, or encountered dead bodies (Tanielian 2009; Foy et al. 1984).

Numerous studies find that PTSD among parents is associated with more adverse outcomes among sons and daughters (Centre for Australian Military and Veterans’ Health 2007) but, in the absence of a prospective longitudinal study, it is difficult to delineate the precise mechanisms linking PTSD among adults to sons’ and daughters’ emotional, physical and social welfare. Having a parent who suffered from PTSD as a result of their Vietnam War service might have affected the Vietnam Veterans Family Study sons and daughters in a number of ways:

- It might have affected sons and daughters by affecting their mothers. PTSD can contribute to psychological and emotional distress (for example, anxiety and depression) among the partners of sufferers, place additional strain on them (as a result of the need to care for the affected partner) and lead to significant problems in the spousal relationship (Gavlovski & Lyons 2003; Dekel & Monson 2010). Partners can also develop symptoms of PTSD themselves as a result of secondary traumatisation (Gavlovski & Lyons 2003; Dekel & Monson 2010). These changes can undermine the capacity of mothers to care for their sons and daughters. We were unable to directly assess the impact of Vietnam War service on the mothers of the VVFS sons and daughters; nonetheless, these factors are broadly consistent with the results observed in this report.
- As a result of the problems posed by PTSD for intimate relationships, sufferers and their partners may be more likely to separate or divorce than other couples (Gavlovski & Lyons 2003). Even though most sons and daughters successfully adjust to parental separation and divorce, marital dissolution can adversely affect sons' and daughters' wellbeing, especially if it is accompanied by intense marital conflict, ineffective conflict resolution, low parent–child attachment, uncooperative co-parenting and poor communication between parents (McIntosh 2003). We found that parental separation helped explain the effects of PTSD on suicidal ideation among the veterans' sons and daughters; parental separation did not, however, help account for the effects of PTSD on any other outcomes.
- Fathers suffering from PTSD can become controlling and overprotective or withdrawn and distant (Caselli & Motta 1995; Dekel & Goldblatt 2008; Gavlovski & Lyons 2003)—parenting styles that have long been associated with poorer developmental outcomes for sons and daughters. They may also be prone to excessive anger and tend to use violence to solve personal problems (Dekel & Goldblatt 2008; Gavlovski & Lyons 2003) more than other parents. Hostile or harsh and erratic parenting has long been associated with internalising and externalising problems in sons and daughters (Ge et al. 1996; Chang et al. 2003; Capaldi 1992; Conger et al. 1992). We found some evidence to support this mechanism; first, paternal warmth partially explained the effects of PTSD on suicidal planning and actions and sons' and

daughters' economic welfare; second, we found links between harsh parenting, PTSD and several outcomes. In the case of harsh parenting, however, the measure does not identify which parent (or other family member) was responsible for the harsh parenting. These findings are discussed in Section 6.3.

- Finally, sons and daughters may experience secondary trauma as a result of being over-exposed to details of the trauma, the child identifying with their father's trauma and adopting or mimicking symptoms (Dekel & Goldblatt 2008; Gavlovski & Lyons 2003). Consistent with this hypothesis, we found that sons and daughters whose fathers had PTSD were more likely to have been diagnosed with PTSD themselves; the child reporting being diagnosed with PTSD did not, however, account for the impact of the father's PTSD on any other child outcomes. This would suggest that sons and daughters do not necessarily have to develop PTSD to be affected by their father's condition, even if they are exposed to secondary traumatisation.

These findings imply that a central focus of reducing the intergenerational consequences of military service should be reducing the prevalence of PTSD among combat veterans. Various psychological therapies have been found to be effective for treating PTSD, including cognitive behavioural therapy, individual and group trauma-focused cognitive behavioural therapy, and eye movement desensitisation and reprocessing (Bisson et al. 2013). Trauma-focused cognitive behavioural therapy, or TF-CBT, is a specialised form of cognitive behavioural therapy that aims to alter the way individuals think about themselves and the event(s) that precipitated their condition, helping them avoid distorted and dysfunctional cognitions. Eye movement desensitisation and reprocessing, or EMDR, seeks to bring trauma-related images, beliefs and body sensations to mind in controlled settings in order to reprocess memories of the event, replacing negative views with more positive ones. Finally, non-TF-CBT involves methods such as stress inoculation training, which aims to reduce anxiety by helping PTSD sufferers understand the thoughts underlying their anxiety, develop skills and techniques for stress management, and practice these skills to improve their application and effectiveness (Bisson et al. 2013; Brewin 2003).

Minimising the impact of military service on families, however, can also require interventions that are focused on veterans and their families (Dekel & Monson 2010). Most treatment approaches continue to focus only on the individual sufferer despite evidence that PTSD can have severe consequences for families. As a result, surprisingly few family-centred interventions have been evaluated (Dekel & Monson 2010). There is some evidence that relationship satisfaction, couples' problem solving and communication, and even the severity of symptoms of PTSD sufferers may improve in response to couple-centred treatment programs (Dekel & Monson 2010). Only two of the studies evaluating these interventions were based on randomised controlled trials, and all of them appear to have evaluated distinct combinations of treatments (for example, cognitive behavioural therapy) and contexts (for example, multi-group or individual couples). Further research aimed at developing and evaluating couple-centred treatment programs is needed, therefore, especially if the impact of PTSD on partners accounts for much of the effect of PTSD on their sons and daughters. Even less research has been done to examine the efficacy of PTSD treatment programs that are focused on improving relationships between parents and their sons and daughters (Dekel & Monson 2010). There is a clear need for additional research to investigate the efficacy of interventions focused on the sons and daughters of veterans suffering from PTSD. A greater focus on family-centred interventions could offer the most efficient way of minimising the intergenerational effects of combat exposure and associated harms. It may even improve the efficacy of individual treatments that are influenced by the family environment (Tarrier et al. 1999).

7.3.3 The role of harsh parenting

Harsh parenting was an important mediator of the impact of deployment on all the sons' and daughters' mental health measures that were examined (that is, depression, anxiety, PTSD, drug use and suicidal ideation) as well as sleep problems and the experience of financial stress. One in five sons and daughters of Vietnam veterans reported experiencing at least one of five indicators of harsh parenting in their childhood compared to one in 10 for sons and daughters of Vietnam-era personnel.

Before focusing on the implications of these findings, it is important to understand the nature of the measure of harsh parenting. Offspring of VV

reported higher rates of verbal abuse, physical punishment and humiliation, ridicule, and bullying or mental cruelty by a parent but did not have significantly higher rates of severe physical abuse (such as being hit or beaten with an object or needing medical treatment) or higher rates of witnessing physical or sexual abuse of others in the family compared to offspring of VEP. The composite measure of harsh parenting used in this study also did not include a measure of neglect or a measure of sexual abuse. The measure therefore characterises physical and verbal abuse rather than neglect and sexual abuse and reflects harsher parenting practices.

Harsh parenting also mediated the influence of having a father who suffered from PTSD, with the impact of deployment mediated through PTSD and then by harsh parenting for sons' and daughters' depression, anxiety, PTSD, suicidal ideation, sleep problems and lifetime financial stress. The rates of experiencing harsh parenting were higher for offspring of VV with PTSD compared to offspring of VV who did not experience PTSD. There were, however, higher rates of harsh parenting in the sample of sons and daughters of VV compared to sons and daughters in the VEP sample. For example, 28 per cent of offspring who had a father with clinical levels of PTSD reported that they had experienced at least one of the five indicators of harsh parenting in their childhood compared to 20 per cent of offspring of VV who did not experience PTSD. So, even for the offspring of VV without PTSD, there were far more of them experiencing harsh parenting practices than was the case for offspring of VEP. In part, this may be due to the measure of veterans' PTSD, which measured PTSD symptomatology in the preceding month, as this may underestimate the experience of PTSD in veterans, particularly in the childhoods of offspring of veterans. It was, however, preferred as a more accurate assessment of PTSD than a report of prior diagnosis and because PTSD was not recognised as a psychological disorder until some time after the Vietnam War. Some of the underlying associations between deployment and harsh parenting may therefore be partly explained by PTSD, although it is unlikely that PTSD is the sole explanation. Other studies report that the experience of deployment is a stressful one and that this provokes more harsh parenting practices in military families (for example, Rentz et al. 2007; McCarroll et al. 2008).

When considering the lifetime implications of parents' deployment in Vietnam, it is important to keep in mind that there are long-term implications of harsh parenting in the general population (Higgins & McCabe 2000). Longitudinal and retrospective studies of sons and daughters suggest that those who had experienced maltreatment reported much higher rates of depression, PTSD and suicidal ideation in adulthood (Gilbert et al. 2009). The precise way in which harsh parenting influences the mental health of children is not well understood, but research does suggest that aversive experiences such as these affect brain development (Gilbert et al. 2009).

In terms of the wider literature on the impact of deployment, several points warrant mention:

- First, the results are consistent with those of other studies that find rates of harsh parenting are higher at times in which larger numbers of personnel are deployed to or returning from active military service (Rentz et al. 2007; McCarroll et al. 2008). It is worth noting that harsh parenting has also been found to be associated with poorer mental health outcomes for children in the general population.
- Second, US studies find that rates of harsh parenting increase during periods of deployment (Gibbs et al. 2007), suggesting that mothers of sons and daughters can also be responsible for harsh parenting practices. The findings do not identify a particular source of harsh parenting, so any attempt to address harsh parenting needs to consider both parents.
- Third, although both parents may have a role to play, the higher rates of harsh parenting for offspring of veterans with PTSD found in our results align with the results of studies that suggest that veterans with PTSD are likely to use violence to solve personal problems (Dekel & Goldblatt 2008; Gavlovski & Lyons 2003).
- Finally, although we tested the capacity to explain the impact of deployment for several elements of the family environment, harsh parenting was the most influential. The other family environment measures—parental separation during childhood, warm parenting behaviour, overprotective parenting by mothers and fathers, and either parent having an alcohol or

drug problem—largely did not explain the impact of deployment on the outcomes examined. Rates of parental separation in childhood were very similar for the offspring of VV and VEP parents, and the previous research literature has been equivocal on whether deployment affects divorce and separation rates (Heerwig & Conley 2013). Rates of parental alcohol or drug use were also comparable between the sons and daughters of veterans from the two groups. For the other measures of parenting behaviour, it appears that while VV fathers were considered to be less warm and more overprotective than fathers who were VEP, the presence of harsh parenting practices matters far more for the long-term outcomes of offspring of VV.

There are some clear implications for targeted service provision to respond to harsh parenting of the kind observed in this study.

A number of programs have been demonstrated to be effective in preventing and responding to harsh parenting. Parenting programs such as Triple P have been evaluated and found to prevent and reduce harsh parenting in a community trial (Holzer et al. 2006; Prinz et al. 2009). For parents of young sons and daughters, home visiting programs have also been found to prevent harsh parenting (Higgins et al. 2006; Olds et al. 1997).

In terms of more targeted programs for the veteran community, the *Talk, Listen, Connect: changes* kit developed by the Sesame Workshop for families with a military parent who has been injured during deployment has been found to have some positive effects on carers and their sons and daughters (Walker et al. 2013). As one would expect with a multimedia intervention, however, the outcomes are modest and do not specifically deal with harsh parenting.

Another strategy that has been used by the US Department of Defense is to provide tailored educational programs and support to professionals who would come into contact with military families. The program, Coming Together around Military Families, offers specialised training and support for professionals and organisations (Osofsky & Chartrand 2013).

There are thus a number of mechanisms through which preventive interventions could be deployed to respond to these concerns for military families involved in more recent conflicts.

7.3.4 The role of problems at school

Of the several experiences at primary or secondary school that sons and daughters were asked to report on, experiences of absenteeism or being bullied, learning problems, and being suspended or expelled were important in explaining the impact of deployment. Disentangling precisely how these problems at school lead to problems in later life is difficult, particularly since the Main Survey is cross-sectional and relies on retrospective reports. To elucidate the precise pathways by which deployment affects sons and daughters, a prospective longitudinal study is needed, although the results reported here highlight several candidates associated with difficulties at school that undermine wellbeing in adulthood.

Other longitudinal studies of sons and daughters in the general population have tried to understand the role of many of these variables in undermining wellbeing in childhood through to adulthood. For example, the available evidence from longitudinal studies examining bullying victimisation suggests that the experience of bullying early in school is a risk factor for depression (Ttofi et al. 2011). Australian and overseas longitudinal studies have found that sons and daughters who had been bullied had higher rates of depression, particularly when accompanied by learning difficulties at school (Ttofi et al. 2014; Vassallo et al. 2014). Sons and daughters of VV also had higher rates of learning problems than sons and daughters of VEP, and a similar process could have been involved with sons and daughters of VV.

School absenteeism also has a detrimental influence on sons' and daughters' life chances. Patterns of absenteeism can be set in train early on in primary school (Daraganova et al., in press), and higher levels of absenteeism in primary school and secondary school have detrimental impacts on school achievement (Daraganova et al., in press; Hancock et al. 2013) and, therefore, life chances.

Learning problems can contribute to higher rates of school absenteeism (Daraganova et al., in press) as well as more difficulties with bullying (Ttofi et al. 2014; Vassallo et al. 2014). Difficulties such as reading problems show a high level of continuity between primary and secondary school (Smart et al. 2005) and so have the potential to undermine school completion, higher education and job prospects.

Problems at school also mediated the impact of deployment through having a father diagnosed with PTSD. This pathway was evident for depression, anxiety, PTSD, suicidal ideation, migraines, sleep problems and lifetime financial stress among sons and daughters. As noted, the precise way in which deployment influences adult outcomes is difficult to disentangle, but these pathways do suggest that at least at school there are early warning signs of sons and daughters experiencing difficulties. Targeted education programs for school teachers, aimed at improving understanding of some of the difficulties military families are experiencing in areas of the country with large numbers of military families, might help families of future deployments (Osofsky & Chartrand 2013).

7.4 Explaining the impact of deployment: deployment characteristics

The specific impacts of deployment on the health and social and economic wellbeing of Vietnam veterans' sons and daughters were examined. For these sons and daughters, the association between the following deployment characteristics and wellbeing was examined:

- total duration of deployment
- time of the child's birth relative to the veteran's first deployment
- corps
- rank
- deployment instability
- exposure to herbicides
- experience of traumatic events such as being in danger of being killed or injured, handling or seeing dead bodies, or hearing of a close friend, relative or other service personnel who had been injured or killed
- conscription.

The main characteristics of deployment that were related to sons' and daughters' outcomes were the following:

- total duration of veteran's deployment

- timing of the child's birth relative to the father's first deployment
- the veteran's corps and rank.

The cumulative length of the father's deployment during the child's lifetime was associated with:

- increased anxiety and sleep disturbances among sons and daughters
- poorer education levels
- difficulty maintaining long-term relationships.

Compared to sons and daughters who were born before their father was first deployed, sons and daughters who were born after their father was deployed were more likely to:

- ever experience financial stress
- be married
- have a university degree.

The father's corps and rank were related to the largest number of sons' and daughters' outcomes. Sons and daughters of fathers who served in the Royal Australian Infantry were more likely to develop poor outcomes compared to sons and daughters of fathers from other corps. More specifically, sons and daughters of fathers who served in the Royal Australian Infantry were more likely to:

- be diagnosed with or treated for PTSD, skin conditions or migraines and be in de facto relationships (compared to sons and daughters of fathers from the Royal Australian Engineers)
- be diagnosed with or treated for anxiety (compared to sons and daughters of fathers from the Royal Australian Artillery and other corps).

Sons and daughters of enlisted fathers were also more likely to experience poor outcomes compared to sons and daughters of fathers who served as non-commissioned officers or officers. Compared to sons and daughters of non-commissioned officers, sons and daughters of enlisted fathers were more likely to have tried drugs. Compared to sons and daughters of officer fathers, sons and daughters of enlisted fathers were also more likely to:

- have low levels of education
- report having depression
- be single
- not be in a long-term relationship
- have suicidal ideation.

The only outcomes related to the father's experience of trauma were associated with physical and economic wellbeing. Sons and daughters of fathers who reported experiencing trauma during their deployment were more likely to report having migraines and less likely to report having only Year 12 or below education.

Having a father who was conscripted was a protective factor for only one outcome: if the father was conscripted his child was less likely to be single.

Overall, the social and economic wellbeing of veterans' sons and daughters was associated with many different aspects of a father's deployment, while mental and physical health was mainly associated with the duration of a father's deployment and the corps and rank the father obtained.

7.4.1 The duration of deployment

We found that the length of each veteran's deployment was positively related to the probability of his sons and daughters having experienced anxiety and sleep disturbances and negatively related to the extent of their educational achievement. In general, sons and daughters were worse off if their fathers spent more time in Vietnam. In addition, sons and daughters whose fathers were deployed for longer were less likely to have been either married or in a cohabiting relationship. These findings were not attributable to the age of respondents or their fathers or their experiences of learning or disciplinary problems at school and held even after adjusting for a range of other explanatory factors.

In comparison to the sons and daughters of veterans who spent less than eight months on active military service in Vietnam, among those whose fathers were deployed for more than a year in total, the predicted probability of:

- reporting having been diagnosed with anxiety was 8 per cent higher

- having completed post-secondary education was 13 per cent lower
- having ever been in a married or cohabiting relationship was 5 per cent lower.

The negative repercussions of deployment length were not confined to the families of veterans who spent more than a year in Vietnam. Compared to the sons and daughters of veterans who were deployed for less than eight months, the predicted probability among sons and daughters whose fathers were deployed for less than 12 months of:

- having been diagnosed with depression was 5 per cent higher
- having been diagnosed with anxiety was 6 per cent higher
- having been diagnosed with or treated for a sleep condition (for example, sleep disturbances, insomnia or sleep apnoea) was 4 per cent higher
- having ever been married or in a cohabiting relationship was 4 per cent lower.

Prior research finds that longer deployments are associated with more adverse psychological outcomes for military personnel (Buckman et al. 2011; Adler et al. 2002). In particular, several studies report an association between the length of deployment and the risk of developing PTSD in response to exposure to combat (Rona et al. 2007). Given the likely effects of PTSD on the sons and daughters and partners of veterans, it could be that lengthy deployments increase the risk of harm to sons and daughters because they contribute to the risk of their parents developing PTSD. In other words, it may be that adult sons and daughters of men who were deployed for longer fare worse than the sons and daughters of other veterans simply because their fathers are more likely to have developed PTSD. There is considerable evidence that PTSD among parents has adverse intergenerational consequences, including the results of our analyses that find that PTSD among parents is negatively associated with the social and emotional wellbeing of their sons and daughters. But the length of deployment is related to child outcomes even after controlling for whether their fathers had PTSD. Even allowing for the possibility that our measure of PTSD underestimates the extent to which sons and daughters were exposed to their father's symptoms, PTSD may not be the only mechanism through which longer deployments result in greater harm to veterans and their families. At least some of the effects of lengthier

deployments on sons and daughters, therefore, may be due to the impact of being separated from their fathers or the effect of longer deployments on the stress and anxiety of their mothers.

These results are broadly consistent with those of several studies that found the length of deployment is related to the social and emotional wellbeing of the sons and daughters of service personnel (Chandra et al. 2010; Lester et al. 2010) and a recent Australian study that found veterans were more likely to state that long-term deployments had a negative effect on their marriages and on the wellbeing of their children (Dobson et al. 2012). Deployment length may affect the daughters and sons of military personnel in a number of ways. For children, separation from a parent during the parent's military deployment can be a significant source of stress and anxiety, can trigger disruptions in daily routines, and can lead to an increased sense of danger (Flake et al. 2009). Proponents of attachment theory also contend that prolonged separation from a significant caregiver can affect children's attachment styles, thereby affecting their interpersonal relationships and their subsequent social and emotional development (Foster et al. 2003). Lengthy deployments may also place significant burdens on non-deployed parents, especially if their children are young. There is some evidence that the parents of young children whose partners were deployed had higher levels of self-reported stress than is typically observed in the general population or among parents in military families in the absence of deployment (Chartrand et al. 2008). Differences in the stress levels experienced by non-deployed parents whose partners are on active military service appear to account for differences in externalising and internalising and attention problems among their children during periods in which the military personnel were deployed (Flake et al. 2009; Rosen et al. 1993).

