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“PSYCHOLOGICAL FALLOUT”: THE EFFECTS OF NUCLEAR RADIATION EXPOSURE

A thesis presented in partial fulfilment
of the requirements for the degree of
Doctor of Clinical Psychology
at Massey University

REBEKAH LEIGH JOURDAIN

2009

NO ORDINARY SUN

*Tree let your arms fall:
raise them not sharply in supplication
to the bright enbaloed cloud.
Let your arms lack toughness and
resilience for this is no mere axe
to blunt, nor fire to smother.*

*Your sap shall not rise again
to the moon's pull.
No more incline a deferential head
to the wind's talk, or stir
to the tickle of coursing rain.*

*Your former shagginess shall not be
wreathed with the delightful flight
of birds nor shield
nor cool the ardour of unheeding
lovers from the monstrous sun.*

*Tree let your naked arms fall
nor extend vain entreaties to the radiant ball.
This is no gallant monsoon's flash,
no dashing trade wind's blast.
The fading green of your magic
emanations shall not make pure again
these polluted skies . . . for this
is no ordinary sun.*

*O tree
in the shadowless mountains
the white plains and
the drab sea floor
your end at last is written.*

- Hone Tuwhare (1964)

ABSTRACT

The present research includes two studies. Study I was based on the research finding that exposure to nuclear radiation and other toxic chemicals results in those who were exposed not only believing their health to be affected, but experiencing significant and chronic stress. It was hypothesised that ongoing stress for New Zealand's nuclear test veterans resulting from the inability to adapt to their past nuclear exposure would result in them experiencing greater depressive symptomatology, poorer perceived health, and poorer perceived memory performance than a control group.

Psychological profiles of 50 nuclear test veterans and 50 age-matched Control participants were obtained through postal survey and face-to-face interview, using the Geriatric Depression Scale, Medical Outcomes Study Short Form-36, and the Memory Assessment Clinics Self-Rating Scale. As predicted, the nuclear veterans exhibited more depressive symptoms, and perceived their health and memory performance to be poorer than the Control group. A stress theory framework is applied to help conceptualise the experience of the nuclear veterans, and to provide an explanation for their lower scores and consequent poorer functioning.

Through the pathway of poor perceived health leading to anxiety, health anxiety was considered a form of chronic stress the nuclear veterans were experiencing. Consequently, Study II aimed to examine whether Acceptance and Commitment Therapy (ACT) could be usefully applied to relieve this anxiety. Most psychotherapeutic approaches have been developed for problems that have an "irrational" or "pathological" foundation. However, these approaches often fit poorly with psychological distress that stems from cognitions that are reality-based and may need to be accepted rather than changed, such as in the case of nuclear exposure-related health anxiety. ACT may be particularly useful in these situations in which cognitive change is not warranted.

Study II examined the use of ACT with 5 NZ nuclear test veterans (of either Māori or Pākehā descent) experiencing moderate to high levels of health anxiety. Results of self-report measures administered at baseline, during treatment, post-treatment, and at 6-week follow-up indicated varying results amongst these men. One participant showed clinically significant post-treatment reductions in health anxiety, experiential avoidance, and general psychological distress that were maintained at follow-up. Two participants showed clinically significant post-

treatment reductions in health anxiety, experiential avoidance, and distress, despite not engaging in therapy as they did not wish to make changes. For the same reason, a fourth participant chose not to engage in therapy, despite high baseline scores on all measures, and showed no improvement during or after therapy. The fifth participant had low baseline scores on all measures, maintaining these throughout therapy, and at follow-up. Results are explained in terms of cohort and gender effects, with suggestions for adapting ACT with NZ older adults, particularly males. Implications for the utility of ACT with toxic exposure populations, older adults, and various cultures are discussed.

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A special thanks to Senior Clinical Psychologist Dr Joanne Taylor for stepping in as an unofficial clinical supervisor when needed. Her support during the therapy process of Study II, and help in grappling with theoretical issues was invaluable.

Thank-you also to Dr Judy Blakey, who collected all of the data for Study I of this project as part of the "New Zealand Nuclear Test Veterans: A Pilot Study [Psychological Impact]." It was a privilege to work alongside her as a Research Assistant, and to learn from her knowledge and experience. I feel greatly indebted to her for her time, patience, generosity, and ideas.

I gratefully acknowledge the help of New Zealand Nuclear Test Veterans Association (NZNTVA) chairman Roy Sefton for his unwavering support of this research and patience with the time it

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Most importantly, I would like to thank the participants in this study who generously gave of their time and personal information to benefit others, particularly future generations. (Thank-you also to those who subsequently decided they no longer wished to be involved.) To Tane, Anaru, Fred, Kingi, and Ray - I learned so much from you all. Thank-you for sharing your personal experiences and reflections with me. It was a pleasure to meet you and be involved in your lives for a short time.

I would like to acknowledge the financial support of the Peace and Disarmament Education Trust (PADET) in the final year of this project. It is hoped this thesis will encourage the consideration of more peaceful approaches to conflict.

Finally, it is hard to express my gratitude to my wonderful family (especially my patient and generous parents), and friends for all their unending love, encouragement, and support throughout this process. Thank-you for your understanding when I have been periodically absent from your lives. I look forward to being more “present” in both mind and body! PJS – You have been amazing, thank-you for everything.

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PREFACE

Rather than being clearly explicated from the start, this thesis “Psychological Fallout¹: The Effects of Nuclear Radiation Exposure” has evolved over time. Study I was originally part of a larger study investigating both the genetic and psychological impact on New Zealand naval veterans of exposure to nuclear tests in the Operation Grapple testing programme. Researchers from the Institute of Molecular BioSciences and the School of Psychology at Massey University were commissioned in 2001 by the New Zealand Nuclear Test Veterans Association (NZNTVA) to perform the “New Zealand Nuclear Test Veterans’ Study: A Pilot Project” (Podd, Blakey, Jourdain, & Rowland, 2005). I was employed by Massey as a research assistant on this project for a period of about two years between 2001 and 2004. While I did not collect the data (the survey development and interviews were completed by J. A. Blakey), I spent many hours assisting with participant selection, co-ordinating and organising data collection, and completed all of the postal survey and interview coding.

By the end of 2003 I had been accepted into Massey’s Clinical Programme and needed a research topic for a Masters thesis in 2004. With the rich data set collected in the project I had been assisting with, and no-one available to analyse and write it up, I decided to undertake this as my project.² As I was nearing completion of Study I in early 2005, the Clinical Programme, after years of discussion, brought in the new degree of Doctor of Clinical Psychology, incorporating both research and practicum components. After many discussions with and help from staff (particularly Dr Kevin Ronan), as well as Massey’s Graduate Research School, I was able to “upgrade” to the new programme. However, my research component was required to be twice the size of a Masters thesis, and to have a clinical component. Study I had more of a health psychology focus,³ my previous interest before I realised clinical psychology was my passion. Again the nuclear veteran research provided useful information, access to participants, and the opportunity to provide therapy for some of the men.

My own hypotheses regarding health anxiety in the nuclear veterans developed based on information from the NZNTVA chairman (R. Sefton), personal information provided by the veterans, and anecdotal reports from the project Research Officer (J. A. Blakey) during the

¹ The term “psychologic fallout” was originally coined by Stiehm (1992).

² It should be noted that because this study focused on psychological status, it was beyond the scope of the project to explicate the genetic and oncogenic effects of radiation exposure.

³ At this time, it was not required that those in the Clinical Programme complete a clinical thesis, due to the shortage of clinical staff available for research supervision.

process of the Pilot Study. Additionally, discussions with Patrick Dulin and Ian Evans, who both proposed ACT as a useful approach to this “presenting problem,” developed the concept for Study II. With the assistance and support of Mr Sefton,⁴ access to participants for this study was obtained.

The explanation of this process may help with understanding the apparent separateness of the two studies comprising this thesis. Indeed, when Study I was being completed, there was no conception that there would be a Study II, thus, important variables such as health anxiety were not measured.

⁴ Any interested reader wishing to know more about the current status of the NZ nuclear test veterans’ efforts for service recognition and compensation may contact Roy Sefton at roy_sefton@clear.net.nz.

