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**Psychological Functioning In Partners and Spouses Of  
Deseal/Reseal Personnel**

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### Abstract

The present study investigated the psychological implications for spouses and partners of RAAF F-111 Deseal/Reseal program personnel. Ninety one spouses of Deseal/Reseal personnel were administered three questionnaires: Personality Assessment Inventory (PAI), Zarit Burden Interview (ZBI), and a questionnaire developed via a pilot project to examine the spouses' coping skills (Spouse Questionnaire (SQ)). Twenty five age matched spouses of RAAF personnel who had not been involved in the Deseal/Reseal program were utilised as a Control Group. Independent sample T tests were used to compare the two groups. There were no significant differences between the Experimental and Control Groups on the PAI Validity Scales, however there were significant differences in the following Clinical Scales: Somatic Complaints ( $p=0.002$ ); Anxiety ( $p=0.0004$ ); and Depression ( $p=0.0068$ ) with the Experimental Group demonstrating significant elevations both in terms of comparison to the Control Group and population norms. Among the Treatment scales of the PAI, there was a significant difference between the two groups on the Stress scale ( $p=0.0004$ ) with this being elevated in the Experimental Group. Contrary to the Control Group, the Experimental Group reflected acknowledgement of the need for change, and the desire for treatment as evidenced on the PAI Treatment Rejection Scale. On the SQ there was a highly significant difference between the two groups ( $p=0.0001$ ) demonstrating that the Experimental Group have unique difficulties associated with caring for their disabled spouses. The ZBI was administered only to the Experimental Group and demonstrated that their level of caregiver stress was Moderate to Severe. Despite the small number of control participants, the results obtained were robust and statistically significant which suggests it is unlikely that the findings would significantly alter given a larger sample. The results of this study can therefore be taken at face value, despite the limited control data collected.

## Psychological Functioning In Partners and Spouses Of Deseal/Reseal Personnel

In 2001 the Royal Australian Air Force (RAAF) determined that personnel involved in the F-111 Deseal/Reseal program had been consistently exposed to chemicals (particularly solvents and sealants) known to be hazardous to human life (RAAF, 2001). During this time, individuals had repeatedly reported acute and chronic symptoms of chemical poisoning such as mucosal membrane irritation, breathing difficulties, skin rashes, dizziness, mood changes and other psychiatric problems, motor dysfunction, gastrointestinal problems, headaches, and cognitive dysfunction including loss of memory and poor concentration. Even now, some thirty years or so after the program's inception, individuals who were involved in the F-111 Deseal/Reseal program are continuing to report some of the longer term effects of the chemical exposure including various cancers and growths, infertility, hepatic and kidney dysfunction, and lasting cognitive deficits. It is now evident that the health of many of these individuals has been significantly compromised as a result of being involved in the F-111 Deseal/Reseal program. However, what is less clear is the impact that their chronic illness has had on their partners and spouses.

Research has indicated that chronic illness can have a profound effect on the family members of the individual involved – particularly on the spouse, who is generally the primary caregiver (Horowitz, 1985). Many partners feel obliged to provide 24 hour a day, informal, unpaid care for their family member who has experienced a serious illness or injury. Research has revealed that previously healthy spouses often find themselves developing a variety of physical and mental health problems within two years of the onset of a serious illness or injury of a family member, thought to be due to the stress associated with this burden of care (Cantor, 1983). The present research project endeavoured to ascertain the psychological implications for spouses and partners of the F-111 Deseal/Reseal program personnel who suffered chemical injuries.