Whatever the underlying explanation for these effects, our results have important implications for the management of deployment in contemporary and future military operations. This is especially important given that the results of our analyses provide evidence of some long-term intergenerational effects of deployment length. The fact that, as adults, men and women whose fathers served for longer were less likely than others to have ever been in a cohabiting or marital relationship suggests that the effects of deployment length can still be observed more than 40 years after those deployments ended.

In the past 20 years the number and duration of operational commitments involving Australian military personnel have increased considerably. Such commitments may limit the Australian Defence Force's ability to restrict the length of military deployments in the era of the all-volunteer military; in fact, even though most ADF personnel appear to be deployed for less than a year, roughly 16 per cent of ADF personnel deployed to the Middle East Area of Operations were deployed for longer than 12 months (Dobson et al. 2012). These figures also do not take into account the total length of multiple deployments. The results of the Vietnam Veterans Family Study suggest that failure to set maximum time limits on such deployments may have serious consequences for the families of service members. Evidence was found of the intergenerational effects of military deployments that lasted longer than 12 months with respect to mental health, education and interpersonal relationships. Together with other studies that highlight the negative effects of such long-term deployments, our results suggest a need to prevent ADF personnel from being deployed for more than a year.[†]

At the same time, our results indicate that even seemingly short-term deployments can have long-term consequences for military families. Sons and daughters whose fathers spent eight to 12 months in Vietnam were still significantly more likely to suffer anxiety and sleep disturbances than those whose fathers served for less than eight months. In addition, those same sons and daughters were less likely to have ever been married or ever had a cohabiting relationship than those whose fathers spent less time in Vietnam. These results are consistent with those of other studies showing that successive short-term deployments may also be harmful. For example, one study reported that personnel who spent more than 13 months within a three-year period on deployment were more likely to develop PTSD (Rona et al. 2007). That study also found an association between deployment duration and severe alcohol problems

[†] It should be noted that the measure of deployment length used in this study was based on the dates of service contained in the Nominal Roll. In particular, we derived the deployment length as the total amount of time that the service member served in Vietnam (as shown on the Nominal Roll). The results of our analyses indicated that the sons and daughters of veterans who spent more than 12 months in Vietnam in total were worse off than the sons and daughters of veterans who were deployed for shorter periods. We did not conduct any analyses to determine whether multiple short-term deployments were related to child outcomes to the same extent as the overall length of deployment: this represents a limitation of the current analyses. On the basis of recent studies that caution against both long-term single deployments and multiple deployments within too short a period, this is a matter worth pursuing in future research.

among veterans. These results might also suggest, therefore, that limiting the duration of deployments to a single year may not be sufficient. For example, as noted, the British Ministry of Defence recommends that military personnel be deployed for six months at a time and for less than 12 months in any three-year period.

7.4.2 Birth relative to father's deployment

In some cases respondents had more positive outcomes if they were born after their father was deployed for the first time. Among those whose father was deployed before they were born, the predicted probability of:

- being married was 20 per cent higher
- being single (that is, not married, cohabiting or divorced) was 16 per cent lower
- being ever in financial stress was 16 per cent higher
- having a university degree was 13 per cent higher.

While the result pertaining to educational outcomes is surprising and runs counter to our expectations, the other two results are consistent with the view that even the temporary disruption to families caused by military deployment can have long-term effects on Defence families. These results are also consistent with some of the specific explanations for how and why military deployment affects sons' and daughters' emotional and social wellbeing. Sons and daughters whose fathers were deployed during their lifetime may have been stressed and anxious as a result of their separation from their father or concern about his safety. These early experiences may have had consequences that endure beyond the period of the father's deployment. For example, this may have affected sons' and daughters' attachment styles (Foster et al. 2003), which could have implications for their experience of intimate relationships in adulthood (Hazan & Shaver 1987; Fraley & Shaver 2000). Prolonged separation from parents in childhood has also been associated with poorer mental health outcomes among adults (Foster et al. 2003; Pesonen et al. 2007). At the same time, the absence of deployed fathers might have contributed to greater anxiety and depression among non-deployed parents. This in turn could have affected the emotional and social wellbeing of

sons and daughters, with implications for their educational performance and relationship outcomes. By contrast, those who were born after their father had begun his deployment did not experience early separation or increased stress on the part of the non-deployed parent.

These results have implications for the way in which deployment in subsequent operations is managed. The likelihood that sons and daughters born before deployment may be disadvantaged relative to those born after it suggests a need to limit the duration of deployments among personnel with young sons and daughters, in addition to considering the adoption of services that support military families, as described in Chapter 5.

7.4.3 Rank and corps

In the case of rank, there were significant differences between the emotional, social and physical wellbeing of the sons and daughters of Vietnam veterans. Relative to enlisted men, the probability of:

- having had suicidal thoughts was 31 per cent lower among the sons and daughters of officers
- having been diagnosed with or treated for a sleep condition (for example, sleep disturbances, insomnia or sleep apnoea) was 4 per cent lower among the sons and daughters of non-commissioned officers
- being single (that is, not married, cohabiting or divorced) was 9 per cent lower among the sons and daughters of officers
- having ever been either married or in a cohabiting relationship was 9 per cent lower among the sons and daughters of officers.

These differences could reflect differences in the pre-deployment characteristics of officers, non-commissioned officers and enlisted men as well as differences in the training they received and their deployment experience, including exposure to combat and the associated risk of experiencing trauma.

In addition to rank, the adult sons and daughters of infantrymen suffered more adverse outcomes than the sons and daughters of other Vietnam veterans. In comparison to those respondents whose fathers had served in the Royal

Australian Infantry, the predicted probability of having been diagnosed with or treated for migraines was 1 per cent lower for the sons and daughters of men who served in the Royal Australian Artillery. Sons and daughters whose fathers had served in the Royal Australian Artillery were also less likely than sons and daughters of infantrymen to be in a cohabiting relationship.

7.4.4 Exposure to Agent Orange and trauma

We were unable to find any evidence of exposure to Agent Orange having harmful effects on the sons and daughters of veterans. The sons and daughters of veterans who were exposed to Agent Orange and other chemicals were no more likely to have trouble conceiving a child or having a miscarriage. Similarly, they were just as likely as the sons and daughters of other veterans to have been diagnosed with physical health conditions such as cancer and heart disease—illnesses that have been associated with exposure to chemical herbicides in Vietnam veterans (Institute of Medicine 2012).

These findings are consistent with the results of other studies that have failed to find evidence of intergenerational effects of exposure to Agent Orange and related chemicals (Institute of Medicine 2012). It should be noted, however, that many of the medical conditions that might affect the sons and daughters of exposed parents are most likely to be observed among elderly populations. As a result, we cannot rule out the possibility that some link between exposure to chemical herbicides and significant differences might be observed at older ages. It should also be noted that we were unable to determine whether sons and daughters whose fathers were exposed to Agent Orange had higher rates of cleft lip or palate or of spina bifida—the medical condition for which there is suggestive evidence of an intergenerational impact (Institute of Medicine 2012)—because there were so few respondents in the Vietnam Veterans Family Study who had the condition.

The results from this study also suggest that veterans who experienced greater numbers of traumatic events—namely, fear of being killed or injured; handling or seeing dead bodies; hearing about friends or relatives being injured or killed; being exposed to a contagious or toxic agent; or witnessing significant human degradation or misery—were more likely to develop PTSD. Even among those veterans who were exposed to very high levels of traumatic events, just over two

in five developed PTSD, so there was a high level of resilience to exposure to these experiences among veterans. For their sons or daughters, however, our results suggest that the experience of traumatic events was significantly related to the development of PTSD among veterans, and that in turn was likely to be contributing to the more negative outcomes observed among the sons and daughters of the Vietnam veterans.

7.5 Conclusion

Our analyses reveal that the sons and daughters of Australia's Vietnam veterans have more frequently been diagnosed as having problems in a range of areas than the sons and daughters of other men who served in the Australian Army during the war but who were not deployed to Vietnam. In comparison to others, the 'second-generation' Vietnam veterans were more likely to have been diagnosed with anxiety, depression and posttraumatic stress disorder. They were more likely to have reported thinking about committing suicide and having made plans or taken action towards ending their lives. The adult sons and daughters of Vietnam veterans are also more likely to have reported skin conditions, migraines and sleeping problems (for example, sleep apnoea, insomnia) and to have used marijuana. Additionally, they were more likely to have experienced financial distress and to have married multiple times or have been in multiple cohabiting relationships and less likely to have completed university. These differences were not attributable to differences between fathers who served in Vietnam and Vietnam-era personnel with respect to pre-deployment service and employment history or to parenting in the veteran's own family of origin and the health of the veteran's parents. The most plausible explanation for these results, therefore, is that the higher rates of emotional, social and physical problems found in the sons and daughters of Vietnam veterans are among the intergenerational effects of military service in the Vietnam War. It should be noted, however, that there were many physical problems for which we found no differences between sons and daughters of Vietnam veterans and Vietnam-era personnel.

This study has some important implications for reducing the intergenerational consequences of military service. Among these are the potential value of family-centred treatment programs that focus on helping service members and their families adjust to the member's military service and the importance of treating

sufferers of posttraumatic stress disorder and others exposed to potentially traumatic events. Our results also suggest that estimates of the costs of military deployments may need to take into account the intergenerational consequences. It may be impossible to ever fully measure the human costs of war, either within a single generation or across several, but future research aimed at estimating the costs generated by school non-attendance and failure, substance abuse and increased demand for medical services, among other things, in the sons and daughters of military service personnel may help provide a more realistic assessment of the costs to the community of future military campaigns.

For some veterans and their families these findings might simply reinforce something they have known all along—that their service in Vietnam changed them fundamentally, profoundly altering their relationships with others, including their mothers and fathers, their partners and their sons and daughters. The sense that the war became a turning point in the lives of the young men and women who waged it was captured poignantly by one of the participants in the Vietnam Veterans Family Study, who commented, ‘My mother is still wondering what happened to her kind and loving, gentle son’. We hope this report will go some way towards helping these families understand what happened to their sons, brothers, husbands and fathers and to them. Although it might not explain all the intergenerational effects described here, the widespread experience of posttraumatic stress disorder among Vietnam veterans has played a significant role in shaping the lives of those veterans and the people around them, including their sons and daughters.

Despite the considerable attention that has been given to the possible intergenerational effects of exposure to toxic chemicals, the results of our analyses suggest that the most important underlying source of the problems the sons and daughters of Vietnam veterans face concerns the psychological impacts of their father’s experience in the war. As another veteran and survey respondent explained:

After returning from Vietnam, I gradually became more moody and withdrew into myself. I began to drink more and ignored my wife’s feelings. I was happy with my own company. It became easier to become angry over small and trifling things. I became very negative and to this day it is a problem that I can’t overcome.

We hope, too, that this report offers similarly placed men and their families some insights into how they might recover from their wartime experiences.

Although we found that the families of Australia's Vietnam veterans are more likely to have significant emotional, physical and social problems than other comparable families, our results suggest that the majority of sons and daughters born to Vietnam veterans are leading healthy, productive lives. And, although our study did not assess the efficacy of treatment programs aimed at veterans and their families, we found several reviews of programs and interventions that could be beneficial to the families of Vietnam veterans.

Appendix A Propensity score analyses

A.1 Estimating the impact of Vietnam War service

Propensity score analysis has been used extensively to estimate the effects of non-random events or treatments on outcomes of interest. It has also been extended to estimate the relative effects of experiencing multiple types of events or treatment alternatives (Imbens 2000; Guo & Fraser 2010). In principle, propensity score analysis is intended to identify cases that differ only in terms of whether they have experienced an event of interest—in this case, deployment to the war in Vietnam. These events are often described in the terminology of the method as ‘treatments’ and the groups that experienced or did not experience them are referred to as the ‘treatment’ and ‘control’ groups respectively.

Researchers begin by estimating the probability of each case experiencing the treatment, conditional on a list of selected covariates, using multivariate regression methods (for example, logistic regression). These estimated probabilities or propensities are then used to compare cases from the treatment and control groups. This can be done by weighting cases by the inverse probability of treatment or by matching comparable cases using one of a number of matching algorithms. Provided that comparable cases in the control and treatment groups can be found, use of the propensity score means that differences between the matched groups (in subsequent outcomes) can be attributed to the effects of treatment and not to any pre-existing factors that might have influenced treatment. The explanation is simple: genuine comparability between the control and treatment groups in terms of their actual treatment probabilities, as distinct from their estimated treatment probabilities, means that whether or not each matched case received treatment is due entirely to chance. In that sense, even though an event may not have occurred randomly, cases are analogous to randomly assigned control and treatment groups used in experimental studies. The more accurate the matches—the more closely the estimated treatment probabilities reflect the actual treatment probabilities—the more confident researchers can be that any differences between the ‘control’ (Vietnam-era personnel) and ‘treatment’ groups (Vietnam veterans) are due to

the effects of experiencing the treatment (that is, service in Vietnam) rather than differences in its likelihood.

It follows, therefore, that the usefulness of propensity score analysis depends on the extent to which genuinely comparable control and treatment subpopulations can be identified. Unless all known and pre-existing differences between Vietnam veterans and Vietnam-era personnel are eliminated by the implementation of propensity score analysis, any subsequent differences between groups cannot be attributed entirely to the effects of treatment. The use of PSA enables a substantially more rigorous test of the intergenerational effects of service in the Vietnam War than would be possible by comparing outcomes for sons and daughters from the VV and VEP subsamples or even by using standard multivariate analytical techniques with a limited number of control variables. But we cannot rule out the possibility that some of the differences observed between the sons and daughters of the VV and those of the VEP might be due to pre-existing differences between the servicemen that were not observed in the survey. As with any observational study, the current study is not immune to the threat of omitted variable bias.

Table A.1 shows the results of the logistic regression analysis of deployment on the pre-deployment characteristics. As can be seen, the year in which the servicemen entered the military is strongly related to the likelihood of deployment. Not surprisingly, those who entered the military from 1950 to 1970 were substantially more likely to be deployed than those who entered on either side of that date range. More importantly, the likelihood of deployment varied from year to year, the highest rates of deployment being found among those entering in 1955, 1957, and 1962 to 1964.

Along with the year of entry, National Service was also associated with the likelihood of deployment. In particular, National Servicemen were almost four times less likely than volunteers to have been deployed to Vietnam ($1/e^{-1.56} = 4.76$).

Table A.1 Logistic regression coefficients of the probability of belonging to the VV subsample

| Variable | B | t-statistic |
|---------------------------------|---------|-------------|
| Intercept | -1.559 | (-1.87) |
| Age | | |
| 60 | -2.12* | (-2.47) |
| 61 | -0.93 | (-1.64) |
| 62 | -0.82 | (-1.58) |
| 63 | -0.34 | (-0.64) |
| 64 | 0.70 | (1.16) |
| 65 | -0.31 | (-0.55) |
| 66 | -0.42 | (-0.77) |
| 67 | -0.06 | (-0.10) |
| Other | | |
| Military service | | |
| Year entered the military | | |
| 1950 | 2.27* | (2.00) |
| 1951 | 1.29 | (0.99) |
| 1952 | 2.77** | (2.61) |
| 1953 | 4.56*** | (4.35) |
| 1954 | 2.58* | (2.00) |
| 1955 | 5.22*** | (4.15) |
| 1956 | 4.10*** | (3.97) |
| 1957 | 4.38*** | (3.48) |
| 1958 | 2.97*** | (3.58) |
| 1959 | 3.63*** | (3.92) |
| 1960 | 3.28*** | (3.50) |
| 1961 | 3.61*** | (4.55) |
| 1962 | 5.25*** | (5.49) |
| 1963 | 4.72*** | (5.89) |
| 1964 | 4.56*** | (5.40) |
| 1965 | 3.82*** | (6.65) |
| 1966 | 3.94*** | (7.12) |
| 1967 | 3.93*** | (7.25) |
| 1968 | 3.73*** | (6.98) |
| 1969 | 3.10*** | (5.96) |
| 1970 | 2.30*** | (4.36) |
| Parent served in military | 0.23 | (1.60) |
| Grandparent served in military | 0.00 | (0.03) |
| National Serviceman (1965-1973) | -1.56** | (-2.87) |

| Variable | B | t-statistic |
|--|---------|-------------|
| Education | | |
| Year 9 | 0.32* | (2.30) |
| Disciplinary problems | 0.40 | (1.17) |
| Behavioural problems | -0.02 | (-0.16) |
| Gifted and talented | -0.37 | (-1.77) |
| Learning problems | 0.21 | (1.52) |
| Prior employment | | |
| None | | |
| One job | 0.98*** | (3.95) |
| Two jobs | 1.25*** | (4.51) |
| Three or more jobs | 1.28*** | (4.64) |
| Family characteristics | | |
| Single-parent household | -0.45 | (-0.71) |
| Parenting (mother) | | |
| Unaffectionate | - | - |
| A little affectionate | -0.91 | (-1.89) |
| Somewhat affectionate | -0.28 | (-1.08) |
| Very affectionate | -0.12 | (-0.72) |
| Caring | -0.45** | (-3.23) |
| Overprotective | -0.21 | (-1.60) |
| Parenting (father) | | |
| Unaffectionate | - | - |
| A little affectionate | -0.23 | (-0.71) |
| Somewhat affectionate | -0.10 | (-0.38) |
| Very affectionate | -0.03 | (-0.14) |
| Caring | -0.16 | (-1.30) |
| Overprotective | 0.22 | (1.64) |
| Parental substance abuse | 0.30 | (1.87) |
| Pre-existing medical conditions | | |
| Mental and behavioural | -0.03 | (-0.04) |
| Musculoskeletal system | -1.71** | (-2.73) |
| Circulatory system | -0.63 | (-0.78) |
| Neoplasms | 1.88 | (1.28) |
| Endocrine, nutritional and metabolic | | |
| Respiratory system | -0.24 | (-0.67) |
| Genitourinary system | 1.01 | (0.84) |
| Digestive system | | |
| Nervous system | 0.34 | (1.08) |
| Parents' health conditions | | |
| Musculoskeletal system diseases | 0.01 | (0.07) |
| Mental and behavioural disorders | -0.01 | (-0.08) |

| Variable | B | t-statistic |
|---|--------------|-------------|
| Circulatory system diseases | -0.29 | (-1.83) |
| Neoplasms | -0.24 | (-1.76) |
| Endocrine, nutritional and metabolic diseases | 0.35 | (1.68) |
| Respiratory system diseases | 0.10 | (0.70) |
| Digestive system diseases | 0.49 | (1.62) |
| Nervous system diseases | 0.21 | (1.48) |
| Genitourinary system diseases | -0.39 | (-1.60) |
| Infectious and parasitic diseases | -0.45 | (-0.57) |
| War-related health conditions | -0.80 | (-0.86) |
| National Service x age | | |
| 60 | | |
| 61 | | |
| 62 | 0.41 | (0.50) |
| 63 | 1.02 | (1.46) |
| 64 | 0.31 | (0.41) |
| 65 | 0.83 | (1.18) |
| 66 | 0.56 | (0.83) |
| 67 | | |
| N | 1,551 | |

Note: *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

Deployment was also related to the respondent's level of education. Those who reached their highest level of education, completing at least Year 9, before joining the military were slightly more likely to be deployed to Vietnam than those who did not complete Year 9 or who continued on with their schooling either during or after their military service. In addition, deployment was also related to the respondent's pre-military employment record. Respondents who worked in paid employment before they joined the military were more likely to have been deployed to Vietnam. In fact, respondents who had only one job before enlistment were 1.66 times more likely to have been deployed than those who did not work ($e^{0.98} = 2.66$). Respondents who had three or more jobs were 2.60 times more likely than their unemployed counterparts to have been deployed to the war in Vietnam ($e^{1.28} = 3.60$).

Only one of the parenting factors was associated with deployment after controlling for all the other pre-deployment characteristics, despite the significant differences observed between the two subsamples. Respondents who described their mothers as caring were significantly less likely to have been deployed to

Vietnam—for each one-unit increase in maternal care, the odds of deployment relative to non-deployment decreased by 56 percentage points ($1/e^{-0.45} = 1.56$).