STUDY I:
The Chronic Stress Experience Resulting from
Nuclear Radiation Exposure

CHAPTER ONE: TOXIC EXPOSURE - NUCLEAR RADIATION

Toxic Exposure

Toxic exposure is an invisible and often unforeseen danger. Its effects can be undetectable and uncertain, sometimes leading to the conclusion that they are non-existent (Vyner, 1988). In the past, little was known of the effects of various substances including nuclear radiation, chemical and biological weapons, and various industrial and agricultural chemicals. Over the years there have been several examples of toxic exposure involving New Zealanders, including the nuclear test veterans involved in British testing (Johnson, 2004; Wahab, Nickless, Najar-M'kacher, Parmentier, Podd, & Rowland, 2008), Vietnam veterans exposed to Agent Orange (Edwards, 2006; Rowland, Edwards, & Podd, 2007), timber workers exposed to pentachlorophenol (PCP; McLean et al., 2007), and workers and residents of Paritutu, New Plymouth exposed to dioxin from a chemical (2,4,5-T) manufactured at the Ivon Watkins Dow agrichemical plant (Fowles et al., in press). With cases such as these being researched and gaining high media profiles in recent years, and with those involved seeking government compensation for their injuries, the physical, and equally important *psychological* effects of toxic exposure are now coming to light.

A number of events have also occurred throughout history in other parts of the world, in which people have been exposed to dangerous amounts of radiation and toxic chemicals in their living and occupational environments. Various nuclear disasters, the case of the Love Canal toxic waste site in New York (Vyner, 1988), and numerous workers exposed to various chemicals (Brodsky, 1983) are examples. Due to the now well-established knowledge that radiation and some chemicals have adverse genetic and biological effects (Bertell, 1985; Miller, 1993; Upton, 1998), discovery of exposure can naturally result in substantial concern and worry for those involved. One form of toxic exposure will be the focus of this research – exposure to nuclear, or ionising radiation.

Ionising (or Nuclear) Radiation

Ionising radiation is released by nuclear weapons and nuclear power plants, and includes short wave, high energy emissions (e.g., gamma rays, x-rays), and atomic particles in various forms

(e.g., neutrons; Upton, 1998). It is dangerous because it can penetrate deeply, ionising atoms in human tissue. Energy is deposited into human cells, displacing electrons so the cells become charged rather than neutral, causing damage to molecules, including genes and chromosomes (Bertell, 1985; Upton, 1998). Consequently, illnesses such as nausea, vomiting, cataracts, thyroid problems, cancer, and genetic problems can result (Bertell, 1985). After high level radiation exposure, there is an elevation of risk for the development of physical health problems, including illnesses such as cancer (of the blood, thyroid, stomach, and lungs) and thyroid disease, which may not manifest until later in life (Bertell, 1985; Upton, 1998).

Ionising radiation exposure has occurred in three kinds of circumstances in history, one of these being exposure from nuclear accidents (e.g., nuclear power plant leakage). The 1986 disaster at the Chernobyl plant in Russia is the most well known. Thousands of people throughout Europe and Scandinavia were exposed to highly dangerous levels of radioactive gases that leaked into the atmosphere (van den Bout, Havenaar, & Meijler-Iljina, 1995; Wroble & Baum, 2002). After the accident, recreation in surrounding areas was forbidden, residents had to stay indoors, and they could not live off their own crops and animals. A number of people were evacuated from the area (van den Bout et al., 1995). Similarly, residents in the vicinity of the Three Mile Island plant in Pennsylvania were potentially exposed to radioactive gases that leaked into the atmosphere (Baum, Gatchel, & Schaeffer, 1983; Wroble & Baum, 2002), and residents living near a smaller nuclear plant in Fernald, Ohio also had radioactive chemicals leak into the air and ground, contaminating the community water supply (Green, Lindy, & Grace, 1994; Wroble & Baum, 2002).

The second circumstance is the experience of nuclear warfare, a deliberate rather than accidental exposure. The first use of atomic bombs in combat was on August 6, 1945, when the United States dropped an atomic bomb on the Japanese cities of Hiroshima, and later that year, Nagasaki. Much research has taken place on survivors of these nuclear bombs, and it is now known and accepted that ionising radiation has detrimental effects on genetic and physical health (Lifton, 1963; Tatara, 1998). People have died from cancers, heart, liver, and blood diseases. Other less fatal radiation sicknesses experienced have been fatigue, cataracts, nausea, vomiting, skin disorders, skeletal problems, and premature ageing (Lifton, 1963). Abnormalities in children of atomic bomb survivors have also been observed (Lifton, 1963).

In preparation for the use of atomic bombs in warfare (again, a deliberate exposure but of a different form), the final instance in which people have been exposed to nuclear radiation is in the testing of nuclear weapons.

Nuclear Weapons Testing

Nuclear history began on July 16, 1945 when the United States (US) tested the first atomic bomb in Alamogordo, New Mexico (Gallery of U.S. nuclear tests, 2001; Roberts, 1972). Later that year, Japan experienced the power and destruction of a nuclear weapon in combat. When the world saw the devastating effects of these weapons on Hiroshima and Nagasaki during World War II, major powers had their eyes opened to the possibility of nuclear war. They felt the need to test atomic bombs to ensure their preparation and status as nuclear powers. Nuclear weapons testing programmes began to take place across the world, in Western and Eastern countries (Roberts, 1972). Armed forces personnel, including soldiers, naval officers, air force, and ground crew were reportedly deliberately exposed (at a “safe” distance from the blast) to examine how testing affected them (Veteran Claims for Disabilities from Nuclear Weapons Testing, 1979, as cited in Vyner, 1983, 1988). The main goal of the testing was to develop hydrogen (or thermonuclear) bombs (“H-bombs”) of even greater power than atomic bombs (“A-bombs”; Roberts, 1972).

United States Testing

The US began atmospheric testing in the Pacific Ocean in 1946 at Bikini Island, and continued two years later on Eniwetok (Roberts, 1972). Following this, in 1951 a major atmospheric testing programme began, both in the Pacific and in the Nevada desert (a main testing site). The US was responsible for testing the first *hydrogen* bomb at Eniwetok in 1952, and continued this programme until September 1958, when a moratorium on testing was signed with the United Kingdom and the Soviet Union until 1961, when laboratory and underground testing resumed. Atmospheric testing resumed in the Pacific again (at Christmas and Johnston Islands) in 1962. In 1963 the US, Britain, and the Soviet Union (and a number of other countries) signed a Partial Test Ban Treaty, banning nuclear tests in the “atmosphere, in outer space, and underwater” (Roberts, 1972, p. 37) (but not underground). Between 1964 and 1991 US testing continued at the Nevada Test Site in Colorado, and in New Mexico, with many of these being joint tests with Britain (Roberts, 1972).

Over 250,000 veterans participated in US nuclear testing (Veterans Claims for Disability from Nuclear Weapon Testing, 1979, as cited in Vyner, 1983, 1988). A number of “atomic” veterans’ associations were established to address veterans’ issues (Vyner, 1983), as men involved in the tests became aware of the dangers of radiation and possible biological damage.

Australia and New Zealand’s Involvement (British Testing)

Following America’s lead, Britain began testing nuclear weapons in 1952 (Roberts, 1972). The majority of this testing took place in Australia, with 13 tests being conducted there between 1952 and 1968, before the moratorium. New Zealand became involved in nuclear testing in 1956. Britain had announced its intention to test nuclear weapons off islands in the middle of the Pacific Ocean, and the New Zealand government offered the use of two Royal New Zealand Navy frigates for weather reporting (Roberts, 1972). This testing programme was named “Operation Grapple.”

Operation Grapple

The operation. The British nuclear testing programme, Operation Grapple, took place between 1957 and 1958, off Malden and Christmas Islands in the middle of the Pacific Ocean. It consisted of a series of nine blasts (seven H-bombs and two A-bombs), varying in size and distance from ground zero.⁵ Three of the blasts were detonated just off Malden Island, and the other six off Christmas Island (Britain’s nuclear weapons: From MAUD to Hurricane, 2007). Armed forces personnel from Britain, Australia, and Fiji participated in these tests and among them approximately 550 New Zealand naval personnel aboard two New Zealand frigates, the HMNZS Pukaki and the HMNZS Rotoiti (Roff, 1999; R. Sefton, personal communication, 2001). These frigates performed meteorological duties (Crawford, 1989; Roberts, 1972), checking that the wind conditions were right for detonation, and monitoring for unauthorised vessels.