Stress as a concept is difficult to define, due to the subjective nature of the experience for the individuals involved. However, it is often conceptualised as psychological distress occurring in situations in which the demands of the situation are perceived to tax or exceed the individual's available resources (Lazarus & Folkman, 1984). The level of perceived stress by the individual is determined by the interaction of: (a) a primary appraisal of the event as involving harm, threat of harm, or challenge; (b) a secondary appraisal identifying

available coping resources; and (c) a coping response (Chwalisz, 1996). Chronic stress can be associated with illness, and also with disease progression in persons who are already unwell (Greenwood, Muir, Packham, & Madeley, 1996). The mechanism of this action is as yet relatively unclear, however it appears that there are at least two major interactions associated with stress related illness. These are; firstly, the action of the stress hormones cortisol, epinephrine, and norepinephrine stimulating peripheral activity, which can lead to "wear-and-tear" on cells from repeated arousal and inefficient control of physiological responses (McEwen, 2000); and secondly, the triggering of compensatory risky health behaviours stemming from poor coping strategies such as; poor diet, sedentary behaviour, and substance abuse (Vitaliano, Zhang, & Scanlan, 2003).

The effects of caregiver stress can be both physical and psychological in nature. For example, a meta-analysis of 23 studies found that caregivers had a 23% higher level of stress hormones than demographically matched controls, and concluded that the act of caregiving significantly influenced the physical health of the caregiver (Vitaliano et al., 2003). One identified psychosocial response to the stress of caregiving is the perceived burden of care. It results from the physical, psychological, emotional, social and financial problems experienced by families caring for impaired adults (George & Gwyther, 1986). Burden can manifest as feelings of embarrassment, overload, depression, anxiety, entrapment, resentment, isolation from friends and family, loss of control, and poor communication (Zarit, Reever, & Bach-Peterson, 1980). Given that the stress that is felt by a caregiver of a person with a progressive condition, such a chemical poisoning, is likely to be both prolonged and intractable, it is not surprising then that these caregivers often report more perceived distress, physical health complaints, and risky health behaviours than do non-caregivers.

One of the more under researched areas of caregiver burden is the psychosocial impact of caregiving both directly and indirectly. Research has demonstrated that providing care to a family member is associated with increased psychological distress (Donaldson, Tarrier, & Burns, 1998). For example, up to 48% of dementia caregivers have been identified as being at risk for psychiatric symptomatology (Draper, Poulos, Cole, Poulos, & Ehrlich, 1992). Often caregivers are faced with difficult caregiving tasks and also behavioural problems of their care recipients, such as verbal and physical aggression and confusion (Teri, Truax, Logsdon, Uomoto, Zarit, & Vitaliano, 1992). Additionally, providing care to a disabled relative often restricts the personal life, social life, and employment of the caregiver. For

example, caregivers may have less time to spend with friends, to fulfil other family obligations, or to pursue leisure pursuits (Zarit et al., 1980). A meta analysis of 84 studies relating to the psychological and physical health of caregivers determined that caregivers are consistently more stressed, depressed, and have lower levels of subjective well-being, physical health, and self-efficacy than non-caregivers (Pinquart & Sorensen, 2003).

Given that it is evident that there can be a wide range of negative consequences on the psychological and physical health of caregivers and family members, the present research attempted to determine whether there is a psychological effect on the spouses of the F-111 Deseal/Reseal program personnel in order to document and define any impact that the program has had in a wider sense, than just the personnel themselves. It was postulated that there would be a statistically significant difference in the psychological functioning of the spouses of the individuals involved in the F-111 Deseal/Reseal program. Given the previous research with spouses of individuals suffering chronic illnesses, it was hypothesised that the spouses of individuals involved in the F-111 Deseal/Reseal program would demonstrate higher levels of depression, anxiety, and stress than spouses of individuals not involved in the F-111 Deseal/Reseal program.