Not surprisingly, servicemen who were diagnosed with musculoskeletal problems before their enlistment were significantly less likely to have served in the war, even after controlling for other factors that were related to the chances of deployment. In fact, those with pre-existing musculoskeletal conditions were 4.53 times less likely to have been deployed ($1/e^{-1.71} = 5.53$).

When estimating the probability of belonging to the VV subsample, we also tested for possible interactions between National Service and the age of the respondent. This was intended to take account of the lower likelihood of deployment among younger conscripts due to the military’s assignment of fewer and fewer National Servicemen to Vietnam in the latter years of the scheme.^{*} These interactions, however, were not significant in multivariate analyses that also controlled for the year in which respondents entered the military.

A.1.1 Predicted probabilities

Table A.2 shows the number of cases correctly and incorrectly classified on the basis of the logistic regression analyses. Overall, 77.95 per cent of cases were correctly classified. Based on the results of a specification link test, the model appeared to be correctly specified. Pearson goodness-of-fit test also indicated that the model fitted the data ($\chi^2=1529.22$).

Table A.2 Predicted deployment for both VV and VEP fathers

| | Vietnam veteran | Vietnam-era personnel | Total |
|---------------|-----------------|-----------------------|--------------|
| Predicted VV | 973 | 268 | 1,241 |
| Predicted VEP | 74 | 236 | 310 |
| Total | 1,047 | 504 | 1,551 |

Figure A.1 shows the distribution of the predicted probabilities of deployment, estimated from the results shown in Table A.2, for both the VV and VEP respondents. As expected, the predicted probability of belonging to the VV

^{*} By the time of the 14th National Service ballot in September 1971, the government was advertising that conscripts (selected in that ballot) would not be committed to Vietnam (*Canberra Times*, 18 September 1971, p. 3).

subsample was significantly higher for the VV (mean = 0.76) than for the VEP (mean = 0.49). Nonetheless, there was still a reasonable spread of probabilities across the two subsamples, meaning that there were respondents from both the VEP and VV subsamples with very similar predicted probabilities of deployment.

Goodness-of-fit statistics indicate that the model is not mis-specified.

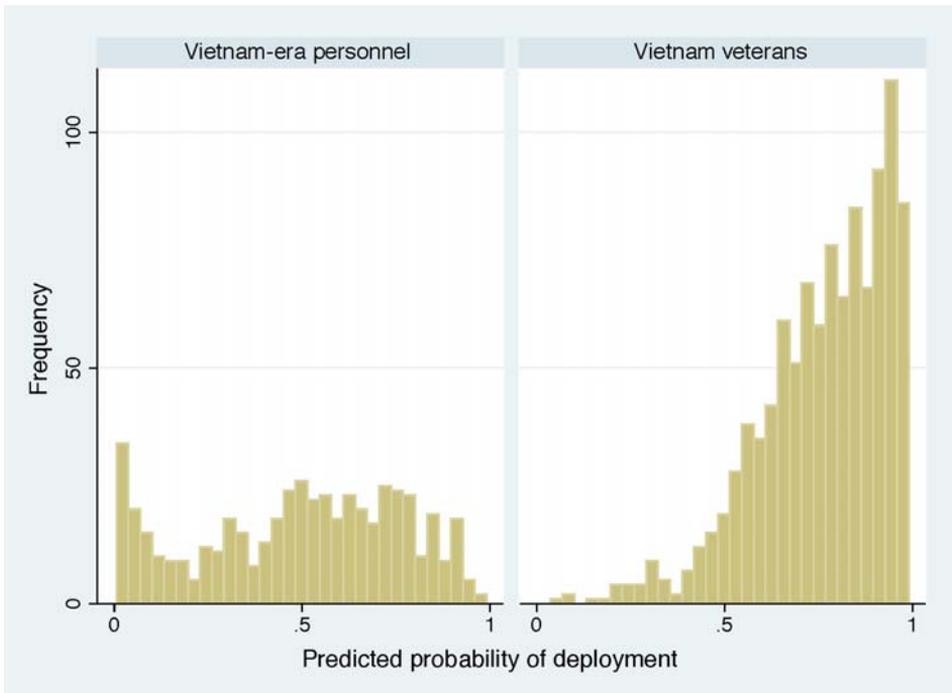


Figure A.1 Predicted probability of belonging to the VV subsample

Appendix B Mechanisms of deployment: results

B.1 Step o

Table B.1 Bivariate relationships between mental and physical health outcomes of sons and daughters and various covariates

| | Depression | Anxiety | PTSD | Drug use | Suicidal thoughts vs no suicidal ideation | Suicidal plans/actions vs no suicidal ideation | Skin conditions | Migraines | Sleep disturbance |
|---|------------|---------|---------|----------|---|--|-----------------|-----------|-------------------|
| Sons' and daughters' characteristics | | | | | | | | | |
| Child behavioural problems | .97*** | .96*** | 1.44*** | .39** | 1.03*** | 1.63*** | .56*** | .83*** | 1.35*** |
| Child disciplinary problems | .62** | .52* | 1.14*** | 1.68*** | .57* | .95** | .10 | .48 | .85** |
| Child learning problems | .85*** | .67*** | 1.21*** | .53*** | .75*** | 1.31*** | .28 | .55** | .79*** |
| Child smart/gifted | -.13 | -.05 | -.08 | .21 | .14 | .26 | -.04 | .19 | .31 |
| Family environment | | | | | | | | | |
| Dad caring | -.37*** | -.32*** | -.70*** | -.23** | -.46*** | 1.08*** | -.07 | -.26* | -.46*** |
| Mum caring | -.22** | -.29*** | -.59*** | .20** | -.23 | -.68*** | -.09 | -.18 | -.41*** |
| Dad overprotective | .35** | .30*** | .35* | .09 | .39*** | .67*** | .06 | .28** | .30*** |
| Mum overprotective | .22* | .22 | .58*** | .16 | .42*** | .50*** | .21* | .34** | .38*** |
| Harsh parenting | 1.09** | 1.05*** | 1.6*** | .80*** | .92*** | 1.97*** | .36* | .67*** | .89*** |
| Parental separation | -.19 | .45 | .37 | .45 | -.63* | .26 | -.37 | -.23 | .72** |
| Mum alcohol problems | -.31 | -.02 | .05 | .05 | .32 | 1.12*** | -.13 | -.03 | -.09 |
| Dad alcohol problems | .07 | .17 | -.12 | .16 | -.11 | .06 | -.17 | -.42* | -.04 |
| Father's health | | | | | | | | | |
| Serviceman depression | .47** | .59*** | .72** | .19 | .45** | .86*** | .22 | .49** | .80 |
| Serviceman anxiety | .30* | .69*** | .66** | .29* | .32 | .73*** | .17 | .40* | .79*** |

| | | | | | | | | | |
|-------------------------------|--------|--------|---------|------|--------|--------|--------|-------|--------|
| Serviceman skin problems | .34** | .31* | .64* | .22 | .06 | .35 | .42*** | .33 | .28 |
| Serviceman migraines | .78*** | .23 | .30 | .08 | .92*** | .66 | .38 | .73** | .00 |
| Serviceman sleeping problems | .33** | .69*** | .70** | .23 | .15 | .60** | .30* | .37 | .75*** |
| Support services used | | | | | | | | | |
| Social support used | .17* | .43* | .85 | -.16 | .10 | .29 | .26 | .23 | .43 |
| Military-related service used | .49** | .61*** | 1.37*** | .03 | .39* | .69*** | .43** | .50* | .90*** |
| Health service used | .39* | .55 | .56 | -.08 | .14 | .26 | .11 | .43 | .75*** |

Notes: *** p < .001; ** p < .01; * p < .05.

Source: Vietnam Veterans Family Study.

Table B.2 Bivariate relationships between social and emotional outcomes of sons and daughters and various covariates

| | Partnered vs married | Divorced/separated vs married | Single/never in relationship vs married | None vs one | Two or more vs one | School one below vs university | Certificate/diploma vs university | Financial stress |
|---|----------------------|-------------------------------|---|-------------|--------------------|--------------------------------|-----------------------------------|------------------|
| Sons' and daughters' characteristics | | | | | | | | |
| Child behavioural problems | .06 | .08 | .26 | -.08 | .38* | .31 | .25 | 1.03*** |
| Child disciplinary problems | .82** | .84** | .54 | -.31 | .59* | .90*** | 1.23*** | .60* |
| Child learning problems | .38** | .66*** | .64*** | .03 | .41* | .45*** | .68*** | .73*** |
| Child smart/gifted | .29 | -.22 | .69** | -.74** | -.16 | -1.26*** | -1.03*** | -.06 |
| Family environment | | | | | | | | |
| Dad caring | .14 | -.36*** | .07 | -.23* | -.28*** | -.29** | -.18** | -.34*** |
| Mum caring | .06 | -.25* | -.01 | .04 | -.40*** | -.20** | -.02 | -.38*** |
| Dad overprotective | -.25* | .07 | -.18 | .12 | .20* | .42*** | .21* | .15 |
| Mum overprotective | -.24* | .10 | -.14 | -.14 | .10 | .28* | .27* | .26** |
| Harsh parenting | .24 | .69*** | .64* | .60** | .68*** | .39 | .14 | 1.06*** |
| Parental separation | .27 | .69* | -.09 | -.61 | .78** | .50* | .50 | .38* |
| Mum alcohol problems | -.11 | -.20 | .15 | -.82 | -.16 | .14 | .02 | -.05 |
| Dad alcohol problems | -.01 | -.08 | -.18 | .08 | -.05 | .06 | .13 | -.09 |

| | Partnered vs married | Divorced/separated vs married | Single/never in relationship vs married | None vs one | Two or more vs one | School ore below vs university | Certificate/diploma vs university | Financial stress |
|-------------------------------|----------------------|-------------------------------|---|-------------|--------------------|--------------------------------|-----------------------------------|------------------|
| Father's health | | | | | | | | |
| Serviceman depression | .03 | .52* | .28 | .09 | .51*** | .54** | .32 | .82*** |
| Serviceman anxiety | .29 | .30 | .23 | .11 | .47** | .27 | .25 | .64*** |
| Serviceman skin problems | .09 | -.04 | -.14 | -.48* | .24 | -.07 | -.07 | .18 |
| Serviceman migraines | -.20 | -.39 | .17 | .18 | .02 | .03 | -.49 | .61 |
| Serviceman sleeping problems | .26 | .20 | .20 | .28 | .53*** | .37** | .29 | .45*** |
| Support services used | | | | | | | | |
| Social support used | -.10 | .14 | .41 | .19 | .25 | -.26 | -.28 | .10 |
| Military-related service used | .15 | .41 | .32 | .02 | .40** | .52** | .26 | .73*** |
| Health service used | -.08 | .42 | .36 | .47 | .37* | .45* | .29 | .38** |

Notes: *** p < .001; ** p < .01; * p < .05.
Source: Vietnam Veterans Family Study.

B.2 Step 1

In Step 1 we examined whether father's PTSD mediated the effect of deployment on sons' and daughters' outcomes using the Baron and Kenny mediation approach (1986).

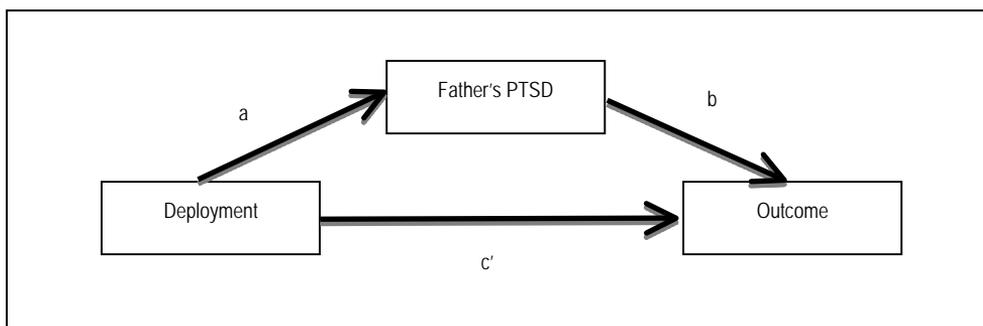


Figure B.1 Mediation model: deployment, father's PTSD—sons' and daughters' outcome

To test for the basic mediation we estimate three regressions:

$$Y = a_1 + cX + e_1 \quad (1)$$

$$Y = a_2 + c'X + bM + e_2 \quad (2)$$

$$M = a_3 + aX + e_3 \quad (3)$$

where X refers to independent variable (deployment)

M refers to mediator variable (father's PTSD)

Y refers to dependent variable (outcome of interest)

a_i refers to the intercept

e_i refers to the error term

According to Baron and Kenny the following conditions must hold in order for mediation to be supported:

1. The relationship between the independent variable (deployment) and dependent variable (outcome of interest) must be statistically significant—path c in equation (1).
2. The relationship between the independent variable (deployment) and mediator variable (father's PTSD) must be statistically significant—path a in equation (2).
3. The relationship between the dependent variable (outcome of interest) and mediator variable (father's PTSD) must be statistically significant—path b in equation (3).

If at least one condition did not hold then we did not test for the mediation effect. To examine whether there was a significant mediation effect we compared the coefficient c from equation (1) and the coefficient c' from equation (2) using the Sobel test that was adapted for binary mediator and outcome measures by Nathaniel Herr (n.d.).

Table B.3 presents the results of the basic mediation model for every outcome separately.

Table B.3 Mechanisms of deployment: Step 1 results for all outcomes

| | a | b | c' | c | Sobel test |
|-----------------------------------|---------|---------|--------------------|---------|------------|
| Mental health | | | | | |
| Depression | 2.46*** | .59*** | .28 | .53*** | Sig |
| Anxiety | 2.46*** | .75*** | .48*** | .62*** | Sig |
| PTSD | 2.46*** | .18 | 1.14 | 1.24*** | Not tested |
| Marijuana use | 2.46*** | -.22 | .59*** | .54*** | Not tested |
| Suicidal ideation | | | | | |
| No suicidal ideation | 2.46*** | | Reference category | | |
| Suicidal thoughts | 2.46*** | .19 | .41*** | .54*** | Not tested |
| Suicidal plans/action | 2.46*** | .52** | .57** | .82*** | Sig |
| Physical health | | | | | |
| Skin conditions | 2.46*** | .09 | .40** | .47*** | Not tested |
| Migraines | 2.46*** | .79*** | .39 | .72*** | Sig |
| Sleep disturbance | 2.46*** | .60*** | .60*** | .61*** | Ns |
| Social wellbeing | | | | | |
| Relationship status | | | | | |
| Married | 2.46*** | | Reference category | | |
| Partnered | 2.46*** | -.05 | .61*** | .60*** | Not tested |
| Divorced/separated | 2.46*** | .27 | .23 | .36 | Not tested |
| Single/never in a relationship | 2.46*** | .22 | -.13 | -.16 | Not tested |
| Number of long-term relationships | | | | | |
| None | 2.46*** | .04 | .44 | .46 | Not tested |
| One | 2.46*** | | Reference category | | |
| Two or more | 2.46*** | -.05 | .47*** | .38** | Not tested |
| Economic wellbeing | | | | | |
| Highest education | | | | | |
| School or below | 2.46*** | 0.78*** | -.01 | .23 | Not tested |
| Certificate/diploma | 2.46*** | .43** | .25 | .43*** | Sig |
| University degree | 2.46*** | | Reference category | | |
| Financial stress (past) | 2.46*** | .40** | .34** | .44*** | Sig |

Notes: *** p < .001; ** p < .01; * p < .05. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

B.3 Step 2

In Step 2 we examined whether the effect of father's PTSD on sons' and daughters' outcomes was mediated by any of the following covariates: sons' and daughters' behaviour at school, family functioning, father's health and father's service. We used the basic mediation analysis proposed by Baron and Kenny (1986).

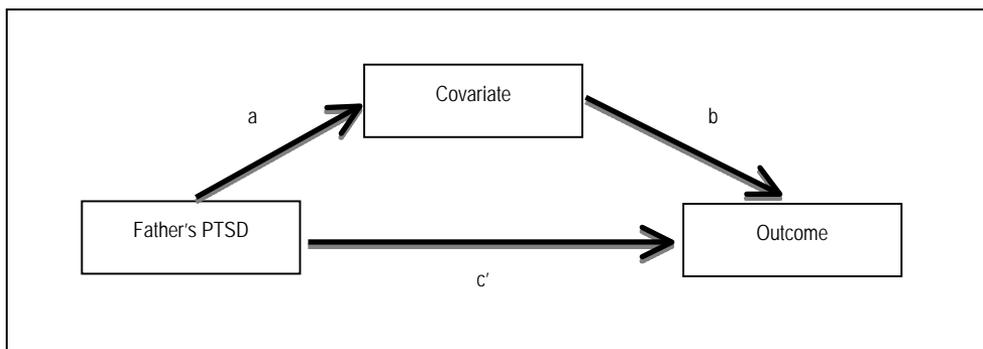


Figure B.2 Mediation model: father's PTSD, covariate of interest—sons' and daughters' outcome

To test for basic mediation we estimate three regressions:

$$Y = a_1 + cX + e_1 \quad (1)$$

$$Y = a_2 + c'X + bM + e_2 \quad (2)$$

$$M = a_3 + aX + e_3 \quad (3)$$

where X refers to independent variable (father's PTSD)

M refers to mediator variable (covariate of interest)

Y refers to dependent variable (outcome of interest)

a_i refers to the intercept

e_i refers to the error term

According to Baron and Kenny the following conditions must hold in order for mediation to be supported:

1. The relationship between the independent variable (father's PTSD) and dependent variable (outcome of interest) must be statistically significant—path c in equation (1).
2. The relationship between the independent variable (father's PTSD) and mediator variable (covariate of interest) must be statistically significant—path a in equation (2).
3. The relationship between the dependent variable (outcome of interest) and mediator variable (covariate of interest) must be statistically significant—path b in equation (3).

If at least one condition did not hold then we did not test for the mediation effect. To examine whether there was a significant mediation effect we compared the coefficient c from equation (1) and the coefficient c' from equation (2) using the Sobel test that was adapted for binary mediator and outcome measures by Nathaniel Herr (n.d.).

Tables B.4 to B.11 present the results of the basic mediation model for every outcome separately. Results for the following outcomes are not presented as there were no statistically significant relationships between father's PTSD and either of sons' and daughters' drug use, skin conditions, relationship status and the number of long-term relationships.