The nuclear tests in this programme were atmospheric, with the bombs being dropped by airliners from a height greater than 2000 metres above the ocean (Crawford, 1989). The ships were stationed from 20 to 150 nautical miles away from ground zero over the different tests (Crawford, 1989). The amount of protective clothing worn ranged from nylon coverall suits and goggles with cotton (“anti-flash”) hoods and gloves, to shirts and jeans (“No. 8 Action Working Dressing” or AWD), to shorts and jandals (“tropical sea rig” or TSR). The amount of protective clothing is said to have progressively declined over the tests (Crawford, 1989; R.

⁵ Ground zero was the site of bomb detonation.

Sefton, personal communication, 2002). There are reports of the use of Geiger counters and dosimeter badges to measure the level of external radiation. However, measurement accuracy and occurrence is disputed (Crawford, 1989).

The naval men involved were stationed on different parts of the boat for the blasts, according to their usual roles. For example, some were in the radio room and others in the boiler room (R. Sefton, personal communication, 2003). However, the majority were required to stand or sit on the upper deck with their backs to the blast, and their hands over their eyes. Once the bomb had been detonated they were permitted to turn around and view the cloud. After each test various post-blast activities took place, such as sampling seawater and marine life for radiation levels, and decontamination exercises such as cleaning the deck. At times the ships would steam through or towards ground zero where the bomb was detonated. At other times the men would swim and fish in the ocean, and go ashore onto Christmas Island for recreational activities (R. Sefton, personal communication, 2003).

This thesis will focus on New Zealand naval personnel who witnessed bomb tests in this operation, known as New Zealand's (NZ) nuclear test veterans.

Health concerns. At the time of the operation in 1957 to 1958, many of the nuclear test veterans were reportedly not concerned about exposure to the bombs (R. Sefton, personal communication, January, 2004). It seems they were not told that they would be exposed to the blasts until they arrived in the testing zones, and were not informed of the dangers of radiation exposure at the time, despite the NZ government's concern about nuclear fallout from the tests (Roberts, 1972). A small group on the ship is said to have had "grave feelings" (R. Sefton, personal communication, January, 2004), but whatever the concerns of a select few, exposure to the bombs was generally not perceived to be a threat at the time.

Concern about radiation exposure developed "over time" (R. Sefton, personal communication, January, 2004) and did not become an issue for many of the men until some years later, in the "late 1970s." This is said to be a result of meeting up with other veterans, discussing unusual and seemingly inexplicable similar physical symptoms ("poor health made us aware") and questioning the unexpected deaths from cancer of other Grapple servicemen (R. Sefton, personal communication, January, 2004). During the 1980s, the profile of Grapple-related health concerns rose as the number of concerned veterans and families increased, and was

picked up by the media (the earliest newspaper articles date back to 1987). This process of going from no concern about the exposure to becoming symptomatic, becoming aware of the dangers of radiation, and then worried about the effects on their health mirrors the process Vyner (1983, 1988) described for a sample of US “atomic” veterans.

New Zealand nuclear test veteran research. At this time, the nuclear veterans made several attempts to obtain compensation for illnesses they believed to be related to the radiation exposure. Research on the physical health of the veterans was conducted in 1990 (Pearce et al., 1990), examining mortality rates and the incidence of cancer in this population compared to a control group between 1957 and 1987. It was concluded that blood cancers were the only illness that could have resulted from radiation exposure, and the nuclear veterans’ group were not at a higher risk for other cancers than non-Operation Grapple New Zealand navy personnel (a control group). Also, the results did not suggest increased risk of death in the nuclear veterans for illnesses other than cancer. Many of the veterans disagreed with these conclusions, and out of their concern, two men (R. Sefton and T. Tahi) formed the New Zealand Nuclear Test Veterans Association (NZNTVA) in 1995. The purpose of this association was for funding, support, and to conduct their own enquiry into Grapple veterans’ health to “take one voice to government” (R. Sefton, personal communication, January, 2004).

In addition to Pearce et al.’s (1990) study, a further follow-up study was completed for the period 1988 to 1992 (Pearce et al., 1997), with the same conclusions being reached. A more recent genetic analysis of a sample of the nuclear veterans’ blood by Massey University researchers (referred to in the Preface), found a significantly higher number of chromosomal abnormalities in the nuclear veterans compared to the Control group (Wahab et al., 2008).

While morbidity, mortality, and genetic damage have been investigated, and a brief discussion of the veterans’ psychological experience presented (Roff, 1999), no research has yet been undertaken on the psychological effects of nuclear radiation exposure on NZ nuclear test veterans. However, research of this kind, while scarce, has taken place on US nuclear test veterans.

CHAPTER TWO: PSYCHOLOGICAL EFFECTS OF NUCLEAR RADIATION EXPOSURE

Nuclear Exposure – A Review of the Literature

Nuclear Weapons Testing

Vyner (1983) performed the earliest study of the psychological effects of radiation on nuclear veterans. All of the 11 US veterans he interviewed had developed the same set of psychiatric symptoms, which he called the Radiation Response Syndrome (RRS). This syndrome comprises: 1) the belief that one has been harmed by radiation (what Vyner calls the “self-diagnostic belief,” or SDB) and a system of beliefs surrounding this; and 2) a set of behavioural symptoms that express this belief system. Exposure to radiation for these men resulted in four symptom processes: problems with the mystery of exposure, such as undiagnosable symptoms and lack of proof that symptoms are linked with exposure; preoccupation with health and radiation; identity conflicts; and development of a set of beliefs about radiation. Problems with the mystery of exposure is said to be the reason for self-diagnosis of radiation harm. Ultimately, the psychological effects of the exposure to nuclear tests were a change in identity, world-view, and lifestyle (lack of employment, preoccupation with health and radiation, and loss of social relationships). Vyner (1983) notes that it takes more than simply exposure to ionising radiation to develop the SDB and the RRS. Important contributing factors are the circumstances of the radiation exposure (*Is it routine such as in medical x-rays, or unusual?*), and the veteran’s health after the exposure (*Is he significantly ill?*).

While Vyner (1983) obtained consistent and similar information across this group of veterans, the small sample size must be considered. A larger group may include veterans with a variety of different experiences, some with a different set of symptoms, and some who are completely asymptomatic. With 250,000 men being involved in US tests (Veteran Claims for Disability from Nuclear Weapon Testing, 1979, as cited in Vyner, 1983) it is likely that many more would be available to research who may not have developed this syndrome. Also, the men were selected because they had “complained of medical and/or psychological problems” (p. 242), so may have been more likely to develop symptoms of this syndrome (due to a particular personality trait). Vyner himself recognises this problem, suggesting that perhaps “the RRS is actually the response of a specific type of character disorder to exposure to ionising radiation”

(p. 259). A further issue is the subjectivity of the participants' information, and the lack of objective and quantitative psychological assessment.

Other studies on the psychological effects of this population are also qualitative, and explore various themes in the veterans' discussion of their experiences. Murphy, Ellis, and Greenberg (1990) found four common themes emerged in interviews with 7 US nuclear veterans and their family members. These themes included: 1) invalidation of the veterans' exposure experiences and health problems; 2) concerns about genetic damage and the health of future generations; 3) the need to protect each other and their children from fears about ill health; and 4) the need to leave some sort of legacy to prevent similar experiences in the future. Garcia (1994) noted comparable central themes from her interviews with 16 US veterans. These involved memories of the exposure including the physical effects of the blast, the psychological climate at the time of testing, and the lack of protective gear; health status post-exposure, and the perceived link with radiation; and perception and reconceptualisation of the experience. Exposure to the nuclear bomb tests seemed to have a similar psychological effect on these two groups of veterans, causing them to consider and attempt to process similar material. A key tenet of both studies was the need for veterans to make sense of or to "find...meaning" (Murphy et al., 1990, p. 422) in their experiences. A notable feature of the psychological effects was the ongoing nature of the processing of this experience. It could not simply be forgotten, and was difficult for the men to obtain closure. An important factor Murphy et al. note is that both samples were small and self-selecting, and the experiences of these veterans may not be representative of the other thousands of veterans exposed in similar ways.

With so little research performed to date on the psychological effects of exposure to nuclear testing, especially with objective psychological assessment, it is necessary to draw on relevant literature on other forms of radiation exposure. This includes the psychological effects of deliberate exposure in nuclear warfare, and accidental exposure through nuclear power plant leakage. Studies in these areas may have relevance for understanding the nature of the psychological reactions experienced by the NZ nuclear test veterans.