## **Method**

### ***Phase 1 – Pilot Study***

In order to obtain a sense of the variety and magnitude of issues involved in caregiving for individuals involved in the F-111 Deseal/Reseal program and to develop and select the appropriate questionnaires for the main study, a pilot study was conducted involving a small sample of spouses of the affected individuals. The Chief Researcher met with six F-111 Deseal/Reseal program spouses over a two day period to conduct structured interviews and psychological assessments of each individual. The Personality Assessment Inventory (PAI; Morey, 1991) and a range of burden of care questionnaires were administered. These included the Zarit Burden Inventory (ZBI; Zarit et al., 1980) and other questionnaires researched via PsycINFO,

The six participants then rated the questionnaires for their appropriateness in representing the difficulties they faced in caring for their chemically affected spouses. Among the burden of care questionnaires, the ZBI was rated the most useful in terms of delineating burden of

care, and five of the six individuals obtained scores which placed them in the moderate to severe range. All of the pilot study participants PAI profiles demonstrated significant peaks on the Depression scale and significant peaks were also noted on the Somatic Complaints, Anxiety, and Stress scales across the participants.

Information collected from the structured interview outlining the problematic issues faced by these individuals in caring for their disabled spouses was collated and transformed into a 28-item questionnaire entitled the "Spouse Questionnaire" (SQ). The draft questionnaire was then reviewed by the representatives of the spouse group and the RAAF project manager and the necessary modifications were made. This pilot study resulted in the selection of the assessment instruments deemed appropriate for the F-111 Deseal/Reseal program spouse study, that is, the PAI, the ZBI, and the SQ.

## ***Phase 2 – Main Study***

### ***Experimental Group***

The experimenters obtained a list of spouses and partners of the F-111 Deseal/Reseal program personnel who had consented to participate in the study from the RAAF. Of the 110 individuals invited to participate, 91 completed the questionnaires sent out to them indicating a response rate of 83%. The age of the participants ranged from 27-73 years (mean=49) and all were female.

### ***Control Group***

The experimenters obtained a list of spouses and partners of personnel who had not been involved in the F-111 Deseal/Reseal program who had consented to participate in the study from the RAAF. Of the 52 individuals invited to participate, 25 completed the questionnaires sent out to them, indicating a response rate of 48%. The age of the participants ranged from 34-69 years (mean=47.1). Twenty one of the participants were female and four were male.

### ***Materials***

***Personality Assessment Inventory (PAI)***. The PAI is a self-administered, objective inventory of adult personality and psychopathology. The PAI contains 344 items comprising 22 non-overlapping full scales including four validity scales (e.g., Inconsistency

and Positive Impression Management etc.), eleven clinical scales (e.g., Depression and Anxiety etc.), five treatment scales (e.g., Stress and Aggression etc.) and two interpersonal scales (Dominance and Warmth) (Morey, 1991). In addition to measurement of clinical constructs, interpretation of results also provides measures for detecting attempts to feign and manipulate symptomology as well as assessing their motivation for treatment. Respondents are asked to indicate to what extent they believe the statements are an accurate representation of themselves on a 4-point ordinal scale (F = False; ST = Slightly True; MT = Mainly True; VT = Very True).

**Zarit Burden Inventory (ZBI).** The ZBI is a 22-item measure of the perceived impact of caregiving on the caregiver's financial status, physical health, emotional health, and social activities (Zarit et al., 1980). The respondents indicate on a 5-point scale describing how much each statement applies to him or her ranging from "Never" to "Nearly Always". The maximum score possible on the ZBI is 88 and a high score is indicative of higher levels of perceived burden of care.

**Spouse Questionnaire (SQ).** The SQ was developed using the information obtained from the participants in the pilot phase of the study. It contained 28 questions relating to feelings and emotions commonly associated with caregiving burden such as stress, and social isolation (e.g., "Do you feel that you are currently under a great deal of pressure?", "Do you feel rejected by family and friends?"). The respondents indicate on a 4-point scale describing how much each statement applies to him or her ranging from "Not at all" to "Always"