Table B.4 Mechanisms of deployment: Step 2 results for depression

| | a | b | c' | c | Sobel test |
|---|---------|---------|--------|---------|------------|
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | .99*** | .61*** | 0.73*** | Sig |
| Child disciplinary problems | .73*** | .62** | .69*** | 0.73*** | Sig |
| Child learning problems | .56*** | .83*** | .63*** | 0.73*** | Sig |
| Child smart/gifted | -.05 | -.08 | .73*** | 0.73*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.35*** | .62*** | 0.73*** | Sig |
| Mum caring | -.51 | -.27*** | .71*** | 0.73*** | Not tested |
| Dad overprotective | .11 | .28** | .69*** | 0.73*** | Not tested |
| Mum overprotective | .85*** | .17 | .70*** | 0.73*** | Not tested |
| Harsh parenting | .98*** | 1.06*** | .56*** | 0.73*** | Sig |
| Parental separation | .53** | -.07 | .73*** | 0.73*** | Not tested |
| Mum alcohol problems | .09 | -.40 | .73*** | 0.73*** | Not tested |
| Dad alcohol problems | .30 | -.04 | .70*** | 0.73*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .28 | .57*** | 0.73*** | Not tested |
| Serviceman anxiety | 2.15*** | .09 | .68*** | 0.73*** | Not tested |
| Serviceman skin problems | .87*** | .18 | .69*** | 0.73*** | Not tested |
| Serviceman migraines | 1.09*** | .60** | .66*** | 0.73*** | Sig |
| Serviceman sleeping problems | 1.89*** | .17 | .62*** | 0.73*** | Not tested |
| Support services used | | | | | |
| Social support used | .65*** | .13 | .72*** | 0.73*** | Not tested |
| Military-related service used | 2.28*** | .36* | .57*** | 0.73*** | Sig |
| Health service used | 1.65*** | .26 | .67*** | 0.73*** | Not tested |

Notes: *** p < .001; ** p < .01; * p < .05. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

Table B.5 Mechanisms of deployment: Step 2 results for anxiety

| | a | b | c' | c | Sobel test |
|---|---------|---------|--------|--------|------------|
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | .85*** | .87*** | .96*** | Sig |
| Child disciplinary problems | .73*** | .58** | .93*** | .96*** | Ns |
| Child learning problems | .56*** | .76*** | .88*** | .96*** | Sig |
| Child smart/gifted | -.05 | .08 | .96*** | .96*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.27** | .89*** | .96*** | Sig |
| Mum caring | -.51 | -.28** | .94*** | .96*** | Not tested |
| Dad overprotective | .11 | .22* | .94*** | .96*** | Not tested |
| Mum overprotective | .85*** | .17 | .94*** | .96*** | Not tested |
| Harsh parenting | .98*** | 1.09*** | .81*** | .96*** | Sig |
| Parental separation | .53** | .08 | .96*** | .96*** | Not tested |
| Mum alcohol problems | .09 | .02 | .97*** | .96*** | Not tested |
| Dad alcohol problems | .30 | .15 | .93*** | .96*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .04 | .94*** | .96*** | Not tested |
| Serviceman anxiety | 2.15*** | .25 | .84*** | .96*** | Not tested |
| Serviceman skin problems | .87*** | .21 | .93*** | .96*** | Not tested |
| Serviceman migraines | 1.09*** | .02 | .96*** | .96*** | Not tested |
| Serviceman sleeping problems | 1.89*** | .34* | .82*** | .96*** | Sig |
| Support services used | | | | | |
| Social support used | .65*** | .30 | .94*** | .96*** | Not tested |
| Military-related service used | 2.28*** | .27 | .84*** | .96*** | Not tested |
| Health service used | 1.65*** | .31 | .90*** | .96*** | Not tested |

Notes: *** $p < .001$; ** $p < .01$; * $p < .05$. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

Table B.6 Mechanisms of deployment: Step 2 results for PTSD

| | a | b | c' | c | Sobel test |
|---|---------|---------|------|-------|------------|
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | 1.41*** | .43 | .62** | Sig |
| Child disciplinary problems | .73*** | 1.11*** | .54 | .62** | Sig |
| Child learning problems | .56*** | 1.10*** | .48 | .62** | Sig |
| Child smart/gifted | -.05 | 0.05 | .62* | .62** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.63*** | .64 | .62** | Sig |
| Mum caring | -.51 | -.60*** | .47 | .62** | Not tested |
| Dad overprotective | .11 | .26 | .51 | .62** | Not tested |
| Mum overprotective | .85*** | .52*** | .45 | .62** | Sig |
| Harsh parenting | .98*** | 1.59*** | .29 | .62** | Sig |
| Parental separation | .53** | .46 | .60* | .62** | Not tested |
| Mum alcohol problems | .09 | .09 | .66 | .62** | Not tested |
| Dad alcohol problems | .30 | -.16 | .60* | .62** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .73* | .21 | .62** | Sig |
| Serviceman anxiety | 2.15*** | .61* | .32 | .62** | Sig |
| Serviceman skin problems | .87*** | .47 | .52 | .62** | Not tested |
| Serviceman migraines | 1.09*** | .18 | .60* | .62** | Not tested |
| Serviceman sleeping problems | 1.89*** | .60* | .37 | .62** | Not tested |
| Support services used | | | | | |
| Social support used | .65*** | .94 | .57* | .62** | Not tested |
| Military-related service used | 2.28*** | 1.28*** | .67 | .62** | Sig |
| Health service used | 1.65*** | .34 | .55* | .62** | Not tested |

Notes: *** p < .001; ** p < .01; * p < .05. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

Table B.7 Mechanisms of deployment: Step 2 results for suicidal ideation

| | a | b | c' | c | Sobel test |
|---|---------|----------|--------|--------|--------------------|
| No suicidal ideation | | | | | Reference category |
| Suicidal ideation | | | | | |
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | 1.03*** | .28 | .39*** | Sig |
| Child disciplinary problems | .73*** | .39 | .37** | .39*** | Not tested |
| Child learning problems | .56*** | .66*** | .32** | .39*** | Sig |
| Child smart/gifted | -.05 | .15 | .39** | .39*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.51*** | .23 | .39*** | Sig |
| Mum caring | -.51 | -.42*** | .35** | .39*** | Not tested |
| Dad overprotective | .11 | .44*** | .31* | .39*** | Not tested |
| Mum overprotective | .85*** | .43*** | .32* | .39*** | Sig |
| Harsh parenting | .98*** | 1.15*** | .25 | .39*** | Sig |
| Parental separation | .53** | -.34 | .41 | .39*** | Not tested |
| Mum alcohol problems | .09 | .37 | .38*** | .39*** | Not tested |
| Dad alcohol problems | .30 | -.14 | .42** | .39*** | Not tested |
| Father's health | | | | | |
| Servicemen depression | 2.50*** | .58*** | .07 | .39*** | Sig |
| Servicemen anxiety | 2.15*** | .38* | .20 | .39*** | Sig |
| Servicemen skin problems | .87*** | -.03 | .39* | .39*** | Not tested |
| Servicemen migraines | 1.09*** | .82** | .31 | .39*** | Sig |
| Servicemen sleeping problems | 1.89*** | .19 | .31 | .39*** | Not tested |
| Support services used | | | | | |
| Social support used | .65*** | .11 | .38** | .39*** | Not tested |
| Military-related service used | 2.28*** | .45** | .19 | .39*** | Sig |
| Health service used | 1.65*** | .19 | .35* | .39*** | Not tested |
| Suicidal plans or actions | | | | | |
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | 1.67*** | .62*** | .79*** | Sig |
| Child disciplinary problems | .73*** | .87*** | .74*** | .79*** | Sig |
| Child learning problems | .56*** | 1.27*** | .66*** | .79*** | Sig |
| Child smart/gifted | -.05 | .30 | .79*** | .79*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -1.11*** | .43* | .79*** | Sig |
| Mum caring | -.51 | -.88*** | .70*** | .79*** | Not tested |
| Dad overprotective | .11 | .66*** | .66** | .79*** | Not tested |
| Mum overprotective | .85*** | .47*** | .70*** | .79*** | Sig |

| | a | b | c' | c | Sobel test |
|-------------------------------|---------|---------|--------|--------|------------|
| Harsh parenting | .98*** | 2.16*** | .46** | .79*** | Sig |
| Parental separation | .53** | -.53 | .76*** | .79*** | Sig |
| Mum alcohol problems | .09 | 1.07*** | .78*** | .79*** | Not tested |
| Dad alcohol problems | .30 | -.09 | .78*** | .79*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .87*** | .31 | .79*** | Sig |
| Serviceman anxiety | 2.15*** | .67*** | .46* | .79*** | Sig |
| Serviceman skin problems | .87*** | .16 | .76*** | .79*** | Not tested |
| Serviceman migraines | 1.09*** | .40 | .76*** | .79*** | Not tested |
| Serviceman sleeping problems | 1.89*** | .54** | .55** | .79*** | Sig |
| Support services used | | | | | |
| Social support used | .65*** | .32 | .77*** | .79*** | Not tested |
| Military-related service used | 2.28*** | .61** | .52** | .79*** | Sig |
| Health service used | 1.65*** | .14 | .76*** | .79*** | Not tested |

Notes: *** $p < .001$; ** $p < .01$; * $p < .05$. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

Table B.8 Mechanisms of deployment: Step 2 results for migraines

| | a | b | c' | c | Sobel test |
|---|---------|---------|--------|--------|------------|
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | .90*** | .86*** | .97*** | Sig |
| Child disciplinary problems | .73*** | .65 | .93*** | .97*** | Not tested |
| Child learning problems | .56*** | .57*** | .90*** | .97*** | Sig |
| Child smart/gifted | -.05 | .30 | .97*** | .97*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.22 | .91*** | .97*** | Not tested |
| Mum caring | -.51 | -.19 | .98*** | .97*** | Not tested |
| Dad overprotective | .11 | .25 | .95*** | .97*** | Not tested |
| Mum overprotective | .85*** | .27* | .96*** | .97*** | Ns |
| Harsh parenting | .98*** | .54** | .88*** | .97*** | Sig |
| Parental separation | .53** | -.17 | .99*** | .97*** | Not tested |
| Mum alcohol problems | .09 | -.16 | .95*** | .97*** | Not tested |
| Dad alcohol problems | .30 | -.69*** | 1.0*** | .97*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .10 | .91*** | .97*** | Not tested |
| Serviceman anxiety | 2.15*** | .04 | .94*** | .97*** | Not tested |
| Serviceman skin problems | .87*** | .09 | .95*** | .97*** | Not tested |
| Serviceman migraines | 1.09*** | .42 | .91*** | .97*** | Not tested |
| Serviceman sleeping problems | 1.89*** | .08 | .93*** | .97*** | Not tested |
| Support services used | | | | | |
| Social support used | .65*** | .19 | .95*** | .97*** | Not tested |
| Military-related service used | 2.28*** | .24 | .86*** | .97*** | Not tested |
| Health service used | 1.65*** | .20 | .92*** | .97*** | Not tested |

Notes: *** p < .001; ** p < .01; * p < .05. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

Table B.9 Mechanisms of deployment: Step 2 results for sleep disturbance

| | a | b | c' | c | Sobel test |
|---|---------|---------|--------|--------|------------|
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | 1.16*** | .73*** | .86*** | Sig |
| Child disciplinary problems | .73*** | .90*** | .81*** | .86*** | Sig |
| Child learning problems | .56*** | .87*** | .77*** | .86*** | Sig |
| Child smart/gifted | -.05 | .58*** | .86*** | .86*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.35*** | .73*** | .86*** | Sig |
| Mum caring | -.51 | -.32*** | .79*** | .86*** | Not tested |
| Dad overprotective | .11 | .19 | .80*** | .86*** | Not tested |
| Mum overprotective | .85*** | .32** | .77*** | .86*** | Sig |
| Harsh parenting | .98*** | .95*** | .70*** | .86*** | Sig |
| Parental separation | .53** | .23 | .84*** | .86*** | Not tested |
| Mum alcohol problems | .09 | -.04 | .85*** | .86*** | Not tested |
| Dad alcohol problems | .30 | -.02 | .82*** | .86*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .41* | .63*** | .86*** | Sig |
| Serviceman anxiety | 2.15*** | .43** | .66*** | .86*** | Sig |
| Serviceman skin problems | .87*** | .20 | .82*** | .86*** | Not tested |
| Serviceman migraines | 1.09*** | -.10 | .87*** | .86*** | Not tested |
| Serviceman sleeping problems | 1.89*** | .36 | .71*** | .86*** | Not tested |
| Support services used | | | | | |
| Social support used | .65*** | .27 | .84*** | .86*** | Not tested |
| Military-related service used | 2.28*** | .53** | .64*** | .86*** | Sig |
| Health service used | 1.65*** | .37 | .79*** | .86*** | Not tested |

Notes: *** $p < .001$; ** $p < .01$; * $p < .05$. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

Table B.10 Mechanisms of deployment: Step 2 results for education

| | a | b | c' | c | Sobel test |
|---|---------|---------|--------|--------|--------------------|
| University degree | | | | | Reference category |
| School or below | | | | | |
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | .08 | .76*** | .77*** | Not tested |
| Child disciplinary problems | .73*** | .87*** | .73*** | .77*** | Sig |
| Child learning problems | .56*** | .39** | .73*** | .77*** | Sig |
| Child smart/gifted | -.05 | -1.1*** | .79*** | .77*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.15 | .75*** | .77*** | Not tested |
| Mum caring | -.51 | -.14 | .82*** | .77*** | Not tested |
| Dad overprotective | .11 | .32*** | .74*** | .77*** | Not tested |
| Mum overprotective | .85*** | .19 | .81*** | .77*** | Not tested |
| Harsh parenting | .98*** | .44** | .70*** | .77*** | |
| Parental separation | .53** | .36 | .76*** | .77*** | Not tested |
| Mum alcohol problems | .09 | .15 | .78*** | .77*** | Not tested |
| Dad alcohol problems | .30 | .05 | .73*** | .77*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .26 | .63*** | .77*** | Not tested |
| Serviceman anxiety | 2.15*** | -.08 | .81*** | .77*** | Not tested |
| Serviceman skin problems | .87*** | -.25 | .82*** | .77*** | Not tested |
| Serviceman migraines | 1.09*** | -.12 | .79*** | .77*** | Not tested |
| Serviceman sleeping problems | 1.89*** | .05 | .75*** | .77*** | Not tested |
| Support services used | | | | | |
| Social support used | .65*** | -.39 | .80*** | .77*** | Not tested |
| Military-related service used | 2.28*** | .22 | .67*** | .77*** | Not tested |
| Health service used | 1.65*** | .16 | .74*** | .77*** | Not tested |
| Certificate or diploma | | | | | |
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | .11 | .54*** | .55*** | Not tested |
| Child disciplinary problems | .73*** | 1.08*** | .50*** | .55*** | Sig |
| Child learning problems | .56*** | .55*** | .47*** | .55*** | Sig |
| Child smart/gifted | -.05 | -.98*** | .57*** | .55*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.11 | .52*** | .55*** | Not tested |
| Mum caring | -.51 | -.07 | .54*** | .55*** | Not tested |
| Dad overprotective | .11 | .19 | .53*** | .55*** | Not tested |
| Mum overprotective | .85*** | .22* | .52*** | .55*** | Ns |

| | a | b | c' | c | Sobel test |
|-------------------------------|----------|----------|-----------|----------|-------------------|
| Harsh parenting | .98*** | .20 | .53*** | .55*** | Not tested |
| Parental separation | .53** | .74** | .52*** | .55*** | |
| Mum alcohol problems | .09 | .07 | .58*** | .55*** | Not tested |
| Dad alcohol problems | .30 | .12 | .51*** | .55*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .25 | .42 | .55*** | Not tested |
| Serviceman anxiety | 2.15*** | .18 | .47*** | .55*** | Not tested |
| Serviceman skin problems | .87*** | -.22 | .59*** | .55*** | Not tested |
| Serviceman migraines | 1.09*** | -.63 | .61*** | .55*** | Not tested |
| Serviceman sleeping problems | 1.89*** | .20 | .46*** | .55*** | Not tested |
| Support services used | | | | | |
| Social support used | .65*** | -.35 | .58*** | .55*** | Not tested |
| Military-related service used | 2.28*** | .11 | .50** | .55*** | Not tested |
| Health service used | 1.65*** | .17 | .52*** | .55*** | Not tested |

Notes: *** $p < .001$; ** $p < .01$; * $p < .05$. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

Table B.11 Mechanisms of deployment: Step 2 results for financial stress

| | a | b | c' | c | Sobel test |
|---|---------|---------|--------|--------|------------|
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | .57*** | 1.15*** | .43** | .57*** | Sig |
| Child disciplinary problems | .73*** | .58* | .54*** | .57*** | Sig |
| Child learning problems | .56*** | .73*** | .48*** | .57*** | Sig |
| Child smart/gifted | -.05 | -.20 | .57*** | .57*** | Not tested |
| Family environment | | | | | |
| Dad caring | -.80*** | -.30*** | .46*** | .57*** | Sig |
| Mum caring | -.51 | -.33*** | .53*** | .57*** | Not tested |
| Dad overprotective | .11 | -.14 | .53*** | .57*** | Not tested |
| Mum overprotective | .85*** | .26* | .53*** | .57*** | Sig |
| Harsh parenting | .98*** | .84*** | .45*** | .57*** | Sig |
| Parental separation | .53** | .26 | .55*** | .57*** | Ns |
| Mum alcohol problems | .09 | -.03 | .55*** | .57*** | Not tested |
| Dad alcohol problems | .30 | -.10 | .63*** | .57*** | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.50*** | .76*** | .17 | .57*** | Sig |
| Serviceman anxiety | 2.15*** | .53** | .32 | .57*** | Sig |
| Serviceman skin problems | .87*** | .10 | .55*** | .57*** | Not tested |
| Serviceman migraines | 1.09*** | .55 | .52*** | .57*** | Not tested |
| Serviceman sleeping problems | 1.89*** | .28* | .44*** | .57*** | Sig |
| Support services used | | | | | |
| Social support used | .65*** | .03 | .56*** | .57*** | Not tested |
| Military-related service used | 2.28*** | .62*** | .28 | .57*** | Sig |
| Health service used | 1.65*** | .22 | .52*** | .57*** | Not tested |

Notes: *** p < .001; ** p < .01; * p < .05. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

B.4 Step 3

In Step 3 we examined whether father's PTSD mediated the effect of deployment on any of the explanatory covariates of interest.

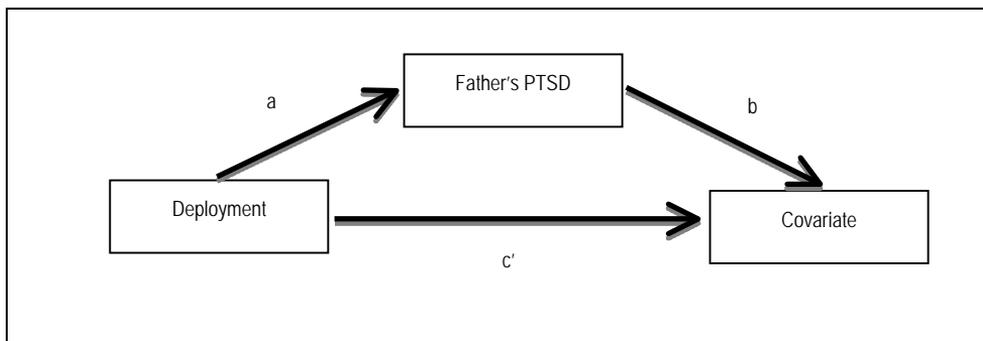


Figure B.3 Mediation model: father's PTSD, covariate of interest

To test for basic mediation we estimate three regressions:

$$Y = a_1 + cX + e_1 \quad (1)$$

$$Y = a_2 + c'X + bM + e_2 \quad (2)$$

$$M = a_3 + aX + e_3 \quad (3)$$

where X refers to independent variable (deployment)

M refers to mediator variable (father's PTSD)

Y refers to dependent variable (covariate of interest)

a_i refers to the intercept

e_i refers to the error term

According to Baron and Kenny the following conditions must hold in order for mediation to be supported:

1. The relationship between the independent variable (deployment) and dependent variable (covariate of interest) must be statistically significant—path c in equation (1).

2. The relationship between the independent variable (deployment) and mediator-variable (father's PTSD) must be statistically significant—path a in equation (2).
3. The relationship between the dependent variable (covariate of interest) and mediator-variable (father's PTSD) must be statistically significant—path b in equation (3).

If at least one condition did not hold then we did not test for the mediation effect. To examine whether there was a significant mediation effect we compared the coefficient c from equation (1) and the coefficient c' from equation (2) using the Sobel test that was adapted for binary mediator and outcome measures by Nathaniel Herr (n.d.).

Table B.12 presents the results of the basic mediation model for every outcome separately.