Nuclear Warfare

In his studies of and interviews with survivors of the Hiroshima A-bomb, the Hibakusha and Hibakusha Nisei (first and second-generation survivors), Lifton (1967) noted a number of

psychological effects relevant to those of nuclear test veterans. These included what he termed “Impaired Body Substance,” and “A-Bomb Neurosis.” The first of these concerned a belief that the body was fundamentally impaired, and worries regarding developments of radiation-related disease. An increased incidence of leukemia resulted from the atomic bomb, and those who did not have this disease feared its future development, “Psychologically speaking, leukemia – or the threat of leukemia became an indefinite extension of earlier ‘invisible contamination’” (p. 104). In addition, fears arose concerning the development of other cancers linked to radiation, such as those of the stomach, lungs, and thyroid (Lifton, 1967). This fear was heightened by the greater latency period after exposure for these illnesses. With a number of fatal and non-fatal illnesses linked to radiation, survivors would be suspicious and apprehensive about any new symptom or everyday illness. Lifton argued that the psychological effects may extend to survivors’ doubt for a positive prognosis contributing to their illness.

Along with fears for their own health, the Hibakusha feared for the health of their children and future generations. Knowing radiation can cause genetic abnormalities, they were concerned that even if their children were presently healthy, they had the potential to become ill and die without warning (Lifton, 1967). Even if babies were not born with abnormalities, there was no psychological rest from the possibilities of illness. The ominous and unpredictable invisible effects of the radiation were a chronic presence.

“A-Bomb Neurosis” was the term for what Lifton (1967) described as a characteristic preoccupation the Hibakusha had with the effects of radiation exposure on their health. Constant anxiety about becoming ill, feeling chronically fatigued, and belief in currently having A-bomb disease or fear of developing this (or cancer), led survivors to closely monitor their blood count, and to be attentive to any new symptom. He characterised A-bomb neurosis as, “a precarious inner balance between the need for symptoms and the anxious association of these symptoms with death and dying” (p. 119). Further, survivors attributed various emotional conflicts they experienced to the A-bomb, and these conflicts, Lifton believed, contributed to physical illnesses, such as cancer. Lifton makes clear that the impairment or disease in the body, and the neurosis in the mind were inextricably linked. The psychological struggle of the Hibakusha was tied up in their physical state.

The psychological effects of exposure to an atomic bomb in nuclear war are similar to the nuclear veteran experience, such as the fear of illness and death from the invisible exposure, and a preoccupation with health and an impaired body. However, the experience of nuclear veterans is clearly different to experiencing the traumatic destruction of an atomic bomb in warfare. This event in Hiroshima was devastating and traumatic at the time, causing mass death, chaos, and stamping horrific visual images on the minds of survivors. The confounding effects of these added stresses render the two types of exposures quite separate and in many ways incomparable.

Nuclear Accidents

Similar effects have been observed in populations of nuclear accident victims. Research on the effects of nuclear accidents has a strong focus on the stress of the experience as having a greater impact on psychological health than any physical illness.

Studies of victims of the Chernobyl accident argue that exposure-related stress is the major contributor to psychological status. An early study by Chinkina and Torubarov (1991) investigated 85 people who had developed Acute Radiation Syndrome (ARS) of the first to third degrees of severity as a result of the accident. This sample was compared to a mixed control group of clinically healthy people and clean-up workers exposed to radiation (but without ARS) on subjective experience, medical history, psychological measures of mental state and personality features, and state of mental functions.

The development of adverse “mental states” potentially contributing to psychological problems was observed in 73% of ARS-III participants, 56% of ARS-II participants, and 33% of ARS-I participants (Chinkina & Torubarov, 1991). However, the total numbers for each group were small (11, 41, and 33, respectively). The significance of this result compared to the control group is not known. These adverse mental states were characterised by high anxiety, depression, distorted self-assessment, and reduced cognitive ability. The authors believe this state was a direct result of the stressful circumstances of the Chernobyl disaster and having ARS. Particular symptoms, characteristic of older persons with more severe ARS, were “disturbances of mental working capacity, marked proneness to exhaustion, and the development of unfavourable mental states” (2.5 to 3 years after the accident) (Chinkina & Torubarov, 1991, p. 306). Unfortunately, no explanation of the different degrees of ARS was

provided, the mixed control group is questionable, and there are generalisability issues to exposure victims without ARS.

Stiehm (1992) alludes to chronic worry as a result of the Chernobyl accident. In 1991, Stiehm became aware that many Ukraine children were being diagnosed with “vegetative dystonia” (with symptomatology similar to chronic fatigue syndrome), believed to develop from radiation exposure through air, food, and soil. However, Stiehm argued that the “epidemic” of this disease was too long after the accident to result from direct radiation exposure, and too soon to be early signs of cancer development. Thus, he concluded it was “psychologic fallout” (p. 761), a psychological creation by many of the children’s parents and doctors resulting from fear and anxiety about past exposure.

Three smaller nuclear accidents in the Kyshtym and Chelyabinsk areas of the former Soviet Union occurred between 1949 and 1967. The accidents involved a plutonium plant releasing radiation into a nearby river, exploding storage tanks near Kyshtym releasing nuclear waste into the atmosphere, and a drought causing a radioactive lake to recede and wind to blow the radioactive sand over Kyshtym and Chelyabinsk. Collins (1992) relies on data collected in discussions and briefings with thousands of exposed people in these areas, and with people south of the exposed area (controls) over a 33-year period. He discusses the lack of perceived control, lack of information about the disaster, and the main factor of “omnipresent invisible threat and the continuing fear that the future is marred by irreversible cancer or genetic defects” (p. 551). This is a further example of stress affecting exposees.

Additionally, Remennick (2002) found that Chernobyl exposees who immigrated to Israel perceived their mental and somatic health to be worse than a control group of other immigrants. Self-reported levels of depression and anxiety about developing cancer were also higher in the exposed group.

Van den Bout et al. (1995) theorised that the health problems and illness behaviours of those exposed to Chernobyl radiation resulted from stress, rather than radiation, and developed a psychosocial stress model. As Figure 1 shows, those who have been exposed to radiation will be more sensitive to any physical sensations they experience, particularly due to knowledge about the negative health effects. People may then label these sensations as symptoms and attribute them to radiation, perhaps as some form of radiation disease. This labelling could

understandably result in anxiety about health and depressive reactions, creating even more sensitivity to physical symptoms. The anxiety and depression may characterise, or contribute to, the development of “stress-related syndromes” (p. 230), and various illness behaviours.