#### **Procedure**

Each of the 162 spouses invited to become involved in the research were mailed a package containing a consent form, the PAI question booklet, a PAI HS Answer Sheet, the SQ, and an information sheet outlining the procedures relating to correctly completing the questionnaires (e.g. test instructions). Additionally, packages mailed to the Experimental Group included the ZBI (as this is an inventory that is highly specific to caregivers it was deemed inappropriate to give to the Control Group). Participants were instructed to return the completed packages along with their signed consent form, in a self-addressed, reply paid envelope, provided by the researchers. Reminder letters were sent to those participants who had not returned their packages after a period of four weeks. Additionally, letters and additional self-addressed reply paid envelopes were sent to participants who

had returned incomplete packages (e.g., missing questionnaires or unsigned consent forms). Altogether 122 packages were returned, however of these six packages were excluded from further analysis. Of these six, three were excluded because the consent form had not been signed despite further written requests, and three because it was clear that the individual involved in the F-111 Deseal/Reseal program had filled in the questionnaires and not the spouse (these individuals were sent new packages with a request for the spouse to fill out however none of these were returned).

The PAI and ZBI were scored according to the procedures determined by their original authors. The SQ was scored by coding each of the four points on the answer scale (e.g., "Not At All" = 0, "Always" = 3), then reverse coding three of the items and summing each of the items. Data analysis was completed using computer software designed for inferential statistics. Ethics approval for this research project had been granted by the Murdoch University Ethics Committee and written informed consent was obtained from all study participants.

## Results

Independent sample t-tests were carried out to determine whether there was a difference on the PAI validity scales, between the Experimental Group and the Control Group. No significant differences were found between the two groups, on the four validity scales (Inconsistency;  $t=1.50$ ,  $p=0.14$ ; Infrequency;  $t=0.787$ ,  $p=0.43$ ; Negative Impression;  $t=1.48$ ,  $p=0.14$ ; and Positive Impression;  $t=1.48$ ,  $p=0.14$ ). This indicates that both groups attended to the items consistently and appropriately, and did not attempt to present an unrealistically favourable or negative impression.

Independent sample t-tests were also performed to determine whether participants assigned to the Experimental Group reported higher levels on the clinical scales of the PAI, than those in the Control Group. Of the 11 scales, significant differences were found between the groups on four of these: Somatic Complaints, Anxiety, Depression and Antisocial Features. The Experimental Group reported higher levels of Somatic Complaints ( $t=3.06$ ,  $p=0.002$ ), Anxiety ( $t=3.62$ ,  $p=0.0004$ ), and Depression ( $t=2.76$ ,  $p=0.0068$ ). The Control Group scored higher on the Antisocial Features scale ( $t=-2.33$ ,  $p=0.02$ ), when compared to the Experimental Group, however on further analysis of the individual participant data pertaining to this scale it appears that the mean obtained had been highly



influenced by three unusually elevated outliers. On removal of these outliers there was no significant difference between the two groups ( $t=0.9$ ,  $p=0.37$ ) and thus this anomaly is excluded from further discussion.

Four independent sample t-tests were carried out to determine whether participants in the Experimental Group obtained higher scores on the treatment scales of Aggression, Suicide, Stress, Non-Support, and Treatment Rejection than those in the Control Group. The Experimental Group reported significantly higher levels of Stress ( $t= 3.61$ ,  $p=0.0004$ ) when compared to the Control Group. There was no significant difference between the groups on the levels of Aggression, Suicidal Ideation, Non Support or Treatment Rejection.

Table 1

Comparison of group means for Experimental and Control Groups.