Table B.12 Mechanisms of deployment: Step 3 results for all covariates

| | a | b | c' | c | Sobel test |
|---|---------|---------|---------|----------|------------|
| Sons' and daughters' characteristics | | | | | |
| Child behavioural problems | 2.46*** | .40** | .34** | .45*** | Sig |
| Child disciplinary problems | 2.46*** | .45* | .60* | .81*** | Sig |
| Child learning problems | 2.46*** | .51*** | .11 | .34** | Sig |
| Child smart/gifted | 2.46*** | .07 | -.23 | -.28 | Not tested |
| Family environment | | | | | |
| Dad caring | 2.46*** | -.46* | -.82** | -1.03*** | Sig |
| Mum caring | 2.46*** | -.07 | -.29** | -1.33** | Not tested |
| Dad overprotective | 2.46*** | .09 | .02 | .03 | Not tested |
| Mum overprotective | 2.46*** | .78** | .14 | .32 | Not tested |
| Harsh parenting | 2.46*** | .56*** | 1.02*** | 1.03*** | Ns |
| Parental separation | 2.46*** | .50* | .07 | -0.9 | Not tested |
| Mum alcohol problems | 2.46*** | .25 | -.33 | -.22 | Not tested |
| Dad alcohol problems | 2.46*** | .35 | -.10 | .08 | Not tested |
| Father's health | | | | | |
| Serviceman depression | 2.46*** | 2.10*** | 1.02*** | 1.41*** | Sig |
| Serviceman anxiety | 2.46*** | 1.74*** | .99*** | 1.31*** | Sig |
| Serviceman skin problems | 2.46*** | .72*** | .32 | .62*** | Sig |
| Serviceman migraines | 2.46*** | 1.05** | 0.09 | .55 | Not tested |
| Serviceman sleeping problems | 2.46*** | 1.41*** | 1.18*** | 1.41*** | Sig |
| Support services used | | | | | |
| Social support used | 2.46*** | .66*** | -.02 | .13 | Not tested |
| Military-related service used | 2.46*** | 1.53*** | 1.99*** | 2.23*** | Sig |
| Health service used | 2.46*** | 1.18** | .96*** | 1.20*** | Sig |

Notes: *** p < .001; ** p < .01; * p < .05. If one of the mediation conditions described above did not hold we did not run Sobel test. Ns—not significant; Sig—significant.

Source: Vietnam Veterans Family Study.

B.5 Step 4

Table B.13 Mechanisms of deployment: Step 4 results for depression

| | OR | Standard error | Significance |
|---|------|----------------|--------------|
| Deployment | 1.04 | 0.22 | 0.87 |
| Father's PTSD | 1.32 | 0.24 | 0.12 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 1.92 | 0.31 | 0.00 |
| Child disciplinary problems | 1.41 | 0.38 | 0.21 |
| Child learning problems | 1.58 | 0.26 | 0.01 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | 0.90 | 0.09 | 0.30 |
| Mum caring | 0.99 | 0.10 | 0.90 |
| Dad overprotective | 1.10 | 0.15 | 0.46 |
| Mum overprotective | 0.96 | 0.13 | 0.78 |
| Harsh parenting | 2.09 | 0.42 | 0.00 |
| Parental separation | – | – | – |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | 1.24 | 0.29 | 0.35 |
| Serviceman anxiety | 0.80 | 0.19 | 0.34 |
| Serviceman skin problems | 1.08 | 0.18 | 0.64 |
| Serviceman migraines | 1.88 | 0.52 | 0.02 |
| Serviceman sleeping problems | 0.99 | 0.18 | 0.98 |
| Support services used | | | |
| Social support used | 1.04 | 0.22 | 0.87 |
| Military-related service used | 1.04 | 0.24 | 0.88 |
| Health service used | 1.16 | 0.28 | 0.54 |
| Control variables | | | |
| Age | 0.99 | 0.01 | 0.25 |
| Female | 1.68 | 0.29 | 0.00 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Notes: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR of greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study.

Table B.14 Mechanisms of deployment: Step 4 results for anxiety

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| Deployment | 1.42 | 0.33 | 0.13 |
| Father's PTSD | 1.77 | 0.40 | 0.01 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 1.73 | 0.25 | 0.00 |
| Child disciplinary problems | 1.31 | 0.29 | 0.22 |
| Child learning problems | 1.48 | 0.23 | 0.01 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | 1.00 | 0.11 | 0.98 |
| Mum caring | 0.94 | 0.10 | 0.52 |
| Dad overprotective | 1.03 | 0.12 | 0.82 |
| Mum overprotective | – | – | – |
| Harsh parenting | 2.36 | 0.48 | 0.00 |
| Parental separation | – | – | – |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | 0.63 | 0.16 | 0.07 |
| Serviceman anxiety | 1.49 | 0.38 | 0.12 |
| Serviceman skin problems | 1.09 | 0.18 | 0.63 |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | 1.24 | 0.26 | 0.32 |
| Support services used | | | |
| Social support used | 1.36 | 0.31 | 0.18 |
| Military-related service used | 0.85 | 0.22 | 0.53 |
| Health service used | – | – | – |
| Control variables | | | |
| Age | 0.96 | 0.01 | 0.01 |
| Female | 1.75 | 0.33 | 0.00 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Source: Vietnam Veterans Family Study.

Table B.15 Mechanisms of deployment: Step 4 results for PTSD

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| Deployment | 1.43 | 0.76 | 0.50 |
| Father's PTSD | 0.65 | 0.22 | 0.20 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 2.35 | 0.81 | 0.01 |
| Child disciplinary problems | 1.83 | 0.64 | 0.08 |
| Child learning problems | 1.74 | 0.59 | 0.10 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | 0.85 | 0.16 | 0.36 |
| Mum caring | 0.87 | 0.15 | 0.41 |
| Dad overprotective | 0.83 | 0.14 | 0.28 |
| Mum overprotective | 1.29 | 0.25 | 0.18 |
| Harsh parenting | 2.62 | 0.90 | 0.01 |
| Parental separation | – | – | – |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | 1.16 | 0.64 | 0.79 |
| Serviceman anxiety | 0.96 | 0.49 | 0.94 |
| Serviceman skin problems | 1.34 | 0.56 | 0.48 |
| Serviceman migraines | | | |
| Serviceman sleeping problems | 1.09 | 0.35 | 0.79 |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | 2.12 | 1.09 | 0.14 |
| Health service used | – | – | – |
| Control variables | | | |
| Age | 1.03 | 0.03 | 0.25 |
| Female | 1.24 | 0.44 | 0.55 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Source: Vietnam Veterans Family Study.

Table B.16 Mechanisms of deployment: Step 4 results for drug use

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| Deployment | 1.36 | 0.19 | 0.03 |
| Father's PTSD | – | – | – |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 1.14 | 0.20 | 0.46 |
| Child disciplinary problems | 3.81 | 1.04 | 0.00 |
| Child learning problems | 1.37 | 0.21 | 0.05 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | 0.95 | 0.08 | 0.57 |
| Mum caring | 0.93 | 0.08 | 0.39 |
| Dad overprotective | 0.96 | 0.11 | 0.75 |
| Mum overprotective | 1.03 | 0.12 | 0.77 |
| Harsh parenting | 1.74 | 0.45 | 0.03 |
| Parental separation | – | – | – |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | – | – | – |
| Serviceman anxiety | 1.05 | 0.16 | 0.77 |
| Serviceman skin problems | – | – | – |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | – | – | – |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | – | – | – |
| Health service used | – | – | – |
| Control variables | | | |
| Age | 0.99 | 0.01 | 0.27 |
| Female | 0.82 | 0.14 | 0.24 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Source: Vietnam Veterans Family Study.

Table B.17 Mechanisms of deployment: Step 4 results for suicidal ideation

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| No suicidal ideation | | | |
| Suicidal thoughts | | | |
| Deployment | 0.05 | 0.19 | 0.80 |
| Father's PTSD | -0.31 | 0.22 | 0.15 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 0.83 | 0.14 | 0.00 |
| Child disciplinary problems | 0.24 | 0.22 | 0.28 |
| Child learning problems | 0.46 | 0.14 | 0.00 |
| Child smart/gifted | - | - | - |
| Family environment | | | |
| Dad caring | -0.34 | 0.09 | 0.00 |
| Mum caring | -0.07 | 0.10 | 0.51 |
| Dad overprotective | 0.00 | 0.11 | 0.97 |
| Mum overprotective | 0.23 | 0.12 | 0.06 |
| Harsh parenting | 0.63 | 0.21 | 0.00 |
| Parental separation | -0.58 | 0.22 | 0.01 |
| Mum alcohol problems | 0.55 | 0.34 | 0.11 |
| Dad alcohol problems | - | - | - |
| Father's health | | | |
| Serviceman depression | 0.35 | 0.21 | 0.10 |
| Serviceman anxiety | -0.01 | 0.20 | 0.98 |
| Serviceman skin problems | - | - | - |
| Serviceman migraines | 0.80 | 0.32 | 0.01 |
| Serviceman sleeping problems | -0.09 | 0.19 | 0.63 |
| Support services used | | | |
| Social support used | - | - | - |
| Military-related service used | 0.21 | 0.20 | 0.31 |
| Health service used | - | - | - |
| Control variables | | | |
| Age | -0.04 | 0.01 | 0.01 |
| Female | -0.22 | 0.15 | 0.15 |
| Suicidal plans or actions | | | |
| Deployment | -0.06 | 0.28 | 0.83 |
| Father's PTSD | -0.39 | 0.26 | 0.14 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 1.11 | 0.20 | 0.00 |
| Child disciplinary problems | 0.57 | 0.31 | 0.07 |

| | Coefficient | Standard error | Significance |
|-------------------------------|-------------|----------------|--------------|
| Child learning problems | 0.81 | 0.21 | 0.00 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | –0.70 | 0.14 | 0.00 |
| Mum caring | –0.26 | 0.13 | 0.05 |
| Dad overprotective | 0.12 | 0.17 | 0.46 |
| Mum overprotective | 0.04 | 0.18 | 0.81 |
| Harsh parenting | 1.21 | 0.25 | 0.00 |
| Parental separation | –0.09 | 0.30 | 0.76 |
| Mum alcohol problems | 1.19 | 0.37 | 0.00 |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | 0.42 | 0.41 | 0.30 |
| Serviceman anxiety | 0.04 | 0.35 | 0.91 |
| Serviceman skin problems | – | – | – |
| Serviceman migraines | 0.63 | 0.34 | 0.07 |
| Serviceman sleeping problems | 0.14 | 0.23 | 0.54 |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | 0.21 | 0.26 | 0.42 |
| Health service used | – | – | – |
| Control variables | | | |
| Age | –0.05 | 0.02 | 0.00 |
| Female | 0.26 | 0.21 | 0.20 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Source: Vietnam Veterans Family Study.

Table B.18 Mechanisms of deployment: Step 4 results for skin conditions

| | OR | Standard error | Significance |
|---|------|----------------|--------------|
| Deployment | 1.20 | 0.25 | 0.40 |
| Father's PTSD | – | – | – |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 1.67 | 0.24 | 0.00 |
| Child disciplinary problems | – | – | – |
| Child learning problems | – | – | – |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | – | – | – |
| Mum caring | – | – | – |
| Dad overprotective | – | – | – |
| Mum overprotective | 1.17 | 0.12 | 0.12 |
| Harsh parenting | 1.10 | 0.20 | 0.61 |
| Parental separation | – | – | – |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | – | – | – |
| Serviceman anxiety | – | – | – |
| Serviceman skin problems | 1.43 | 0.22 | 0.02 |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | – | – | – |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | 1.26 | 0.26 | 0.27 |
| Health service used | – | – | – |
| Control variables | | | |
| Age | 0.97 | 0.01 | 0.04 |
| Female | 1.54 | 0.24 | 0.01 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Notes: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR of greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study.

Table B.19 Mechanisms of deployment: Step 4 results for migraines

| | OR | Standard error | Significance |
|---|------|----------------|--------------|
| Deployment | 1.31 | 0.35 | 0.30 |
| Father's PTSD | 1.99 | 0.43 | 0.00 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 1.93 | 0.35 | 0.00 |
| Child disciplinary problems | – | – | – |
| Child learning problems | 1.24 | 0.21 | 0.20 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | 0.93 | 0.12 | 0.57 |
| Mum caring | – | – | – |
| Dad overprotective | 1.07 | 0.17 | 0.68 |
| Mum overprotective | 1.17 | 0.14 | 0.22 |
| Harsh parenting | 1.31 | 0.30 | 0.25 |
| Parental separation | – | – | – |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | 0.52 | 0.10 | 0.00 |
| Father's health | | | |
| Serviceman depression | – | – | – |
| Serviceman anxiety | – | – | – |
| Serviceman skin problems | – | – | – |
| Serviceman migraines | 1.65 | 0.43 | 0.05 |
| Serviceman sleeping problems | – | – | – |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | 0.91 | 0.26 | 0.73 |
| Health service used | – | – | – |
| Control variables | | | |
| Age | 0.99 | 0.01 | 0.50 |
| Female | 3.05 | 0.74 | 0.00 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Notes: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR of greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study.

Table B.20 Mechanisms of deployment: Step 4 results for sleep disturbance

| | OR | Standard error | Significance |
|---|------|----------------|--------------|
| Deployment | 1.25 | 0.31 | 0.37 |
| Father's PTSD | 1.22 | 0.26 | 0.34 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 2.38 | 0.42 | 0.00 |
| Child disciplinary problems | 1.71 | 0.47 | 0.05 |
| Child learning problems | 1.63 | 0.29 | 0.01 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | 0.92 | 0.10 | 0.45 |
| Mum caring | 0.97 | 0.12 | 0.80 |
| Dad overprotective | 0.92 | 0.11 | 0.48 |
| Mum overprotective | 1.19 | 0.19 | 0.26 |
| Harsh parenting | 1.66 | 0.42 | 0.04 |
| Parental separation | 0.85 | 0.19 | 0.48 |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | 0.97 | 0.26 | 0.91 |
| Serviceman anxiety | 1.26 | 0.30 | 0.34 |
| Serviceman skin problems | – | – | – |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | 0.97 | 0.26 | 0.91 |
| Support services used | | | |
| Social support used | 1.19 | 0.29 | 0.47 |
| Military-related service used | 1.12 | 0.30 | 0.67 |
| Health service used | 1.10 | 0.31 | 0.74 |
| Control variables | | | |
| Age | 1.05 | 0.01 | 0.00 |
| Female | 1.26 | 0.25 | 0.24 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Notes: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR of greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study.

Table B.21 Mechanisms of deployment: Step 4 results for relationship status

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| Married | | | |
| Partnered | | | |
| Deployment | 0.60 | 0.18 | 0.00 |
| Father's PTSD | – | – | – |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | – | – | – |
| Child disciplinary problems | 0.59 | 0.30 | 0.05 |
| Child learning problems | 0.39 | 0.17 | 0.02 |
| Child smart/gifted | 0.18 | 0.21 | 0.39 |
| Family environment | | | |
| Dad caring | 0.21 | 0.12 | 0.07 |
| Mum caring | –0.17 | 0.13 | 0.18 |
| Dad overprotective | –0.03 | 0.15 | 0.85 |
| Mum overprotective | –0.28 | 0.14 | 0.06 |
| Harsh parenting | 0.25 | 0.22 | 0.27 |
| Parental separation | 0.31 | 0.23 | 0.18 |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | – | – | – |
| Serviceman anxiety | – | – | – |
| Serviceman skin problems | – | – | – |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | – | – | – |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | – | – | – |
| Health service used | – | – | – |
| Control variables | | | |
| Age | –0.10 | 0.01 | 0.00 |
| Female | –0.11 | 0.17 | 0.51 |
| Divorced/separated | | | |
| Deployment | 0.14 | 0.24 | 0.55 |
| Father's PTSD | | | |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | – | – | – |
| Child disciplinary problems | 0.71 | 0.35 | 0.05 |

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| Child learning problems | 0.59 | 0.22 | 0.01 |
| Child smart/gifted | -0.40 | 0.28 | 0.16 |
| Family environment | | | |
| Dad caring | -0.22 | 0.15 | 0.14 |
| Mum caring | -0.02 | 0.14 | 0.90 |
| Dad overprotective | -0.14 | 0.18 | 0.44 |
| Mum overprotective | 0.01 | 0.18 | 0.95 |
| Harsh parenting | 0.28 | 0.27 | 0.30 |
| Parental separation | 0.44 | 0.34 | 0.20 |
| Mum alcohol problems | - | - | - |
| Dad alcohol problems | - | - | - |
| Father's health | | | |
| Serviceman depression | - | - | - |
| Serviceman anxiety | - | - | - |
| Serviceman skin problems | - | - | - |
| Serviceman migraines | - | - | - |
| Serviceman sleeping problems | - | - | - |
| Support services used | | | |
| Social support used | - | - | - |
| Military-related service used | - | - | - |
| Health service used | - | - | - |
| Control variables | | | |
| Age | 0.02 | 0.02 | 0.19 |
| Female | 0.48 | 0.26 | 0.07 |
| Single/never had relationship | | | |
| Deployment | -0.27 | 0.20 | 0.16 |
| Father's PTSD | - | - | - |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | - | - | - |
| Child disciplinary problems | 0.24 | 0.34 | 0.49 |
| Child learning problems | 0.65 | 0.21 | 0.00 |
| Child smart/gifted | 0.50 | 0.27 | 0.07 |
| Family environment | | | |
| Dad caring | 0.18 | 0.12 | 0.14 |
| Mum caring | -0.16 | 0.17 | 0.34 |
| Dad overprotective | -0.11 | 0.14 | 0.45 |
| Mum overprotective | -0.17 | 0.16 | 0.31 |
| Harsh parenting | 0.88 | 0.51 | 0.63 |

| | Coefficient | Standard error | Significance |
|-------------------------------|-------------|----------------|--------------|
| Parental separation | 0.16 | 0.03 | 0.00 |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | – | – | – |
| Serviceman anxiety | – | – | – |
| Serviceman skin problems | – | – | – |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | – | – | – |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | – | – | – |
| Health service used | – | – | – |
| Control variables | | | |
| Age | –0.10 | 0.02 | 0.00 |
| Female | –0.41 | 0.20 | 0.04 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.
Source: Vietnam Veterans Family Study.

Table B.22 Mechanisms of deployment: Step 4 results for number of long term-relationships

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| One relationship | | | |
| None relationships | | | |
| Deployment | 0.52 | 0.27 | 0.05 |
| Father's PTSD | – | – | – |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | –0.02 | 0.23 | 0.95 |
| Child disciplinary problems | –0.53 | 0.38 | 0.17 |
| Child learning problems | 0.11 | 0.27 | 0.69 |
| Child smart/gifted | –0.84 | 0.29 | 0.00 |
| Family environment | | | |
| Dad caring | –0.23 | 0.13 | 0.09 |
| Mum caring | 0.12 | 0.17 | 0.50 |
| Dad overprotective | 0.01 | 0.15 | 0.97 |
| Mum overprotective | | | |
| Harsh parenting | 0.50 | 0.35 | 0.15 |
| Parental separation | –0.65 | 0.38 | 0.09 |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | –0.22 | 0.30 | 0.46 |
| Serviceman anxiety | 0.03 | 0.29 | 0.91 |
| Serviceman skin problems | –0.48 | 0.23 | 0.03 |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | 0.24 | 0.31 | 0.44 |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | –0.36 | 0.26 | 0.16 |
| Health service used | 0.64 | 0.35 | 0.07 |
| Control variables | | | |
| Age | –0.06 | 0.02 | 0.01 |
| Female | –0.20 | 0.22 | 0.36 |
| Two or more relationships | | | |
| Deployment | 0.16 | 0.20 | 0.44 |
| Father's PTSD | – | – | – |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 0.12 | 0.16 | 0.44 |

| | Coefficient | Standard error | Significance |
|-------------------------------|-------------|----------------|--------------|
| Child disciplinary problems | 0.36 | 0.30 | 0.22 |
| Child learning problems | 0.22 | 0.16 | 0.16 |
| Child smart/gifted | -0.10 | 0.19 | 0.59 |
| Family environment | | | |
| Dad caring | -0.02 | 0.10 | 0.84 |
| Mum caring | -0.21 | 0.09 | 0.02 |
| Dad overprotective | 0.00 | 0.11 | 0.99 |
| Mum overprotective | - | - | - |
| Harsh parenting | 0.29 | 0.17 | 0.09 |
| Parental separation | 0.54 | 0.27 | 0.04 |
| Mum alcohol problems | - | - | - |
| Dad alcohol problems | - | - | - |
| Father's health | | | |
| Serviceman depression | 0.21 | 0.22 | 0.33 |
| Serviceman anxiety | 0.10 | 0.24 | 0.68 |
| Serviceman skin problems | 0.15 | 0.16 | 0.36 |
| Serviceman migraines | - | - | - |
| Serviceman sleeping problems | 0.21 | 0.18 | 0.25 |
| Support services used | | | |
| Social support used | - | - | - |
| Military-related service used | -0.12 | 0.21 | 0.58 |
| Health service used | 0.04 | 0.21 | 0.83 |
| Control variables | | | |
| Age | 0.04 | 0.01 | 0.00 |
| Female | 0.11 | 0.16 | 0.46 |

- Denotes variables that were not included in the final model based on Steps 0 to 3.
Source: Vietnam Veterans Family Study.