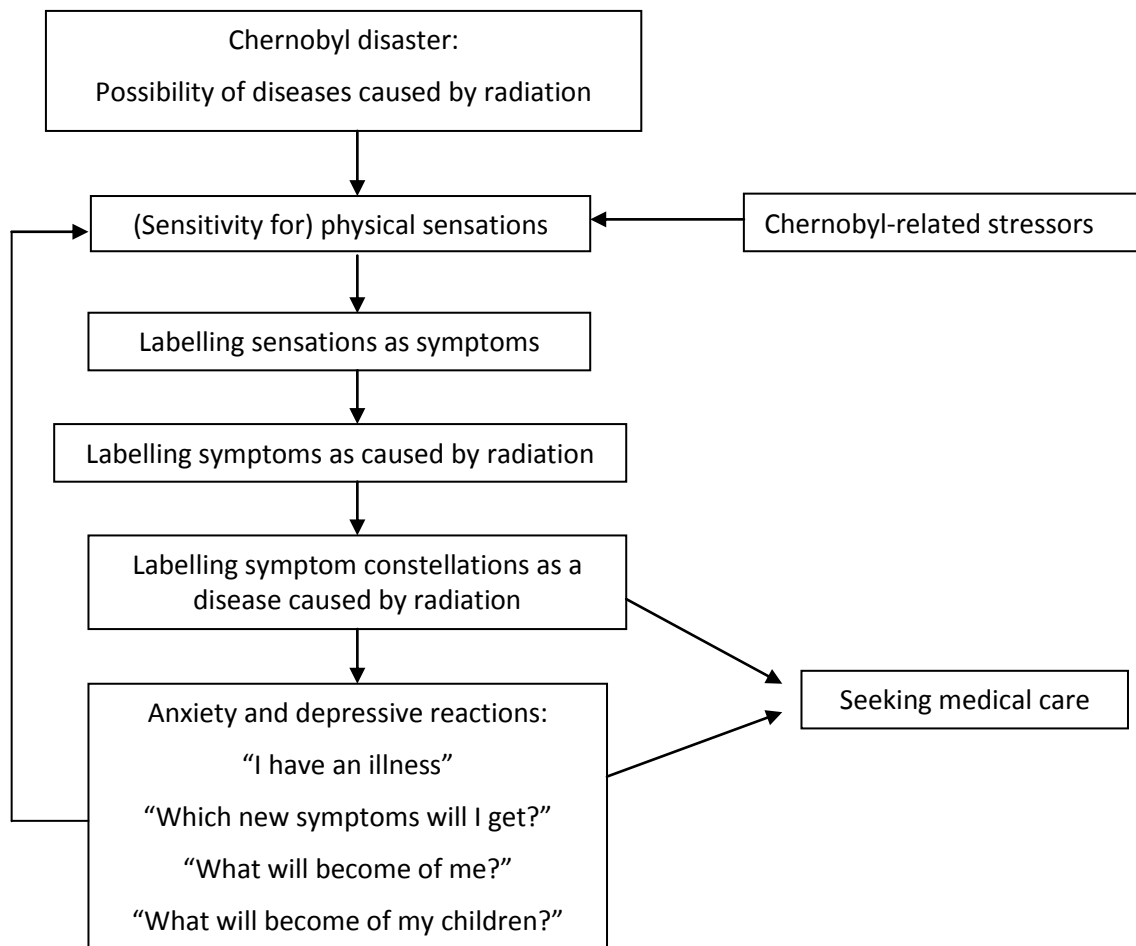


Figure 1. Psychosocial stress model of pathways linking Chernobyl stress to illness behaviour (van den Bout et al., 1995, p. 229).

Van den Bout et al. (1995) stated that the health problems resulted from both the “traumatic stress” of radiation exposure, and the “chronic stress” of experiences subsequent to the accident. Chronic stress resulted from the stressors of evacuation, discrimination, confusion about safe dose limits, lifestyle changes, and unknown food contamination level. However, what is defined as traumatic stress, “living in the constant fear that health effects will inevitably appear soon or later” (p. 227) may also be a form of chronic stress. Thus, it is

difficult to discriminate between the two forms of stress, and to understand the mechanisms at work.

Later, Havenaar, Savelkoul, van den Bout, Bootsma, and van den Brink (1999) investigated whether psychological effects of the Chernobyl disaster resulted from illness or illness behaviour due to stress. Residents of the Gomel area (Belarus region) in the direct vicinity of the plant were compared with controls of the Tver region 1000 kilometres away, on physical and psychiatric status. The researchers found self-reported levels of psychological distress (measured by the General Health Questionnaire; GHQ) and subjective health (Medical Outcomes Study questionnaire, Short Form) to be substantially higher⁶ (worse) in the 1617 exposees, compared to the 1427 controls. Medical consumption was also higher in the exposed group.

Scores on the GHQ determined the participant group for Phase II of the study, with a larger proportion of more distressed individuals included ($n=265$ and 184 for the Gomel and Tver regions, respectively; Havenaar et al., 1999). In this phase, participants received standardised psychiatric and full medical examinations. No differences in the prevalence of psychiatric disorders existed between the two groups. With such a large sample size any small effect for this factor should have been detected. The Gomel sample was found to have more physical illness, but these illnesses were not radiation-related. The researchers concluded that the symptoms the residents were exhibiting resulted from psychological stress and illness behaviour, rather than exposure to ionising radiation. However, the two populations were not studied simultaneously, and the results could have been confounded by being evacuated, or being a decontamination worker or a mother with young children, factors related to vulnerability to psychological distress.

The same kinds of effects have been observed in residents of the Three Mile Island (TMI) area after its nuclear accident. Baum et al. (1983) took emotional, behavioural, and physiological measures of stress in a group of TMI residents, and three control groups (20 miles away from any nuclear plant, within 5 miles of an undamaged plant, and in a 5-mile area around a coal plant). The emotional health of the TMI group was worse than that of the other three populations. In particular, they exhibited greater depression, anxiety, and concentration

⁶ Where comparisons are made, the reader should assume these are statistically significant ($p < .05$), unless otherwise stated.

problems, as measured by the Symptom Checklist-90, but only scores on the anxiety scale were different from the controls. However, with such small numbers in each group (n=24 to 38), sufficient statistical power may not have been available to detect an effect. Scores on the Beck Depression Inventory (BDI) were higher for the exposed group than for the controls, but this was only at a significance level of .10. The TMI residents also performed worse on a proof-reading and an embedded figures task (measures of cognitive function) than the three control groups. Further, this group had higher urinary catecholamine levels than the undamaged nuclear and coal plant groups, showing chronic arousal of the sympathetic nervous system. As this research took place more than a year after the TMI accident, the authors stated these effects must be due to the chronic stress residents were experiencing as a result of ongoing uncertainty, and the threat of potential exposure-related illness.

Prince-Embury (1992) suggested that receiving understandable information can contribute to the psychological symptom level in individuals experiencing nuclear accident-related stress. She examined the relationship between information provided and the psychological symptoms of TMI residents on the Symptom Checklist-90 (SCL-90). A self-selected sample of residents participated in a course six years after the accident, in which they received information on cancer and its epidemiology, and on radiation. They rated this information on understandability, reliability, relevance, and certainty, with the degree of understandability being related to a lower level of psychological symptoms. However, this only accounted for 3% of the variance. Prince-Embury states that "Increased understanding, in whatever form this takes for an individual, may allow the necessary habituation required to cope with ongoing conditions of uncertainty" (p. 1156).

Green et al. (1994) interviewed 50 residents of Fernald, Ohio who had recently discovered they were exposed to radioactive waste leakage through air and water from a nearby nuclear weapons plant. The measures used included the Psychiatric Evaluation Form (PEF), the Impact of Event Scale (IES), the Symptom Checklist-90 Revised Version (SCL-90-R), and the Coping Strategies Inventory (CSI). Information about stressors (worries and dreams) was collected using a structured interview format. Results on the PEF taken at the "worst time" (time of highest distress after receiving information about the exposure) showed high anxiety, depression, belligerence, and daily routine impairment ratings. At the current assessment time (covering the month up to the interview), anxiety, depression, somatic concerns, and belligerence had the highest ratings. Over time, anxiety, depression, daily routine impairment,

and agitation decreased. However, somatic concerns, social isolation, and suspiciousness persisted over time. These ratings were higher than those of non-exposed residents of the Big Coal River Valley (West Virginia), but lower than those of outpatients. Results for the SCL-90-R included elevated somatisation, obsessive/compulsive symptoms, hostility, paranoid ideation, and interpersonal sensitivity (mistrust of others). The results were similar for those of TMI residents five years after the accident. On the IES (measuring stressful life events), avoidance scores were higher than intrusion scores (the reverse of what would be expected of those usually exposed to trauma). Related to this, Fernald residents were high on disengagement coping strategies including problem avoidance, wishful thinking, and social withdrawal, and low on engagement strategies including problem solving, cognitive restructuring, expressing emotions, and social supports compared to patients with a recent cancer diagnosis, and university students thinking about a recent stressor. Ninety-five percent of participants had particular worries, the most common of which were fear of illness in oneself (45%), fear of illness in one's family (48%), and fears about contamination (43%).

Green et al. (1994) describe the Informed of Radioactive Contamination Syndrome, said to result from a failure to process the stressful cognitive problems faced in the wake of exposure. Anyone could develop the syndrome, often characterised by depression and anxiety. One phase involved extensive worry about health, and another was action-oriented, in which individuals sought information about the exposure and possible consequences, trying actively to cope with their situation. While Green et al. claimed the syndrome was similar to Post-Traumatic Stress Disorder (PTSD), they did not consider this an appropriate diagnosis. However, in a later revision of this article (Lindy, Grace, & Green, 2003) it is proposed as a PTSD subtype.

An accident in Goiania, Brazil, involved a radioactive cesium isotope being stolen from an old radiotherapy machine and portions of it given to residents of Goiania (Collins & Bandeira de Carvalho, 1993). The waste was transported to a suburb of Goiania. Three-and-a-half years after the accident, the authors compared a group of Goiania residents exposed to radiation with residents of this suburb (who had the potential for exposure), and a non-exposed control group. The exposed group showed higher psychological symptomatology on a self-report measure of psychological and physical health, higher levels of fear, a lower level of perceived overall health, worse performance on a behavioural "maze" test, and higher excretion of vanillylmandelic acid (showing greater sympathetic nervous system activation) than the

control group. It was concluded that the exposed residents were experiencing stress because of this exposure, from uncertainty about future health, a fear of cancer, and a diminished quality of life (Collins & Bandeira de Carvalho, 1993).