	Experimental Mean	Control Mean	SD	T-Values	Significance
<b>Validity Scales</b>					
Inconsistency	51.5	48.3	9.37	$t = 1.60$	$p = 0.14$ (ns)
Infrequency	50.3	51.8	8.24	$t = -0.787$	$p = 0.43$ (ns)
Negative Imp.	56.7	52.7	11.9	$t = 1.48$	$p = 0.14$ (ns)
Positive Imp.	49.2	51.4	10.7	$t = -0.928$	$p = 0.36$ (ns)
<b>Clinical Scales</b>					
Somatic Comp.	60.5	51.2	13.5	$t = 3.06$	$p = 0.0028$ **
Anxiety	61.7	51.9	12.0	$t = 3.62$	$p = 0.0004$ ***
Anxiety Disorders	57.4	53.4	12.2	$t = 1.47$	$p = 0.14$ (ns)
Depression	65.3	56.9	13.5	$t = 2.76$	$p = 0.0068$ *
Mania	46.6	47.9	9.71	$t = -0.607$	$p = 0.55$ (ns)
Paranoia	52.6	52.8	11.0	$t = 0.66$	$p = 0.95$ (ns)
Schizophrenia	57.1	52.3	13.4	$t = 1.57$	$p = 0.12$ (ns)
Borderline	55.1	52.7	11.7	$t = 0.926$	$p = 0.36$ (ns)
Antisocial Feat.	43.6	47.5	6.84	$t = -2.33$	$p = 0.02$ *
Alcohol	48.5	51.4	9.18	$t = -1.4$	$p = 0.16$ (ns)
Drug	49.6	49	7.45	$t = 0.326$	$p = 0.74$ (ns)
<b>Treatment Scales</b>					
Aggression	48.2	50.3	11.3	$t = -0.805$	$p = 0.42$ (ns)
Suicide	55.1	50.2	16.0	$t = 1.46$	$p = 0.15$ (ns)
Stress	57.1	48.8	10.1	$t = 3.61$	$p = 0.0004$ ***
Non Support	53.2	50.0	11.3	$t = 1.25$	$p = 0.21$ (ns)
Treatment Reject.	49.7	52.4	9.49	$t = -1.27$	$p = 0.21$ (ns)
<b>Inter. Scales</b>					
Dominance	44.8	46.5	10	$t = -0.731$	$p = 0.47$ (ns)
Warmth	47.3	47.3	10.6	$t = -0.549$	$p = 1.00$ (ns)
<b>Inventories</b>					
SQ	38.7	20.8	13.0	$t = 6.05$	$p = 0.0001$ ***
ZBI	41.4	N/A	N/A	N/A	N/A

NB: NS =  $p > 0.05$ , \* =  $p < 0.05$ , \*\* =  $p < 0.005$ , \*\*\* =  $p < 0.0005$

An independent sample t-test was used to determine whether there was a difference on the SQ scores between the Experimental Group and the Control Group. The Experimental

Group scored very significantly higher ( $t=6.05$ ,  $p<0.0001$ ) on this measure of distress than the Control Group.

The ZBI scores were calculated only for the Experimental Group to determine their level of burden of care (mean=41.42). This score indicated that they had experienced a Moderate to Severe level of stress in caring for their disabled spouses compared with test normative data.

### Discussion

The results of the study indicate that there are significant deleterious effects on the psychological functioning of spouses of individuals involved in the F-111 Deseal/Reseal program as a result of the program itself. While only a limited number of control participants took part in the study, some very robust results were obtained at high levels of significance. Therefore, the results of the study can be taken at face value despite such limitations, as it is unlikely that anything different would be obtained with a larger control sample.

In addition to the significant differences between the Experimental and Control Groups in the PAI clinical scales of Somatic Complaints, Anxiety, and Depression, the scores for the Experimental Group fell into the significantly elevated range when compared to a normative population sample. According to Morey (1996), when Somatic Complaints scores are between 60 and 69 such as those in the Experimental Group (mean=61), it reflects individuals with concerns about health functioning which would not be uncommon in individuals with specific medical conditions, and those under significant levels of stress. Anxiety scores in the range between 60 and 69 as seen in the Experimental Group (mean=62) represented individuals who were likely to be experiencing stress and be worried, sensitive and emotional. Depression scores between 60 and 69 such as those in the Experimental Group (mean=65) indicate a group of people who were likely to be unhappy, sensitive, pessimistic and self doubting. However, below average Treatment Rejection scores from 43 to 52 like those obtained by the Experimental Group (mean=48) indicate they were willing to acknowledge the need to make some changes in their life, have a positive attitude to the possibility of change and accept the importance of personal responsibility. Conversely, among the Control Group participants scores there were no significant elevations on the PAI scales compared to a normative population sample. The Treatment Rejection scores in this Control Group (mean=52.4) indicated individuals who

are generally satisfied with themselves and see little need for major changes in their cognitions, emotions, and behaviour.