Table B.23 Mechanisms of deployment: Step 4 results for education

| | Coefficient | Standard error | Significance |
|---|-------------|----------------|--------------|
| University degree | | | |
| School or below | | | |
| Deployment | -0.24 | 0.24 | 0.32 |
| Father's PTSD | 0.66 | 0.19 | 0.00 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | -0.01 | 0.19 | 0.97 |
| Child disciplinary problems | 0.90 | 0.31 | 0.00 |
| Child learning problems | 0.34 | 0.18 | 0.06 |
| Child smart/gifted | -1.16 | 0.21 | 0.00 |
| Family environment | | | |
| Dad caring | 0.01 | 0.11 | 0.94 |
| Mum caring | 0.01 | 0.11 | 0.89 |
| Dad overprotective | 0.26 | 0.13 | 0.04 |
| Mum overprotective | 0.00 | 0.13 | 0.98 |
| Harsh parenting | 0.35 | 0.22 | 0.12 |
| Parental separation | - | - | - |
| Mum alcohol problems | - | - | - |
| Dad alcohol problems | - | - | - |
| Father's health | | | |
| Serviceman depression | | | |
| Serviceman anxiety | | | |
| Serviceman skin problems | -0.23 | 0.18 | 0.19 |
| Serviceman migraines | 0.10 | 0.37 | 0.79 |
| Serviceman sleeping problems | - | - | - |
| Support services used | | | |
| Social support used | - | - | - |
| Military-related service used | 0.34 | 0.27 | 0.21 |
| Health service used | 0.03 | 0.26 | 0.92 |
| Control variables | | | |
| Age | 0.06 | 0.01 | 0.00 |
| Female | -0.09 | 0.19 | 0.65 |
| Certificate or diploma | | | |
| Deployment | 0.11 | 0.21 | 0.59 |
| Father's PTSD | 0.37 | 0.19 | 0.05 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | -0.01 | 0.16 | 0.97 |
| Child disciplinary problems | 0.99 | 0.32 | 0.00 |

| | Coefficient | Standard error | Significance |
|-------------------------------|-------------|----------------|--------------|
| Child learning problems | 0.52 | 0.15 | 0.00 |
| Child smart/gifted | -1.06 | 0.17 | 0.00 |
| Family environment | | | |
| Dad caring | -0.05 | 0.09 | 0.58 |
| Mum caring | 0.07 | 0.11 | 0.50 |
| Dad overprotective | 0.09 | 0.12 | 0.48 |
| Mum overprotective | 0.13 | 0.12 | 0.29 |
| Harsh parenting | 0.01 | 0.20 | 0.98 |
| Parental separation | - | - | - |
| Mum alcohol problems | - | - | - |
| Dad alcohol problems | - | - | - |
| Father's health | | | |
| Serviceman depression | - | - | - |
| Serviceman anxiety | - | - | - |
| Serviceman skin problems | -0.19 | 0.17 | 0.25 |
| Serviceman migraines | -0.46 | 0.31 | 0.14 |
| Serviceman sleeping problems | - | - | - |
| Support services used | | | |
| Social support used | - | - | - |
| Military-related service used | 0.02 | 0.23 | 0.92 |
| Health service used | 0.20 | 0.22 | 0.38 |
| Control variables | | | |
| Age | 0.03 | 0.01 | 0.01 |
| Female | -0.30 | 0.15 | 0.05 |

- Denotes variables that were not included in the final model based on Steps 0 to 3.

Source: Vietnam Veterans Family Study.

Table B.24 Mechanisms of deployment: Step 4 results for financial stress

| | OR | Standard error | Significance |
|---|------|----------------|--------------|
| Deployment | 0.95 | 0.21 | 0.83 |
| Father's PTSD | 0.87 | 0.20 | 0.53 |
| Sons' and daughters' characteristics | | | |
| Child behavioural problems | 2.39 | 0.39 | 0.00 |
| Child disciplinary problems | 1.33 | 0.35 | 0.28 |
| Child learning problems | 1.57 | 0.25 | 0.01 |
| Child smart/gifted | – | – | – |
| Family environment | | | |
| Dad caring | 0.95 | 0.08 | 0.59 |
| Mum caring | 0.95 | 0.10 | 0.64 |
| Dad overprotective | – | – | – |
| Mum overprotective | 1.11 | 0.14 | 0.40 |
| Harsh parenting | 1.46 | 0.24 | 0.02 |
| Parental separation | 1.04 | 0.24 | 0.87 |
| Mum alcohol problems | – | – | – |
| Dad alcohol problems | – | – | – |
| Father's health | | | |
| Serviceman depression | 1.70 | 0.34 | 0.01 |
| Serviceman anxiety | 1.07 | 0.21 | 0.73 |
| Serviceman skin problems | – | – | – |
| Serviceman migraines | – | – | – |
| Serviceman sleeping problems | 1.02 | 0.18 | 0.91 |
| Support services used | | | |
| Social support used | – | – | – |
| Military-related service used | 1.46 | 0.36 | 0.13 |
| Health service used | 0.86 | 0.18 | 0.46 |
| Control variables | | | |
| Age | 1.01 | 0.01 | 0.53 |
| Female | 1.24 | 0.23 | 0.24 |

– Denotes variables that were not included in the final model based on Steps 0 to 3.

Notes: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR of greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study.

Appendix C Impact of deployment on outcomes of veterans' sons and daughters: analysis results

Table C.1 Impact of deployment on depression of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 1.49 | 0.32 | 0.06 |
| More than 12 months | 1.34 | 0.37 | 0.29 |
| Exposure to Agent Orange | 1.34 | 0.25 | 0.12 |
| Exposure to trauma | 1.05 | 0.12 | 0.70 |
| Conscription | 0.69 | 0.15 | 0.08 |
| Born after deployment | 1.08 | 0.39 | 0.82 |
| Deployment instability | 1.17 | 0.22 | 0.40 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.69 | 0.22 | 0.24 |
| Royal Australian Artillery | 0.87 | 0.27 | 0.66 |
| Other | 0.89 | 0.20 | 0.61 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 0.83 | 0.18 | 0.37 |
| Officer | 0.38 | 0.17 | 0.03 |
| Sons' and daughters' characteristics | | | |
| Age | 0.99 | 0.02 | 0.58 |
| Female | 1.66 | 0.33 | 0.01 |
| Child behavioural problems | 2.29 | 0.41 | 0.00 |
| Child disciplinary problems | 1.37 | 0.37 | 0.25 |
| Child learning problems | 2.00 | 0.35 | 0.00 |
| Child smart/gifted | 0.76 | 0.17 | 0.23 |
| Family environment | | | |
| Dad caring | 0.76 | 0.09 | 0.02 |
| Mum caring | 0.78 | 0.09 | 0.04 |

| | OR | Standard error | Significance |
|---------------------------------------|------|--------------------|--------------|
| Dad overprotective | 0.93 | 0.13 | 0.64 |
| Mum overprotective | 1.10 | 0.16 | 0.50 |
| Harsh parenting | 1.52 | 0.29 | 0.03 |
| Parental separation | 0.82 | 0.21 | 0.43 |
| Mum alcohol problems | 0.44 | 0.17 | 0.04 |
| Dad alcohol problems | 1.10 | 0.22 | 0.63 |
| Father's characteristics | | | |
| Father's age | 1.01 | 0.04 | 0.82 |
| Father's age entering military | 1.06 | 0.04 | 0.10 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.83 | 0.22 | 0.49 |
| Certificate/diploma | 0.88 | 0.17 | 0.52 |
| University degree | 1.82 | 0.52 | 0.04 |
| Father's father caring | 1.27 | 0.16 | 0.06 |
| Father's father overprotective | 1.15 | 0.18 | 0.38 |
| Father's mother caring | 0.81 | 0.10 | 0.09 |
| Father's mother overprotective | 0.90 | 0.13 | 0.45 |
| Father's PTSD symptoms | 1.18 | 0.22 | 0.36 |
| Model-specific characteristics | | | |
| Servicemen depression | 1.24 | 0.30 | 0.37 |
| Servicemen anxiety | 0.95 | 0.23 | 0.84 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not. Source: Vietnam Veterans Family Study ($N = 1,113$).

Table C.2 Impact of deployment on anxiety of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 1.59 | 0.35 | 0.04 |
| More than 12 months | 1.81 | 0.48 | 0.02 |
| Exposure to Agent Orange | 1.36 | 0.24 | 0.08 |
| Exposure to trauma | 0.87 | 0.11 | 0.25 |
| Conscription | 0.88 | 0.18 | 0.51 |
| Born after deployment | 1.31 | 0.47 | 0.45 |
| Deployment instability | 1.11 | 0.20 | 0.56 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.81 | 0.22 | 0.45 |
| Royal Australian Artillery | 0.72 | 0.23 | 0.29 |
| Other | 0.56 | 0.13 | 0.01 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 1.03 | 0.21 | 0.89 |
| Officer | 1.02 | 0.39 | 0.95 |
| Sons' and daughters' characteristics | | | |
| Age | 0.97 | 0.02 | 0.06 |
| Female | 1.72 | 0.34 | 0.01 |
| Child behavioural problems | 2.06 | 0.36 | 0.00 |
| Child disciplinary problems | 1.34 | 0.34 | 0.25 |
| Child learning problems | 1.51 | 0.26 | 0.02 |
| Child smart/gifted | 1.02 | 0.21 | 0.94 |
| Family environment | | | |
| Dad caring | 0.86 | 0.09 | 0.15 |
| Mum caring | 0.86 | 0.10 | 0.19 |
| Dad overprotective | 0.90 | 0.12 | 0.45 |
| Mum overprotective | 1.21 | 0.17 | 0.17 |
| Harsh parenting | 1.88 | 0.37 | 0.00 |
| Parental separation | 0.80 | 0.19 | 0.37 |
| Mum alcohol problems | 1.53 | 0.48 | 0.18 |
| Dad alcohol problems | 0.91 | 0.17 | 0.59 |
| Father's characteristics | | | |

| | OR | Standard error | Significance |
|---------------------------------------|------|--------------------|--------------|
| Father's age | 1.02 | 0.03 | 0.63 |
| Father's age entering military | 1.09 | 0.04 | 0.01 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.94 | 0.24 | 0.82 |
| Certificate/diploma | 1.05 | 0.21 | 0.79 |
| University degree | 1.56 | 0.48 | 0.15 |
| Father's father caring | 0.95 | 0.12 | 0.67 |
| Father's father overprotective | 0.89 | 0.14 | 0.46 |
| Father's mother caring | 0.95 | 0.12 | 0.68 |
| Father's mother overprotective | 1.09 | 0.16 | 0.55 |
| Father's PTSD symptoms | 1.35 | 0.25 | 0.11 |
| Model-specific characteristics | | | |
| Servicemen depression | 0.96 | 0.22 | 0.85 |
| Servicemen anxiety | 1.45 | 0.32 | 0.10 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study (*N* = 1,113).

Table C.3 Impact of deployment on PTSD of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 1.69 | 0.73 | 0.23 |
| More than 12 months | 0.91 | 0.49 | 0.86 |
| Exposure to Agent Orange | 1.30 | 0.43 | 0.43 |
| Exposure to trauma | 1.16 | 0.26 | 0.51 |
| Conscription | 0.74 | 0.28 | 0.42 |
| Born after deployment | 1.09 | 0.62 | 0.87 |
| Deployment instability | 1.52 | 0.53 | 0.23 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.22 | 0.19 | 0.07 |
| Royal Australian Artillery | 0.71 | 0.43 | 0.58 |
| Other | 0.55 | 0.23 | 0.16 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 1.68 | 0.63 | 0.17 |
| Officer | 1.67 | 0.99 | 0.39 |
| Sons' and daughters' characteristics | | | |
| Age | 1.09 | 0.04 | 0.03 |
| Female | 0.73 | 0.25 | 0.37 |
| Child behavioural problems | 2.25 | 0.79 | 0.02 |
| Child disciplinary problems | 1.30 | 0.59 | 0.55 |
| Child learning problems | 4.15 | 1.44 | 0.00 |
| Child smart/gifted | 1.50 | 0.58 | 0.30 |
| Family environment | | | |
| Dad caring | 0.84 | 0.18 | 0.41 |
| Mum caring | 0.84 | 0.16 | 0.38 |
| Dad overprotective | 0.82 | 0.19 | 0.38 |
| Mum overprotective | 1.67 | 0.36 | 0.02 |
| Harsh parenting | 2.00 | 0.66 | 0.04 |
| Parental separation | 0.94 | 0.44 | 0.89 |
| Mum alcohol problems | 1.81 | 1.25 | 0.39 |
| Dad alcohol problems | 1.08 | 0.39 | 0.82 |
| Father's characteristics | | | |
| Father's age | 0.94 | 0.05 | 0.26 |

| | OR | Standard error | Significance |
|---------------------------------------|------|--------------------|--------------|
| Father's age entering military | 1.15 | 0.06 | 0.01 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.73 | 0.34 | 0.50 |
| Certificate/diploma | 0.75 | 0.32 | 0.51 |
| University degree | 1.00 | 0.59 | 1.00 |
| Father's father caring | 1.33 | 0.33 | 0.25 |
| Father's father overprotective | 0.99 | 0.33 | 0.98 |
| Father's mother caring | 0.90 | 0.25 | 0.70 |
| Father's mother overprotective | 1.20 | 0.40 | 0.59 |
| Father's PTSD symptoms | 0.88 | 0.31 | 0.72 |
| Model-specific characteristics | | | |
| Father's depression | 0.71 | 0.28 | 0.39 |
| Father's anxiety | 1.40 | 0.52 | 0.37 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not. Source: Vietnam Veterans Family Study ($N = 1,113$).

Table C.4 Impact of deployment on drug use of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 1.17 | 0.23 | 0.43 |
| More than 12 months | 1.10 | 0.28 | 0.72 |
| Exposure to Agent Orange | 0.83 | 0.14 | 0.30 |
| Exposure to trauma | 0.93 | 0.11 | 0.54 |
| Conscription | 0.87 | 0.17 | 0.48 |
| Born after deployment | 0.93 | 0.28 | 0.81 |
| Deployment instability | 0.98 | 0.17 | 0.91 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.97 | 0.25 | 0.90 |
| Royal Australian Artillery | 0.73 | 0.20 | 0.26 |
| Other | 0.79 | 0.17 | 0.26 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 0.67 | 0.13 | 0.03 |
| Officer | 0.96 | 0.35 | 0.91 |
| Sons' and daughters' characteristics | | | |
| Age | 1.00 | 0.02 | 1.00 |
| Female | 0.77 | 0.12 | 0.09 |
| Child behavioural problems | 0.91 | 0.13 | 0.54 |
| Child disciplinary problems | 2.64 | 0.79 | 0.00 |
| Child learning problems | 1.12 | 0.17 | 0.46 |
| Child smart/gifted | 1.21 | 0.25 | 0.35 |
| Family environment | | | |
| Dad caring | 1.08 | 0.10 | 0.43 |
| Mum caring | 0.89 | 0.10 | 0.29 |
| Dad overprotective | 1.13 | 0.15 | 0.36 |
| Mum overprotective | 0.93 | 0.12 | 0.58 |
| Harsh parenting | 1.33 | 0.24 | 0.12 |
| Parental separation | 1.33 | 0.32 | 0.24 |
| Mum alcohol problems | 1.48 | 0.58 | 0.32 |
| Dad alcohol problems | 1.13 | 0.20 | 0.50 |
| Father's characteristics | | | |

| | OR | Standard error | Significance |
|---------------------------------------|--------------------|----------------|--------------|
| Father's age | 0.96 | 0.03 | 0.23 |
| Father's age entering military | 1.06 | 0.04 | 0.13 |
| Father's education | | | |
| Below Year 12 | Reference category | | |
| Year 12 | 1.13 | 0.29 | 0.64 |
| Certificate/diploma | 0.89 | 0.17 | 0.53 |
| University degree | 1.19 | 0.32 | 0.53 |
| Father's father caring | 0.74 | 0.09 | 0.01 |
| Father's father overprotective | 0.81 | 0.13 | 0.19 |
| Father's mother caring | 1.17 | 0.14 | 0.19 |
| Father's mother overprotective | 1.06 | 0.16 | 0.71 |
| Father's PTSD symptoms | 0.68 | 0.13 | 0.04 |
| Model-specific characteristics | | | |
| Father's depression | 1.36 | 0.32 | 0.19 |
| Father's anxiety | 1.22 | 0.27 | 0.35 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not. Source: Vietnam Veterans Family Study ($N = 1,032$).

Table C.5 Impact of deployment on suicidal ideation of veterans' sons and daughters

| | Coefficient | Standard error | Significance |
|---|--------------------|----------------|--------------|
| No suicidal ideation | Reference category | | |
| Suicidal thoughts | | | |
| Deployment-related characteristics | | | |
| Total duration | Reference category | | |
| Up to 8 months | | | |
| 8–12 months | -0.03 | 0.20 | 0.89 |
| More than 12 months | 0.26 | 0.25 | 0.29 |
| Exposure to Agent Orange | -0.16 | 0.18 | 0.38 |
| Exposure to trauma | 0.24 | 0.11 | 0.04 |
| Conscription | -0.29 | 0.21 | 0.16 |
| Born after deployment | -0.36 | 0.34 | 0.29 |
| Deployment instability | 0.16 | 0.18 | 0.38 |
| Corps | Reference category | | |
| Royal Australian Infantry | | | |
| Royal Australian Engineers | 0.40 | 0.26 | 0.13 |
| Royal Australian Artillery | 0.34 | 0.31 | 0.27 |
| Other | 0.23 | 0.20 | 0.24 |
| Rank | Reference category | | |
| Enlisted | | | |
| Non-commissioned | -0.27 | 0.20 | 0.16 |
| Officer | -1.67 | 0.38 | 0.00 |
| Sons' and daughters' characteristics | | | |
| Age | -0.05 | 0.02 | 0.00 |
| Female | 0.01 | 0.17 | 0.93 |
| Child behavioural problems | 0.91 | 0.16 | 0.00 |
| Child disciplinary problems | 0.43 | 0.31 | 0.16 |
| Child learning problems | 0.48 | 0.17 | 0.00 |
| Child smart/gifted | -0.15 | 0.20 | 0.45 |
| Family environment | | | |
| Dad caring | -0.36 | 0.11 | 0.00 |
| Mum caring | -0.24 | 0.12 | 0.05 |
| Dad overprotective | 0.11 | 0.14 | 0.45 |
| Mum overprotective | 0.15 | 0.14 | 0.28 |
| Harsh parenting | 0.58 | 0.21 | 0.01 |
| Parental separation | -0.26 | 0.26 | 0.32 |
| Mum alcohol problems | 0.31 | 0.40 | 0.45 |

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| Dad alcohol problems | -0.17 | 0.19 | 0.36 |
| Father's characteristics | | | |
| Father's age | 0.02 | 0.03 | 0.48 |
| Father's age entering military | 0.06 | 0.03 | 0.05 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.17 | 0.24 | 0.50 |
| Certificate/diploma | 0.02 | 0.19 | 0.94 |
| University degree | 0.57 | 0.27 | 0.04 |
| Father's father caring | -0.21 | 0.11 | 0.06 |
| Father's father overprotective | -0.37 | 0.15 | 0.02 |
| Father's mother caring | 0.10 | 0.12 | 0.39 |
| Father's mother overprotective | 0.40 | 0.15 | 0.01 |
| Father's PTSD symptoms | -0.46 | 0.17 | 0.01 |
| Model-specific characteristics | | | |
| Father's suicidal thoughts | 0.03 | 0.18 | 0.87 |
| Father's suicidal plans/actions | 0.12 | 0.24 | 0.62 |
| Suicidal plans/actions | | | |
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8-12 months | 0.06 | 0.28 | 0.84 |
| More than 12 months | -0.30 | 0.41 | 0.46 |
| Exposure to Agent Orange | -0.01 | 0.25 | 0.96 |
| Exposure to trauma | 0.23 | 0.17 | 0.17 |
| Conscription | -0.61 | 0.29 | 0.04 |
| Born after deployment | -0.47 | 0.47 | 0.31 |
| Deployment instability | 0.50 | 0.26 | 0.05 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | -0.28 | 0.46 | 0.54 |
| Royal Australian Artillery | 0.52 | 0.40 | 0.20 |
| Other | -0.10 | 0.29 | 0.74 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | -0.18 | 0.28 | 0.53 |
| Officer | -1.20 | 0.60 | 0.05 |
| Sons' and daughters' characteristics | | | |

| | Coefficient | Standard error | Significance |
|---------------------------------------|-------------|--------------------|--------------|
| Age | -0.08 | 0.03 | 0.01 |
| Female | -0.10 | 0.27 | 0.72 |
| Child behavioural problems | 1.35 | 0.25 | 0.00 |
| Child disciplinary problems | 0.67 | 0.37 | 0.08 |
| Child learning problems | 0.68 | 0.24 | 0.01 |
| Child smart/gifted | -0.10 | 0.30 | 0.73 |
| Family environment | | | |
| Dad caring | -0.53 | 0.16 | 0.00 |
| Mum caring | -0.46 | 0.16 | 0.00 |
| Dad overprotective | 0.17 | 0.19 | 0.35 |
| Mum overprotective | 0.25 | 0.19 | 0.18 |
| Harsh parenting | 1.07 | 0.26 | 0.00 |
| Parental separation | -0.36 | 0.37 | 0.33 |
| Mum alcohol problems | 0.12 | 0.51 | 0.81 |
| Dad alcohol problems | 0.14 | 0.28 | 0.62 |
| Father's characteristics | | | |
| Father's age | 0.05 | 0.05 | 0.32 |
| Father's age entering military | 0.04 | 0.05 | 0.40 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.31 | 0.36 | 0.39 |
| Certificate/diploma | 0.08 | 0.27 | 0.78 |
| University degree | 0.49 | 0.44 | 0.26 |
| Father's father caring | 0.24 | 0.17 | 0.17 |
| Father's father overprotective | -0.14 | 0.23 | 0.54 |
| Father's mother caring | -0.22 | 0.17 | 0.19 |
| Father's mother overprotective | -0.07 | 0.21 | 0.73 |
| Father's PTSD symptoms | -0.60 | 0.25 | 0.02 |
| Model-specific characteristics | | | |
| Father's suicidal thoughts | 0.25 | 0.29 | 0.39 |
| Father's suicidal plans/actions | 0.68 | 0.36 | 0.06 |

Source: Vietnam Veterans Family Study ($N = 1,019$).