The Common Experience

The circumstances of exposure to nuclear radiation for the groups described above varies somewhat, but it is clear that they have one major factor in common – the experience of chronic stress. Vyner discusses the stress reaction to toxic exposure and its antecedents in his book “Invisible Trauma: The psychosocial effects of the invisible environmental contaminants” (1988).⁷ He argues that people in all of these situations are experiencing stress due to an inability to adapt to threat, resulting from a lack of sufficient information, stemming from the characteristic ambiguity and uncertainty of the toxic exposure experience.

Invisibility and Ambiguity

A nuclear veteran faces this adaptive dilemma because of *environmental invisibility*, *medical invisibility*, and *diagnostic ambiguity*. Environmental invisibility means the contaminant cannot be detected through the senses. Thus, it is difficult for the veteran to ascertain whether he is in danger because he does not know whether the radiation is being absorbed into his body, how much is being absorbed, and if the amount is dangerous (Vyner, 1988). Such a person cannot easily adapt to this kind of exposure because he does not know if he is in a dangerous situation, or if he has been harmed.

Medical invisibility is when diseases resulting from radiation exposure are invisible at some point to the exposee and to doctors; that is, they do not become symptomatic until years after the exposure. This time period is called a latency period, and creates *latency invisibility* (a form of medical invisibility),

In the dose range in which radiation can cause delayed radiation illness (for example, cancer) the actual biological damage done at the time of exposure occurs at the cellular level. This early cellular damage is present in the form of either genetic mutations...or as one of several types of cytoplasmic injuries. These early cellular injuries can develop, over three to thirty-five years, into both the cancers and the many forms of non-tumourous lesions caused by radiation. (Vyner, 1988, p. 15)

⁷ The information in the following two sections is taken from this book.

Because it is impossible to locate these cellular lesions during the latency period, doctors cannot inform radiation exposees as to whether they will develop cancer or other radiation-related illnesses in the future. *Etiological invisibility*, another form of medical invisibility, exists if any disease or symptoms resulting from an exposure cannot be causally linked to the contaminant. For the NZ veterans, it is impossible to know whether any symptoms or diseases (e.g., leukemia) they may have were caused by their exposure to radiation, because there is no “morphological or biochemical marker” (p. 16) indicating which forms of leukemia have developed from radiation versus another cause. Diagnostic ambiguity - when any symptoms the exposees have cannot be diagnosed by their doctors or themselves – also makes adaptation difficult.

Because of this invisibility and ambiguity, the information needed to effectively adapt to an invisible exposure is not available. No concrete answers or clear solutions exist to the numerous questions and complex issues involved. Adaptation is rendered terribly “difficult, if not impossible” (Vyner, 1988, p. 18).

Uncertainty

This invisibility and ambiguity also creates uncertainty for an exposed person. Vyner (1988) presents 12 types of uncertainty exposees may face, all of which make adapting to an invisible exposure extremely difficult. Nine of these (see Table 1) are relevant to the experiences of the population groups in the literature, but particularly to those of the nuclear veteran.

Summarising, after being exposed an individual may become concerned either as a direct result of this exposure, or due to subsequent health problems. Both of these instances lead to attempts at adaptation. However, due to the lack of information from the invisibility and ambiguity discussed, adaptational dilemmas and uncertainties will often be experienced.

When attempts to adapt to a threatening situation are thwarted, the individual experiences stress. This stress is chronic, becoming part of the fabric of an exposee’s life. What does the experience of “chronic stress from an inability to adapt” mean in terms of the mental and physical health of those who are exposed? Some understanding can be gained from examining the biological basis of stress.

CHAPTER TWO

Table 1
Nine Types of Uncertainty Nuclear Veterans Face

| Type of Uncertainty | Definition |
|----------------------------------|---|
| Dose uncertainty | Not knowing the amount of dose one was exposed to. |
| Significance-of-Dose uncertainty | Knowing the amount but not what the health effects of this dose will be. |
| Latency uncertainty | Knowing that one was exposed but not knowing whether any damage done will result in future disease. |
| Etiological uncertainty | Not knowing if a current disease has been caused by exposure. |
| Diagnostic uncertainty | Lack of diagnosis for symptoms developing after an exposure. |
| Prognostic uncertainty | Uncertainty about future health when one thinks or knows he or she has been harmed. |
| Treatment uncertainty | Knowing the best way to medically treat organic or psychosomatic symptoms after exposure. |
| Coping uncertainty | Lack of knowledge about how best to adapt to the exposure. |
| Financial uncertainty | Uncertainty about who carries the responsibility to finance health costs of the exposure. |

CHAPTER THREE: STRESS

Introduction to Stress

Defining Stress

Over the years there has been much confusion and disagreement over a definition of stress. However, Cohen, Kessler, and Gordon (1995) recognise enough similarity between various perspectives to produce the definition, “a process in which environmental demands [threats] tax or exceed the adaptive capacity of an organism, resulting in psychological and biological changes that may place persons at risk for disease” (p. 3). Stress is therefore any stimulus (or stressor) that disrupts the normal functioning of the body or homeostasis (Lovullo, 1997), and consists of an interaction between psychological and biological factors. A stressor can be either physical, such as temperature change, or psychological, such as major disappointment (Lovullo, 1997). Further, the type of stress elicited by the stressor can be acute or chronic. Acute stress occurs when a person is exposed to an infrequent stressor for a limited period of time, for example, a physical injury. Chronic stress occurs through continual exposure to or the persistent demand of a stressor over time (Gottlieb, 1997).

General Adaptation Syndrome

Selye developed the first physiological model of stress, the General Adaptation Syndrome (GAS), or *stress syndrome*. When an individual experiences stress, the body defends itself by trying to adapt (Selye, 1978). The GAS is made up of three components, the *alarm reaction*, the *stage of resistance*, and the *stage of exhaustion*. The alarm reaction is the body’s initial response to the stressor in which the bodily defenses prepare to cope with the stress. This alarm reaction is followed by the *stage of resistance* in which the body attempts to adapt to or resist the stressor. Finally, the organism enters the *stage of exhaustion*, in which any adaptive response disappears after prolonged exposure to the stressor, and the organism experiences “premature ageing due to wear and tear” (p. 38) and ultimately, death (Selye, 1978).

According to Steptoe (1998), Selye failed to understand specific stress responses resulting from the complex interplay between bodily systems (e.g., neuroendocrine, autonomic, and immune), demands on an organism, and various coping responses. It is now recognised as

more than simply a biological response; psychological and biological factors interact in a stress reaction.

A Modern View of Stress - Psychoneuroimmunology

Psychoneuroimmunology (PNI) examines the interactions between behaviour, the nervous system, and the immune system (Maier, Watkins, & Fleshner, 1994). The central nervous system (CNS) controls global immune processes involving the organism as a whole, and local immune processes at the cellular level. It receives information about immune processes, and the immune system exerts some control over the CNS (Maier et al., 1994). The existence of this neural-immune pathway makes possible interactions between psychological and immune functions, as psychological processes take place in the brain.

Unlike the GAS model, PNI includes the psychological component of stress. There are two key behavioural effects on the immune system. The first is classically conditioned immune responses (Ader, 2001), such as conditioned immunosuppression to a hospital chemotherapy room (Maier et al., 1994). The second is one of the predominant areas of interest in PNI, the stress-disease link, with the belief that exposure to stress may produce immune changes. This happens indirectly, as psychological factors affect autonomic nervous system functioning, and subsequent hormone activity can affect immune response (Maier et al., 1994). The effects of stress on the immune system, however, are not simple and causal, and can be moderated by a number of other psychological factors. Furthermore, the exact effects on the immune system will differ with varying physical conditions, such as hormonal activity (Maier et al., 1994).

Cohen and Herbert (1996) describe pathways through which psychological factors can result in disease, mediated by the immune system (see Figure 2). Stressors or negative psychological states can contribute to immune change through direct contact with the CNS, hormonal changes, and adaptive or coping behavioural changes. The immune changes produced can lead to disease susceptibility (Cohen & Herbert, 1996).