It was determined that 63.73% of the Experimental Group obtained significantly elevated Depression Scores (i.e., scores over 60) ranging from 60 to 108, some of whom (25.27%) had highly elevated Suicidal Ideation scores. This sub-group was then separated out to determine the potential for suicide via the Suicide Potential Index (SPI) of the PAI. The mean SPI for this sub-group was 10.09 which indicated that they were in the low category for suicide risk (Morey, 1996). However, as some group members had extremely elevated Suicidal Ideation scores in addition to high levels of Depression, Anxiety, and Stress, it was considered prudent to calculate the sub-group's potential response to treatment and the likelihood of treatment success via the Treatment Process Index (TPI) of the PAI. This sub-group had a mean TPI of 2.8 which indicated the presence of numerous personal assets that may assist in the treatment process (Morey, 1996). This low TPI in consideration with a below average Treatment Rejection Score, suggests that these individuals acknowledge that they have significant problems and perceive that they have a need for assistance in dealing with their problems. People in this category report a positive attitude towards the possibility of personal change, and they recognise the value of therapy and the importance of personal responsibility. They seem interested and willing to engage in introspection, in order to bring about self-improvement (Morey, 1996). Therefore, the TPI and SPI of this sub-group indicated that participants who had elevated Suicidal Ideation scores would be in the low risk group for suicidal or self-harm behaviours, but would be likely to respond well to treatment, given that they acknowledged and perceived a need for help in dealing with their problems. Bearing in mind these important factors, if treatment were offered to members of the Experimental Group who were suffering significant emotional distress, it is likely that they would respond well to this offer and that the resources provided would be well utilised.

## Conclusions

As the literature indicates, individuals enduring the burden of caring for their chronically ill and disabled spouses are likely to suffer emotional and physical distress themselves. The present research project supports these findings and clearly demonstrates the levels of somatic or physical health complaints, the anxiety, depression, and stress that the spouses and partners of F-111 Deseal/Reseal program personnel have suffered as a result of their caring role.

The SQ, which was constructed to outline the problems faced by the F-111 Deseal/Reseal program spouses, demonstrates its usefulness in delineating the specific difficulties experienced by these individuals. The difference between the Experimental and Control Groups was extremely significant at a probability level of 0.0001, highlighting the unique problems faced by the spouses of the F-111 Deseal/Reseal program personnel. As the ZBI placed the F-111 Deseal/Reseal program spouses in the Moderate to Severe range for burden of care, compared to a normative sample, it demonstrates that this group of individuals is struggling to cope with the burden of care placed upon them. Some of these individuals recorded significantly high suicidal ideation scores as well which indicates their potential risk for self harm. These high scores also indicated that their level of psychological distress is beginning to exceed their available coping strategies.

Given that there is clear evidence to suggest that the F-111 Deseal/Reseal program has had a deleterious effect on the psychological functioning of the spouses of the individuals involved, it would be responsible for the research project organisers to offer appropriate evidence based psychological treatment for this group, focusing on the areas of most concern, i.e., stress, depression, anxiety, suicidal ideation, generalised coping strategies and physical health concerns would be most useful. Such treatments could be, cognitive behavioural therapy focused on anxiety or depression, schema focussed therapy and other therapies approved by the Australian Psychological Society for the treatment of such conditions. Other suggested interventions could include the development of weekly support groups which could be funded by the RAAF, where the spouses could have an outlet to discuss and vent emotional distress with other individuals in similar situations and circumstances and to facilitate effective coping strategies. Additionally, regularly funded respite breaks would be recommended for the spouses to enable them to engage in self-care activities to increase their resilience to the psychological distress they face on a daily

basis. As the above results have demonstrated a willingness for treatment and the likelihood of positive treatment outcomes for members of the Experimental Group, any future resources allocated for this purpose would be likely to be well utilised by these individuals.

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