Table C.6 Impact of deployment on skin conditions of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 1.09 | 0.21 | 0.64 |
| More than 12 months | 0.76 | 0.20 | 0.29 |
| Exposure to Agent Orange | 0.99 | 0.18 | 0.96 |
| Exposure to trauma | 0.86 | 0.11 | 0.23 |
| Conscription | 0.87 | 0.19 | 0.51 |
| Born after deployment | 1.09 | 0.34 | 0.78 |
| Deployment instability | 0.95 | 0.17 | 0.75 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.79 | 0.22 | 0.39 |
| Royal Australian Artillery | 0.54 | 0.18 | 0.06 |
| Other | 0.67 | 0.15 | 0.07 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 0.91 | 0.18 | 0.64 |
| Officer | 1.63 | 0.59 | 0.18 |
| Sons' and daughters' characteristics | | | |
| Age | 1.00 | 0.02 | 0.99 |
| Female | 1.49 | 0.28 | 0.03 |
| Child behavioural problems | 1.63 | 0.27 | 0.00 |
| Child disciplinary problems | 1.04 | 0.27 | 0.88 |
| Child learning problems | 1.13 | 0.19 | 0.46 |
| Child smart/gifted | 1.87 | 0.37 | 0.00 |
| Family environment | | | |
| Dad caring | 1.01 | 0.11 | 0.92 |
| Mum caring | 0.85 | 0.09 | 0.15 |
| Dad overprotective | 0.84 | 0.12 | 0.21 |
| Mum overprotective | 1.21 | 0.17 | 0.17 |
| Harsh parenting | 1.30 | 0.25 | 0.18 |
| Parental separation | 0.78 | 0.20 | 0.33 |
| Mum alcohol problems | 0.99 | 0.31 | 0.98 |
| Dad alcohol problems | 0.96 | 0.17 | 0.84 |
| Father's characteristics | | | |

| | OR | Standard error | Significance |
|---------------------------------------|------|--------------------|--------------|
| Father's age | 0.98 | 0.03 | 0.56 |
| Father's age entering military | 0.98 | 0.04 | 0.59 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 1.04 | 0.26 | 0.86 |
| Certificate/diploma | 0.80 | 0.15 | 0.25 |
| University degree | 0.94 | 0.26 | 0.84 |
| Father's father caring | 0.92 | 0.11 | 0.48 |
| Father's father overprotective | 0.75 | 0.12 | 0.07 |
| Father's mother caring | 0.99 | 0.11 | 0.91 |
| Father's mother overprotective | 1.22 | 0.18 | 0.18 |
| Father's PTSD symptoms | 1.45 | 0.26 | 0.03 |
| Model-specific characteristics | | | |
| Skin conditions (father) | 1.74 | 0.29 | 0.00 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not. Source: Vietnam Veterans Family Study (*N* = 1,113).

Table C.7 Impact of deployment on migraines of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 1.14 | 0.27 | 0.58 |
| More than 12 months | 0.84 | 0.26 | 0.57 |
| Exposure to Agent Orange | 0.76 | 0.17 | 0.22 |
| Exposure to trauma | 1.32 | 0.18 | 0.05 |
| Conscription | 0.82 | 0.20 | 0.43 |
| Born after deployment | 0.58 | 0.23 | 0.17 |
| Deployment instability | 0.72 | 0.16 | 0.15 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.54 | 0.20 | 0.09 |
| Royal Australian Artillery | 1.03 | 0.36 | 0.93 |
| Other | 1.02 | 0.26 | 0.93 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 1.36 | 0.30 | 0.17 |
| Officer | 0.68 | 0.34 | 0.45 |
| Sons' and daughters' characteristics | | | |
| Age | 0.98 | 0.02 | 0.47 |
| Female | 2.33 | 0.54 | 0.00 |
| Child behavioural problems | 1.29 | 0.27 | 0.22 |
| Child disciplinary problems | 1.31 | 0.40 | 0.37 |
| Child learning problems | 1.36 | 0.28 | 0.13 |
| Child smart/gifted | 1.01 | 0.25 | 0.96 |
| Family environment | | | |
| Dad caring | 0.87 | 0.11 | 0.29 |
| Mum caring | 0.86 | 0.11 | 0.22 |
| Dad overprotective | 1.13 | 0.18 | 0.44 |
| Mum overprotective | 1.32 | 0.20 | 0.07 |
| Harsh parenting | 0.92 | 0.21 | 0.72 |
| Parental separation | 0.92 | 0.26 | 0.77 |
| Mum alcohol problems | 1.00 | 0.49 | 1.00 |
| Dad alcohol problems | 0.51 | 0.12 | 0.00 |
| Father's characteristics | | | |

| | OR | Standard error | Significance |
|---------------------------------------|------|--------------------|--------------|
| Father's age | 0.94 | 0.04 | 0.12 |
| Father's age entering military | 1.06 | 0.04 | 0.18 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.86 | 0.25 | 0.62 |
| Certificate/diploma | 1.05 | 0.25 | 0.83 |
| University degree | 1.43 | 0.54 | 0.35 |
| Father's father caring | 1.09 | 0.14 | 0.48 |
| Father's father overprotective | 1.23 | 0.20 | 0.21 |
| Father's mother caring | 0.93 | 0.12 | 0.58 |
| Father's mother overprotective | 0.83 | 0.13 | 0.24 |
| Father's PTSD symptoms | 1.23 | 0.26 | 0.32 |
| Model-specific characteristics | | | |
| Migraines (father) | 1.42 | 0.40 | 0.21 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not. Source: Vietnam Veterans Family Study ($N = 1,113$).

Table C.8 Impact of deployment on sleep disturbance of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 2.02 | 0.51 | 0.01 |
| More than 12 months | 1.30 | 0.44 | 0.44 |
| Exposure to Agent Orange | 1.17 | 0.25 | 0.47 |
| Exposure to trauma | 1.25 | 0.18 | 0.12 |
| Conscription | 0.62 | 0.16 | 0.06 |
| Born after deployment | 1.16 | 0.42 | 0.67 |
| Deployment instability | 0.73 | 0.17 | 0.17 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 1.02 | 0.34 | 0.95 |
| Royal Australian Artillery | 0.99 | 0.35 | 0.99 |
| Other | 0.98 | 0.26 | 0.93 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 1.10 | 0.27 | 0.71 |
| Officer | 1.37 | 0.57 | 0.45 |
| Sons' and daughters' characteristics | | | |
| Age | 1.07 | 0.03 | 0.00 |
| Female | 1.10 | 0.23 | 0.67 |
| Child behavioural problems | 2.41 | 0.48 | 0.00 |
| Child disciplinary problems | 2.19 | 0.61 | 0.00 |
| Child learning problems | 1.78 | 0.35 | 0.00 |
| Child smart/gifted | 1.92 | 0.42 | 0.00 |
| Family environment | | | |
| Dad caring | 0.86 | 0.11 | 0.22 |
| Mum caring | 0.80 | 0.10 | 0.09 |
| Dad overprotective | 0.93 | 0.14 | 0.65 |
| Mum overprotective | 1.18 | 0.20 | 0.31 |
| Harsh parenting | 1.31 | 0.31 | 0.25 |
| Parental separation | 1.18 | 0.31 | 0.53 |
| Mum alcohol problems | 1.02 | 0.40 | 0.96 |
| Dad alcohol problems | 1.10 | 0.26 | 0.67 |

| | OR | Standard error | Significance |
|---------------------------------------|------|--------------------|--------------|
| Father's characteristics | | | |
| Father's age | 0.95 | 0.04 | 0.16 |
| Father's age entering military | 1.04 | 0.04 | 0.26 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 1.26 | 0.35 | 0.42 |
| Certificate/diploma | 0.97 | 0.22 | 0.88 |
| University degree | 1.31 | 0.47 | 0.46 |
| Father's father caring | 1.41 | 0.19 | 0.01 |
| Father's father overprotective | 1.03 | 0.19 | 0.86 |
| Father's mother caring | 0.82 | 0.11 | 0.13 |
| Father's mother overprotective | 1.04 | 0.17 | 0.84 |
| Father's PTSD symptoms | 0.94 | 0.19 | 0.74 |
| Model-specific characteristics | | | |
| Sleep disturbance (father) | 1.24 | 0.25 | 0.28 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study ($N = 1,113$).

Table C.9 Impact of deployment on relationship status of veterans' sons and daughters

| | Coefficient | Standard error | Significance |
|---|--------------------|----------------|--------------|
| Married | Reference category | | |
| De facto/cohabitation | | | |
| Deployment-related characteristics | | | |
| Total duration | Reference category | | |
| Up to 8 months | | | |
| 8–12 months | 0.03 | 0.22 | 0.89 |
| More than 12 months | -0.24 | 0.29 | 0.41 |
| Exposure to Agent Orange | -0.08 | 0.20 | 0.68 |
| Exposure to trauma | -0.16 | 0.13 | 0.22 |
| Conscription | 0.08 | 0.23 | 0.74 |
| Born after deployment | -0.57 | 0.42 | 0.18 |
| Deployment instability | 0.21 | 0.20 | 0.30 |
| Corps | Reference category | | |
| Royal Australian Infantry | | | |
| Royal Australian Engineers | -0.16 | 0.34 | 0.63 |
| Royal Australian Artillery | -0.69 | 0.36 | 0.06 |
| Other | 0.14 | 0.24 | 0.56 |
| Rank | Reference category | | |
| Enlisted | | | |
| Non-commissioned | 0.08 | 0.21 | 0.69 |
| Officer | -0.04 | 0.40 | 0.91 |
| Sons' and daughters' characteristics | | | |
| Age | -0.14 | 0.02 | 0.00 |
| Female | -0.20 | 0.20 | 0.30 |
| Child behavioural problems | 0.13 | 0.18 | 0.49 |
| Child disciplinary problems | 0.39 | 0.29 | 0.19 |
| Child learning problems | 0.44 | 0.19 | 0.02 |
| Child smart/gifted | -0.07 | 0.24 | 0.77 |
| Family environment | | | |
| Dad caring | 0.06 | 0.12 | 0.60 |
| Mum caring | -0.20 | 0.13 | 0.13 |
| Dad overprotective | 0.05 | 0.17 | 0.74 |
| Mum overprotective | -0.29 | 0.16 | 0.07 |
| Harsh parenting | -0.01 | 0.23 | 0.95 |
| Parental separation | 0.35 | 0.26 | 0.18 |

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| Mum alcohol problems | 0.35 | 0.38 | 0.36 |
| Dad alcohol problems | -0.06 | 0.21 | 0.76 |
| Father's characteristics | | | |
| Father's age | 0.02 | 0.04 | 0.67 |
| Father's age entering military | 0.02 | 0.05 | 0.60 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | -0.21 | 0.28 | 0.45 |
| Certificate/diploma | -0.32 | 0.22 | 0.14 |
| University degree | -0.03 | 0.31 | 0.91 |
| Father's father caring | 0.04 | 0.14 | 0.74 |
| Father's father overprotective | 0.09 | 0.18 | 0.62 |
| Father's mother caring | 0.09 | 0.14 | 0.50 |
| Father's mother overprotective | -0.03 | 0.17 | 0.84 |
| Father's PTSD symptoms | -0.14 | 0.20 | 0.49 |
| Model-specific characteristics | | | |
| Father married/de facto | 0.35 | 0.41 | 0.39 |
| Separated/divorced | | | |
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8-12 months | 0.09 | 0.34 | 0.80 |
| More than 12 months | 0.47 | 0.40 | 0.24 |
| Exposure to Agent Orange | -0.30 | 0.28 | 0.28 |
| Exposure to trauma | -0.09 | 0.17 | 0.61 |
| Conscription | 0.43 | 0.33 | 0.19 |
| Born after deployment | -0.04 | 0.47 | 0.94 |
| Deployment instability | 0.43 | 0.26 | 0.11 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | -0.32 | 0.48 | 0.51 |
| Royal Australian Artillery | -0.31 | 0.48 | 0.53 |
| Others | -0.27 | 0.34 | 0.42 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 0.50 | 0.30 | 0.10 |
| Officer | 0.94 | 0.49 | 0.05 |

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| Sons' and daughters' characteristics | | | |
| Age | 0.03 | 0.04 | 0.52 |
| Female | 0.11 | 0.29 | 0.71 |
| Child behavioural problems | -0.34 | 0.29 | 0.24 |
| Child disciplinary problems | 0.51 | 0.40 | 0.21 |
| Child learning problems | 0.79 | 0.28 | 0.01 |
| Child smart/gifted | 0.58 | 0.32 | 0.07 |
| Family environment | | | |
| Dad caring | 0.03 | 0.17 | 0.87 |
| Mum caring | -0.08 | 0.18 | 0.64 |
| Dad overprotective | 0.27 | 0.21 | 0.20 |
| Mum overprotective | -0.09 | 0.25 | 0.71 |
| Harsh parenting | 0.20 | 0.32 | 0.54 |
| Parental separation | 0.51 | 0.39 | 0.20 |
| Mum alcohol problems | -0.59 | 0.74 | 0.42 |
| Dad alcohol problems | -0.27 | 0.31 | 0.38 |
| Father's characteristics | | | |
| Father's age | -0.03 | 0.05 | 0.57 |
| Father's age entering military | 0.06 | 0.05 | 0.20 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | -1.47 | 0.52 | 0.01 |
| Certificate/diploma | -0.19 | 0.28 | 0.50 |
| University degree | -0.61 | 0.45 | 0.17 |
| Father's father caring | 0.14 | 0.19 | 0.46 |
| Father's father overprotective | 0.34 | 0.23 | 0.15 |
| Father's mother caring | -0.35 | 0.16 | 0.03 |
| Father's mother overprotective | -0.49 | 0.26 | 0.06 |
| Father's PTSD symptoms | -0.23 | 0.26 | 0.37 |
| Model-specific characteristics | | | |
| Father married/partnered | -0.37 | 0.51 | 0.46 |
| Single | | | |
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8-12 months | -0.02 | 0.23 | 0.92 |
| More than 12 months | 0.03 | 0.29 | 0.92 |
| Exposure to Agent Orange | 0.19 | 0.20 | 0.35 |

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| Exposure to trauma | -0.28 | 0.14 | 0.05 |
| Conscription | -0.67 | 0.25 | 0.01 |
| Born after deployment | -1.18 | 0.43 | 0.01 |
| Deployment instability | 0.46 | 0.19 | 0.02 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | -0.36 | 0.29 | 0.22 |
| Royal Australian Artillery | -0.36 | 0.39 | 0.36 |
| Other | -0.35 | 0.24 | 0.15 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | -0.14 | 0.24 | 0.54 |
| Officer | -0.99 | 0.51 | 0.05 |
| Sons' and daughters' characteristics | | | |
| Age | -0.20 | 0.03 | 0.00 |
| Female | -0.27 | 0.20 | 0.18 |
| Child behavioural problems | 0.40 | 0.20 | 0.05 |
| Child disciplinary problems | 0.01 | 0.32 | 0.98 |
| Child learning problems | 0.27 | 0.20 | 0.18 |
| Child smart/gifted | 0.05 | 0.25 | 0.84 |
| Family environment | | | |
| Dad caring | 0.05 | 0.12 | 0.70 |
| Mum caring | -0.23 | 0.13 | 0.08 |
| Dad overprotective | -0.09 | 0.16 | 0.57 |
| Mum overprotective | -0.14 | 0.18 | 0.43 |
| Harsh parenting | 0.22 | 0.24 | 0.36 |
| Parental separation | -1.02 | 0.39 | 0.01 |
| Mum alcohol problems | 0.45 | 0.41 | 0.27 |
| Dad alcohol problems | 0.08 | 0.20 | 0.68 |
| Father's characteristics | | | |
| Father's age | 0.03 | 0.04 | 0.51 |
| Father's age entering military | 0.08 | 0.05 | 0.11 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.01 | 0.28 | 0.98 |
| Certificate/diploma | 0.22 | 0.23 | 0.33 |
| University degree | 0.28 | 0.35 | 0.42 |

| | Coefficient | Standard error | Significance |
|---------------------------------------|-------------|----------------|--------------|
| Father's father caring | 0.09 | 0.13 | 0.49 |
| Father's father overprotective | 0.03 | 0.17 | 0.84 |
| Father's mother caring | 0.12 | 0.14 | 0.38 |
| Father's mother overprotective | 0.04 | 0.16 | 0.80 |
| Father's PTSD symptoms | 0.14 | 0.21 | 0.49 |
| Support services used | | | |
| Social support used | 0.23 | 0.30 | 0.44 |
| Military-related service used | 0.45 | 0.34 | 0.19 |
| Health service used | -0.22 | 0.43 | 0.60 |
| Model-specific characteristics | | | |
| Father married/partnered | -0.26 | 0.44 | 0.56 |

Source: Vietnam Veterans Family Study ($N = 1,074$).