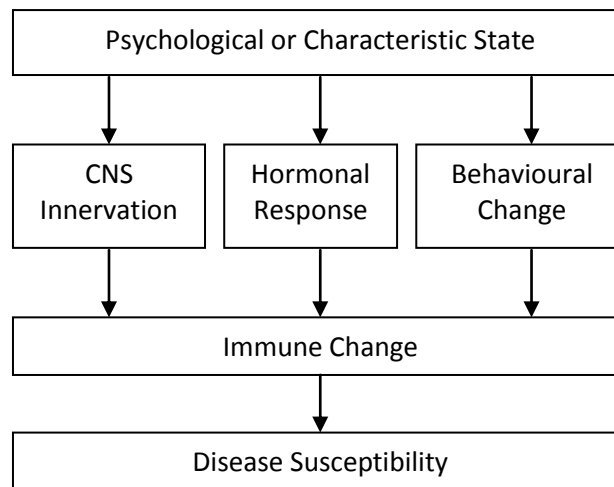


Figure 2. Psychoneuroimmune pathways to disease (Cohen & Herbert, 1996, p. 118).

An overview of how stress is known to affect the body is provided in the next section.

The Psychobiology of Stress⁸

The autonomic nervous system (ANS) is a set of neurons that convey information to and receive it from the heart, intestines, and other organs. Its responses are involuntary and automatic (Step toe, 1998). The ANS has two branches: the sympathetic and the parasympathetic nervous systems. The sympathetic nervous system is responsible for the body's fight or flight mechanism, activated when a person is in a state of arousal. By increasing heart rate and breathing, and channelling blood from the major organs to the skeletal muscles, it prepares the individual to react to a threat or stressor. When a person is under stress, the sympathetic system is continually activated and the body is in a constant state of arousal, ready to react to the threat (Step toe, 1998).

When the body is functioning normally it is in a state of homeostasis, in which all biological processes such as temperature regulation and blood glucose are in balance within a set range

⁸ Only the biological response to chronic stress (and not acute stress) will be explained here, as it is the former that is relevant to the present study.

(Steptoe, 1998). The hypothalamus in the forebrain is responsible for maintaining homeostasis within the body through a number of nuclei that give the brain information on homeostatic changes (Card, Swanson, & Moore, 1999). Stress occurs when a stressor upsets this state of balance, and the hypothalamus organises the body's response (Miller, Chen, & Zhou, 2007).

The Hypothalamic-Pituitary-Adrenal (HPA) Axis Response

When the hypothalamus is activated, it releases corticotropic-releasing hormone (CRH) which finds receptors in the pituitary gland that release adrenocorticotrophic hormone (ACTH) in response (Claes, 2004). This hormone travels via the bloodstream to the adrenal glands, which stimulate the release of glucocorticoids. The main glucocorticoid in humans is cortisol, and this is taken to different parts of the body, especially the brain, to enable it to cope effectively with the stressor. Cortisol makes blood glucose available to the body and brain providing energy to cope with stress. Due to the connection between these three areas, this stress response in the brain is called the HPA axis response (Claes, 2004; see Figure 3).

Release of cortisol into the bloodstream is controlled by a negative feedback loop. Usually cortisol in the blood inhibits the further release of CRH from the hypothalamus and ACTH from the pituitary gland. However, when an individual is under chronic stress, this loop can become impaired, causing cortisol levels to increase and remain elevated (Claes, 2004). This chronic overactivity of the HPA axis has a number of adverse effects, including fear, osteoporosis, decreased immune system functioning (Claes, 2004), and in particular, damage to neurons in certain areas of the brain (McEwen, 1995). Elevated cortisol levels can damage and destroy neurons in the hippocampus, resulting in long-term memory impairment (McEwen, 1995). Hippocampal damage results in increased cortisol release, and consequently, further damage, giving rise to memory encoding and retrieval problems (Bremner, Krystal, Southwick, & Charney, 1996).

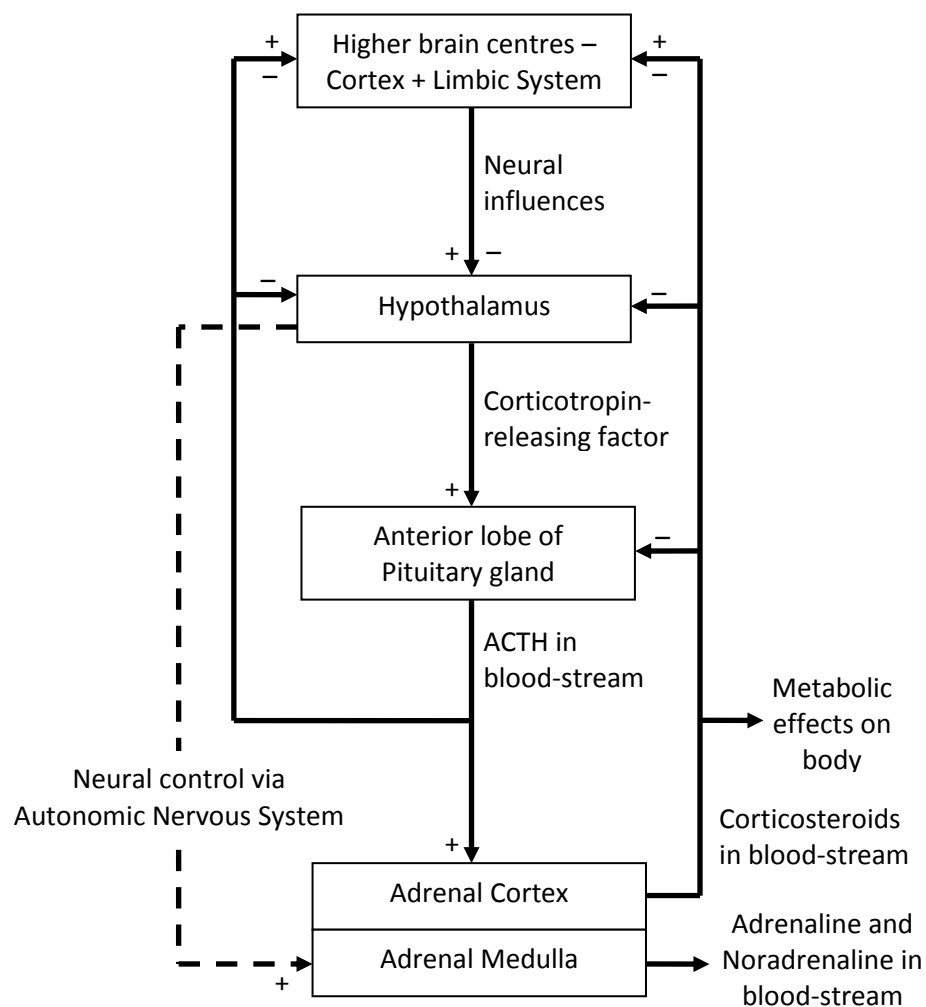


Figure 3. The HPA system, and feedback control of ACTH secretion (Green, 1987, p. 242).

Stress and the Immune System

Stress impacts immunity through activation of the ANS and the HPA axis, and the subsequent levels of hormones in the blood, regulating immune function (Maier et al., 1994). Stressors activate the sympathetic nervous system, resulting in the release of norepinephrine (NE) and epinephrine (E) from the adrenal glands (Maier et al., 1994); immune organs and cells have receptor sites for these hormones. Also, sympathetic nerves in the immune organs have direct contact with lymphocytes (Felten & Felten, 1991). Furthermore, the processes of the HPA axis involved in the release of cortisol are essential, as cortisol binds to receptor sites on T and B immune system cells (Plaut, 1987), altering their level of activity. Examination stress has been found to reduce natural killer cell activity (Glaser, Rice, Speicher, Stout, & Kiecolt-Glaser, 1986) and lymphocyte proliferation (Glaser, Pearson, Bonneau, Esterling, Atkinson, & Kiecolt-Glaser,

1993) in university students. Other research shows that stressors *suppress* immune functioning, such as studies of bereavement (Schleifer, Keller, Camerino, Thornton, & Stein, 1983), marital difficulty (Kiecolt-Glaser, Fisher, Ogrocki, Stout, & Speicher, & Glaser, 1987), and caring long-term for a relative with a disability (Pariante et al., 1997).