Table C.10 Impact of deployment on number of relationships of veterans' sons and daughters

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| One relationship | | Reference category | |
| None relationship | | | |
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 0.73 | 0.32 | 0.02 |
| More than 12 months | 0.77 | 0.41 | 0.06 |
| Exposure to Agent Orange | 0.08 | 0.28 | 0.76 |
| Exposure to trauma | 0.02 | 0.18 | 0.92 |
| Conscription | -0.13 | 0.30 | 0.65 |
| Born after deployment | 0.32 | 0.73 | 0.66 |
| Deployment instability | -0.11 | 0.27 | 0.70 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | -0.36 | 0.43 | 0.40 |
| Royal Australian Artillery | -0.19 | 0.44 | 0.67 |
| Others | -0.32 | 0.33 | 0.33 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | -0.34 | 0.34 | 0.31 |
| Officer | -2.65 | 1.23 | 0.03 |
| Sons' and daughters' characteristics | | | |
| Age | -0.10 | 0.03 | 0.00 |
| Female | -0.49 | 0.26 | 0.06 |
| Child behavioural problems | -0.05 | 0.23 | 0.82 |
| Child disciplinary problems | -0.90 | 0.62 | 0.15 |
| Child learning problems | 0.39 | 0.25 | 0.12 |
| Child smart/gifted | -0.51 | 0.39 | 0.19 |
| Family environment | | | |
| Dad caring | -0.21 | 0.17 | 0.21 |
| Mum caring | 0.13 | 0.18 | 0.46 |
| Dad overprotective | 0.15 | 0.22 | 0.50 |
| Mum overprotective | -0.25 | 0.24 | 0.29 |
| Harsh parenting | -0.10 | 0.34 | 0.78 |
| Parental separation | -0.44 | 0.49 | 0.37 |

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| Mum alcohol problems | -0.58 | 0.70 | 0.40 |
| Dad alcohol problems | 0.30 | 0.28 | 0.28 |
| Father's characteristics | | | |
| Father's age | 0.04 | 0.06 | 0.52 |
| Father's age entering military | 0.08 | 0.06 | 0.17 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.14 | 0.40 | 0.72 |
| Certificate/diploma | 0.24 | 0.28 | 0.40 |
| University degree | 0.20 | 0.47 | 0.66 |
| Father's father caring | -0.14 | 0.18 | 0.41 |
| Father's father overprotective | -0.05 | 0.24 | 0.84 |
| Father's mother caring | 0.19 | 0.17 | 0.27 |
| Father's mother overprotective | 0.07 | 0.24 | 0.78 |
| Father's PTSD symptoms | -0.15 | 0.27 | 0.58 |
| Model-specific characteristics | | | |
| Two or more relationships (father) | -0.09 | 0.24 | 0.71 |
| Two or more relationships | | | |
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8-12 months | 0.07 | 0.19 | 0.73 |
| More than 12 months | -0.13 | 0.24 | 0.58 |
| Exposure to Agent Orange | -0.19 | 0.17 | 0.28 |
| Exposure to trauma | 0.11 | 0.11 | 0.31 |
| Conscription | 0.08 | 0.21 | 0.71 |
| Born after deployment | -0.27 | 0.29 | 0.35 |
| Deployment instability | -0.12 | 0.18 | 0.51 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | -0.19 | 0.28 | 0.50 |
| Royal Australian Artillery | -0.06 | 0.30 | 0.85 |
| Other | 0.11 | 0.21 | 0.60 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | -0.03 | 0.19 | 0.86 |
| Officer | -0.16 | 0.34 | 0.65 |

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| Sons' and daughters' characteristics | | | |
| Age | 0.01 | 0.02 | 0.78 |
| Female | 0.08 | 0.17 | 0.61 |
| Child behavioural problems | 0.03 | 0.17 | 0.87 |
| Child disciplinary problems | 0.48 | 0.26 | 0.07 |
| Child learning problems | 0.55 | 0.16 | 0.00 |
| Child smart/gifted | 0.14 | 0.20 | 0.50 |
| Family environment | | | |
| Dad caring | -0.13 | 0.10 | 0.21 |
| Mum caring | -0.08 | 0.11 | 0.46 |
| Dad overprotective | -0.04 | 0.13 | 0.77 |
| Mum overprotective | -0.08 | 0.14 | 0.57 |
| Harsh parenting | 0.35 | 0.19 | 0.06 |
| Parental separation | 0.25 | 0.26 | 0.35 |
| Mum alcohol problems | 0.23 | 0.38 | 0.55 |
| Dad alcohol problems | -0.12 | 0.19 | 0.54 |
| Father's characteristics | | | |
| Father's age | 0.00 | 0.03 | 0.91 |
| Father's age entering military | -0.06 | 0.04 | 0.10 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.10 | 0.25 | 0.69 |
| Certificate/diploma | 0.21 | 0.19 | 0.26 |
| University degree | -0.07 | 0.28 | 0.79 |
| Father's father caring | -0.14 | 0.12 | 0.22 |
| Father's father overprotective | -0.05 | 0.16 | 0.74 |
| Father's mother caring | 0.20 | 0.12 | 0.09 |
| Father's mother overprotective | 0.06 | 0.15 | 0.71 |
| Father's PTSD symptoms | -0.13 | 0.17 | 0.45 |
| Model-specific characteristics | | | |
| Two or more relationships (father) | 0.12 | 0.16 | 0.45 |

Source: Vietnam Veterans Family Study ($N = 914$).

Table C.11 Impact of deployment on experience of financial stress of veterans' sons and daughters

| | OR | Standard error | Significance |
|---|------|--------------------|--------------|
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 1.23 | 0.27 | 0.35 |
| More than 12 months | 1.25 | 0.35 | 0.42 |
| Exposure to Agent Orange | 1.23 | 0.24 | 0.27 |
| Exposure to trauma | 1.01 | 0.13 | 0.92 |
| Conscription | 0.78 | 0.18 | 0.27 |
| Born after deployment | 2.05 | 0.74 | 0.05 |
| Deployment instability | 1.04 | 0.21 | 0.86 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.70 | 0.21 | 0.23 |
| Royal Australian Artillery | 1.24 | 0.41 | 0.51 |
| Other | 0.92 | 0.21 | 0.72 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 0.94 | 0.20 | 0.75 |
| Officer | 1.10 | 0.42 | 0.81 |
| Sons' and daughters' characteristics | | | |
| Age | 1.04 | 0.02 | 0.08 |
| Female | 1.27 | 0.25 | 0.22 |
| Child behavioural problems | 2.54 | 0.45 | 0.00 |
| Child disciplinary problems | 1.36 | 0.39 | 0.28 |
| Child learning problems | 2.02 | 0.36 | 0.00 |
| Child smart/gifted | 0.86 | 0.19 | 0.51 |
| Family environment | | | |
| Dad caring | 0.95 | 0.11 | 0.66 |
| Mum caring | 0.83 | 0.10 | 0.14 |
| Dad overprotective | 1.01 | 0.16 | 0.94 |
| Mum overprotective | 1.04 | 0.16 | 0.78 |
| Harsh parenting | 1.12 | 0.25 | 0.60 |
| Parental separation | 1.12 | 0.31 | 0.69 |
| Mum alcohol problems | 1.05 | 0.45 | 0.91 |
| Dad alcohol problems | 0.81 | 0.16 | 0.29 |

| | OR | Standard error | Significance |
|---------------------------------------|------|--------------------|--------------|
| Father's characteristics | | | |
| Father's age | 0.96 | 0.03 | 0.20 |
| Father's age entering military | 1.04 | 0.05 | 0.40 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | 0.90 | 0.24 | 0.69 |
| Certificate/diploma | 1.10 | 0.23 | 0.65 |
| University degree | 0.76 | 0.25 | 0.41 |
| Father's father caring | 0.80 | 0.10 | 0.09 |
| Father's father overprotective | 1.04 | 0.17 | 0.81 |
| Father's mother caring | 1.04 | 0.13 | 0.78 |
| Father's mother overprotective | 1.16 | 0.18 | 0.35 |
| Father's PTSD symptoms | 0.91 | 0.18 | 0.64 |
| Model-specific characteristics | | | |
| Father's financial stress | 1.89 | 0.35 | 0.00 |

Note: OR = odds ratio. The odds ratio is a relative measure of risk that tells how much more likely it is that someone who is exposed to the factor under study will develop the outcome compared to someone who is not exposed. An OR greater than 1 suggests that the outcome is more likely for those who were exposed to the factor compared to those who were not. An OR of 1 suggests that there is no difference in the outcome between two groups. An OR of less than 1 suggests the outcome is less likely for those who were exposed to the factor compared to those who were not.

Source: Vietnam Veterans Family Study ($N = 706$).

Table C.12 Impact of deployment on education of veterans' sons and daughters

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| University degree | | Reference category | |
| School or below | | | |
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 0.42 | 0.22 | 0.06 |
| More than 12 months | 0.78 | 0.28 | 0.01 |
| Exposure to Agent Orange | 0.12 | 0.20 | 0.54 |
| Exposure to trauma | -0.32 | 0.13 | 0.01 |
| Conscription | -0.27 | 0.23 | 0.23 |
| Born after deployment | -0.50 | 0.37 | 0.18 |
| Deployment instability | 0.11 | 0.20 | 0.58 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.05 | 0.31 | 0.88 |
| Royal Australian Artillery | 0.05 | 0.32 | 0.87 |
| Other | 0.06 | 0.23 | 0.81 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | -0.20 | 0.21 | 0.35 |
| Officer | -0.93 | 0.44 | 0.03 |
| Sons' and daughters' characteristics | | | |
| Age | 0.06 | 0.02 | 0.00 |
| Female | -0.36 | 0.20 | 0.07 |
| Child behavioural problems | 0.13 | 0.18 | 0.48 |
| Child disciplinary problems | 0.97 | 0.32 | 0.00 |
| Child learning problems | 0.54 | 0.19 | 0.00 |
| Child smart/gifted | -1.09 | 0.24 | 0.00 |
| Family environment | | | |
| Dad caring | 0.09 | 0.12 | 0.44 |
| Mum caring | 0.02 | 0.13 | 0.86 |
| Dad overprotective | 0.08 | 0.16 | 0.62 |
| Mum overprotective | -0.10 | 0.16 | 0.55 |
| Harsh parenting | 0.17 | 0.23 | 0.46 |
| Parental separation | 0.29 | 0.28 | 0.30 |
| Mum alcohol problems | 0.06 | 0.43 | 0.90 |

| | Coefficient | Standard error | Significance |
|---|-------------|--------------------|--------------|
| Dad alcohol problems | -0.05 | 0.21 | 0.82 |
| Father's characteristics | | | |
| Father's age | -0.08 | 0.04 | 0.04 |
| Father's age entering military | 0.04 | 0.04 | 0.30 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | -0.20 | 0.26 | 0.44 |
| Certificate/diploma | -0.40 | 0.21 | 0.06 |
| University degree | -1.60 | 0.37 | 0.00 |
| Father's father caring | 0.18 | 0.13 | 0.16 |
| Father's father overprotective | -0.05 | 0.17 | 0.79 |
| Father's mother caring | -0.29 | 0.13 | 0.02 |
| Father's mother overprotective | 0.06 | 0.16 | 0.72 |
| Father's PTSD symptoms | 0.35 | 0.19 | 0.07 |
| Certificate/diploma | | | |
| Deployment-related characteristics | | | |
| Total duration | | | |
| Up to 8 months | | Reference category | |
| 8–12 months | 0.06 | 0.19 | 0.74 |
| More than 12 months | 0.09 | 0.25 | 0.73 |
| Exposure to Agent Orange | 0.34 | 0.18 | 0.05 |
| Exposure to trauma | -0.09 | 0.12 | 0.43 |
| Conscription | -0.11 | 0.21 | 0.60 |
| Born after deployment | -0.52 | 0.34 | 0.13 |
| Deployment instability | 0.07 | 0.18 | 0.71 |
| Corps | | | |
| Royal Australian Infantry | | Reference category | |
| Royal Australian Engineers | 0.42 | 0.28 | 0.13 |
| Royal Australian Artillery | -0.07 | 0.30 | 0.81 |
| Other | 0.22 | 0.21 | 0.28 |
| Rank | | | |
| Enlisted | | Reference category | |
| Non-commissioned | 0.07 | 0.19 | 0.72 |
| Officer | -0.34 | 0.37 | 0.35 |
| Sons' and daughters' characteristics | | | |
| Age | 0.05 | 0.02 | 0.01 |
| Female | -0.50 | 0.17 | 0.00 |
| Child behavioural problems | 0.08 | 0.17 | 0.62 |

| | Coefficient | Standard error | Significance |
|---------------------------------|-------------|--------------------|--------------|
| Child disciplinary problems | 0.66 | 0.30 | 0.03 |
| Child learning problems | 0.53 | 0.17 | 0.00 |
| Child smart/gifted | -0.90 | 0.21 | 0.00 |
| Family environment | | | |
| Dad caring | -0.07 | 0.11 | 0.54 |
| Mum caring | 0.17 | 0.12 | 0.15 |
| Dad overprotective | 0.01 | 0.15 | 0.96 |
| Mum overprotective | 0.14 | 0.14 | 0.33 |
| Harsh parenting | 0.09 | 0.21 | 0.67 |
| Parental separation | 0.46 | 0.25 | 0.07 |
| Mum alcohol problems | 0.17 | 0.40 | 0.67 |
| Dad alcohol problems | 0.14 | 0.19 | 0.46 |
| Father's characteristics | | | |
| Father's age | -0.08 | 0.03 | 0.02 |
| Father's age entering military | -0.01 | 0.04 | 0.76 |
| Father's education | | | |
| Below Year 12 | | Reference category | |
| Year 12 | -0.60 | 0.25 | 0.02 |
| Certificate/diploma | -0.46 | 0.19 | 0.02 |
| University degree | -1.20 | 0.30 | 0.00 |
| Father's father caring | 0.19 | 0.12 | 0.11 |
| Father's father overprotective | 0.09 | 0.15 | 0.55 |
| Father's mother caring | -0.06 | 0.12 | 0.62 |
| Father's mother overprotective | 0.19 | 0.15 | 0.21 |
| Father's PTSD symptoms | -0.04 | 0.18 | 0.84 |

Source: Vietnam Veterans Family Study ($N=1,033$).

Shortened forms

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|--------|---|
| ADF | Australian Defence Force |
| AIHW | Australian Institute of Health and Welfare |
| Anzac | Australian and New Zealand Army Corps |
| CATI | computer-assisted telephone interview |
| CMVH | Centre for Military and Veterans' Health (now the Centre for Australian Military and Veterans' Health) |
| COVVHS | Children of Vietnam Veterans Health Study Inc. |
| DVA | Department of Veterans' Affairs |
| EMDR | eye movement desensitisation and reprocessing |
| ESO | ex-service organisation |
| FSP | Family Studies Program |
| ISA | Independent Scientific Adviser |
| NDI | National Death Index |
| NHMRC | National Health and Medical Research Council |
| PCL-C | PTSD Check List – civilian version |
| PTSD | posttraumatic stress disorder |
| RAAF | Royal Australian Air Force |
| RAN | Royal Australian Navy |
| RSL | Returned and Services League of Australia |
| TF-CBT | trauma-focused cognitive behavioural therapy |
| TPI | Special (Totally and Permanently Incapacitated) Rate of disability pension |
| VVCS | Veterans and Veterans Families Counselling Service—previously known as the Vietnam Veterans Counselling Service |
| VVFS | Vietnam Veterans Family Study |

Glossary

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|----------------------|---|
| Age standardisation | A method of adjusting the crude mortality rate to eliminate the effect of differences in population age structures when comparing crude rates for different periods, different geographic areas and/or different population subgroups |
| Cohort | A group of subjects who have shared a particular event together at a particular time. Cohorts can be tracked over extended periods in a cohort study |
| Confounding | The distortion of the effect of an exposure on the risk of an outcome as a result of other factors influencing the outcome |
| Conscript | A 20-year-old male civilian registered with the Department of Labour and National Service whose birth date was drawn in a ballot. This made him liable for military service, including 'special overseas service', between November 1964 and December 1972. The period of service was two years of full-time military service (later 18 months) and three years on the active reserve list. Men compelled into service in this way were also referred to as National Servicemen |
| Control group | A group of subjects or conditions that is matched as closely as possible with an experimental group (in this instance, Vietnam veterans and their family) but is not exposed to any experimental event (in this instance, service in the Vietnam War). The results are compared in order to determine the changes that may occur as a result of the experimental event (in this instance, operational service in Vietnam) |
| Crude mortality rate | The number of deaths from all causes in an entire population in a given period. Usually expressed as a number per 1,000 or 100,000 population |
| Cumulative hazards | A measure of the risk of dying within a small interval of time, conditional on survival of the individual to the beginning of that period |
| Ethnographic study | The scientific study and description of a group of people and their culture |

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| Evidence-based research | Application of the best available scientific research results (evidence) when making decisions about programs and services |
| Exposure | In this instance, a father who experienced operational service in Vietnam |
| Gold Card | Repatriation Health Card for All Conditions (Gold). Entitles the holder to the full range of approved health care services at the Department of Veterans' Affairs' expense. This includes medical and allied health care, assistance in the home and support services through arrangements with registered health care service providers and hospitals, both public and private |
| Key participant | Army Vietnam veteran or Army Vietnam-era person who did not deploy to Vietnam |
| Main Survey | In this instance, refers to the quantitative research method involving the administration of a self-report questionnaire |
| Morbidity | The incidence of ill-health in a population |
| Mortality | The incidence of death in a population |
| Mortality curve | A visual representation of data from life tables. Life tables describe the pattern of age-specific mortality and survival rates for a population over a lifetime or a period of study |
| National Death Index | Australian database, held at the Australian Institute of Health and Welfare, that contains records of all deaths occurring in Australia since 1980. The data are obtained from the registrars of births, deaths and marriages in each state and territory |
| National Serviceman | See <i>Conscript</i> |
| Nominal Roll of Vietnam Veterans | A database containing information about approximately 61,000 Australian service personnel who experienced operational service in Vietnam |
| Propensity score matching | A statistical matching technique that attempts to estimate the effect of a treatment, policy or other intervention by accounting for the covariates that predict receiving the treatment |
| Proportional mortality | The number of deaths for a given cause of death as a proportion of all deaths |

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| Qualitative research | A research technique used to gain insight into the factors underlying a topic through the analysis of non-numerical data gathered through methods such as interviews and open-ended surveys. The aim is to gain an understanding of people's opinions, feelings, attitudes, motivations, values and perceptions |
| Quantitative research | A research technique in which numerical data are gathered and statistically analysed. The aim is to provide a connection between empirical observation and statistical relationships |
| Randomly selected | In this instance, refers to people who were randomly invited to participate in the Vietnam Veterans Family Study. This ensured that the study sample was representative of the population of Vietnam veterans and their families and minimised any potential bias in the research outcomes |
| Regulars | Men and women who volunteer to join the Australian Defence Force |
| Relative risk | The ratio of the probability of death among the study group (exposed) to the probability of death among a comparison group (non-exposed) |
| Research Protocol | The protocol developed by the Centre for Military and Veterans' Health to guide the development of research undertaken through the Family Studies Program and, in particular, the Vietnam Veterans Family Study |
| Sample | A set of people whose characteristics represent, as accurately as possible, a broader group of people in a larger population |
| Self-select | In this instance, refers to people who nominated themselves to take part in the Vietnam Veterans Family Study |
| Standardised mortality ratio | A comparison of the number of deaths in an observed population with number of deaths expected in a standard or common population |
| Statistically significant | A pivotal element of statistical hypothesis testing. Used to determine whether a null hypothesis (default position) should be rejected or retained |
| Survey | A research technique that involves asking questions of a sample of respondents using a questionnaire or an interview |

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| Unconfirmed deaths | In this instance, reported deaths of children that could not be verified after investigation by the Australian Institute of Health and Welfare |
| Vietnam veteran | For the purposes of this study, a person who served in the Australian armed forces in Vietnam at any time between 1962 and 1975. In this instance, refers to Army personnel only |
| Vietnam War: years of Australian involvement | Australia's military involvement in Vietnam spanned the period 1962 to 1972, when the last Australian combat forces were withdrawn. Some Australian military personnel, the Embassy Guard, remained in South Vietnam after this but were not engaged in operations. The Vietnam War continued until April 1975, when South Vietnam surrendered to North Vietnam. During the final weeks of the war RAAF personnel were involved in relief operations and evacuations. The war's end date is therefore 1975, but Australia's combat involvement ended in 1972 |
| Vietnam-era personnel | For the purposes of this study, people who served in the Australian Defence Force at any time between 1962 and 1975 but did not deploy to Vietnam |
| White Card | Repatriation Health Card for Specific Conditions (White). Entitles the holder to the full range of health care services at the Department of Veterans' Affairs' expense but generally only for those disabilities or illnesses accepted as service-related |

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