Maier et al. (1994) suggest that suppression of the immune system in response to stress diverts energy from the immune system to the central and peripheral nervous systems, providing more energy to cope with the stressor. However, when the immune system is suppressed this can result in susceptibility to illness. If a person is exposed to chronic stress, their immune system may be in a constant state of suppression, contributing not only to organic illness, but to fatigue and other psychological disorders.

Chronic Stress and Mental Health

In addition to adverse physical effects, stress can result in a number of mental disorders, including major depressive disorder, fatigue disorders, and PTSD. Depressed people may have an overactive HPA axis (Claes, 2004; Michelson, Licinio, & Gold, 1995) in which excess CRH is released, producing excess cortisol levels. This can contribute to decreased sleep and appetite changes (Michelson et al., 1995). In contrast to depression, people with fatigue disorders such as chronic fatigue syndrome and fibromyalgia have low levels of CRH (Cleare et al., 2001). If a person cannot release enough CRH when stressed, the stress systems will not be adequately activated and the person cannot respond effectively to the stressor. ANS fight or flight responses may be completely nonexistent. As CRH indirectly triggers the production of cortisol, if CRH levels are low less cortisol is produced, resulting in lack of energy (Cleare et al., 2001).

Chronic stress can result in the development of PTSD through the increased release of NE. This increase activates the sympathetic nervous system, causing the body to remain in a state of hyperarousal. Thus, a person with PTSD will over-respond to stimuli that resemble aspects of their traumatic event (Bremner et al., 1996). The increased NE activity is thought to produce panic and flashback symptoms (Southwick, Yehuda, & Morgan, 1995). People with PTSD are known to have low levels of cortisol, which can make them respond more intensely to stressors (Yehuda, 1997).

Post-Traumatic Stress Disorder in the Nuclear Veterans

There is some controversy over whether exposure to nuclear radiation results in PTSD. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), to receive this diagnosis an individual must have been exposed to a “traumatic event” (American Psychiatric Association [APA], 2000, p. 467), which must have involved “actual or threatened death or serious injury” and a response of “intense fear, helplessness, or horror” (p. 467).

Vyner (1983) and Green et al. (1994) initially argued against a PTSD diagnosis for people exposed to nuclear radiation. Regarding nuclear veterans, Vyner states, “...the subjects are not really preoccupied with a past event in the same sense that one is in PTSD. [They]...do not generally re-experience the tests in which they participated, although this does occasionally occur. They are, instead, preoccupied with radiation and its impact on their lives” (p. 252). He also argues that the onset of his proposed Radiation Response Syndrome is more than a decade after the actual event, whereas the DSM-IV-TR defines delayed onset as “at least 6 months after the stressor” (APA, 2000, p. 468). Similarly, in discussing their Informed of Radioactive Contamination Syndrome, Green et al. (1994) argued against a diagnosis of PTSD in nuclear accident victims, stating that the stressor was “ongoing and future oriented. It is not confined to a single happening which can be processed by the senses and, therefore, the pathology is less likely to include nightmares and re-enactments” (p. 174). It is clear from these descriptions that the syndromes generally lack re-experiencing symptomatology for PTSD, such as dreams, intrusive images, or “reliving” sensations (APA, 2000). Van den Bout et al. (1995) make a similar observation in their research on Chernobyl victims, “[PTSD] requires the presence of intrusive as well as avoidance symptoms. Our observations in the contaminated areas point to the presence of avoidance, but to the presence of intrusion to only a much smaller extent” (van den Bout et al., 1995, p. 224).

Later, however, Vyner (1988) and Lindy et al. (2003) provide the opposite argument, proposing their respective syndromes as types of PTSD. Vyner argues that the single event of exposure to a bomb test can cause “a major change in the lives” of the men (Vyner, 1983, p. 251), and Green et al. (1994) highlight individuals’ inability to effectively process the various issues involved. Vyner states the reason for his change of opinion as belief in the similarity of the “psychopathological processes” (p. 121) involved in the development of both the RRS and PTSD, now believing the RRS to be a form of delayed-onset PTSD. Similarly, Lindy et al. (2003) state that being exposed to an accidental chronic stressor over a period of time can also be

seen as a subtype of PTSD, and change the name of their syndrome to Toxic Contamination Stress.

However, this opinion, particularly in relation to nuclear veterans, can be challenged. For a nuclear veteran to have PTSD he must have had a response of intense fear, helplessness, or horror. It is by definition a trauma a person is consciously aware of at the time. The literature (Vyner, 1983, 1988; Garcia, 1994) and personal communication with NZ nuclear test veterans suggests that the blast event(s) was not construed as traumatic at the time; neither did the veterans experience the characteristic feelings. Additionally, while victims of nuclear accidents may be experiencing PTSD, this is not sufficient argument for similarity with the nuclear veteran experience. Many residents reacted with alarm and fear to news of leakage and possible exposure (Wroble & Baum, 2002), knowing they were in danger at the time, with the event involving the threat of serious injury. Additional stressful events such as evacuation, relocation, and restriction of life activities, which were not present for the nuclear veterans, may also have contributed to the development of PTSD for these individuals.

Furthermore, the event for the veterans must have involved actual or threatened serious injury. But at the time of the exposure most veterans were not concerned about their health, "the majority...left the service believing that their health had not been impaired by the radiation" (Vyner, 1983, p. 243). Those who were concerned "claim to have forgotten their concerns until years later" (Vyner, 1983, p. 260; R. Sefton, personal communication, January, 2004). It was not until 8 to 20 (Vyner, 1983), or even up to 30 years later (R. Sefton, personal communication, January, 2004) that the veterans became concerned.

A further argument against a PTSD diagnosis is the prolonged period of stress the nuclear veterans, especially NZ veterans, have experienced. The time period from NZ veterans' initial health concerns "in about the late 70s" (R. Sefton, personal communication, January, 2004) until the present, represents a period of at least 20 years of experiencing anxiety. This is a considerable amount of time to be constantly exposed to a stressor; it is not an acute event. Furthermore, it is not time-limited, as the stressor is "ongoing and future-oriented" (Green et al., 1994, p. 174). Additionally, suffering chronic stress for 20 years would have a greater cumulative effect compared to that of 10 years.

This factor, along with the lack of perceived trauma at the time of the event and no feelings of helplessness, horror, or threatened injury, sheds doubt on the accuracy of a PTSD diagnosis for these veterans. A name indicating it is a form of toxic exposure-related chronic stress disorder may be more appropriate. Such a disorder can best be understood within the framework of a psychological model of stress.

A Psychological Model of Stress – The Stress and Coping Paradigm

Perhaps the predominant psychological model of stress is the stress and coping paradigm, developed by Lazarus and colleagues. Lazarus (1966, 1999; Lazarus & Folkman, 1984) states that stress is determined by an individual's perception. Stress is defined in terms of transactions between "person variables" and the environment; both the stimulus and personality (individual differences) account for an individual's emotional reaction (Lazarus, 1966, 1999; Lazarus & Folkman, 1984).

Central to the experience of psychological stress is the concept of threat – the anticipation of future harm based on present cues (Lazarus, 1966). It is "brought about by cognitive processes involving perception, learning, memory, judgement, and thought" (p. 30). However, the evaluation or *appraisal* of a situation determines whether or not it is threatening. Therefore, the interpretation or perception of a situation determines the particular emotional reaction (Lazarus, 1966, 1999).

According to Lazarus (1966, 1999), two forms of appraisal take place. *Primary appraisal*, involves evaluating the personal significance of the threatening event, which involves the concept of motivation. A stimulus is only threatening if it thwarts one's motives (such as the motive to live a healthy and long life), and is relevant to one's goals or values (Lazarus, 1966, 1999). Threat appraisal is difficult, though, if the stimulus is ambiguous, that is, if there is uncertainty about the presence of danger. Ambiguity can also intensify the potential for threat if the situation is already negative, because it decreases an individual's feeling of control; it "weakens his ability to take effective action" (p. 117). This type of situation is very difficult to master.

Secondary appraisal is where individuals determine the coping strategy they will use from those they have available (Lazarus, 1966, 1999). Primary and secondary appraisal are

interdependent. Appraising a situation as threatening depends partly on determining if coping strategies exist to enable one to master the situation (Vyner, 1988). Stress occurs if an event or situation is appraised as threatening, and the individual does not have adequate resources to cope successfully (Lazarus & Folkman, 1984). Lazarus (1966) reports that the affect experienced in a situation reveals the process of secondary appraisal employed, with the coping-reaction pattern of attack related to anger, avoidance to fear, inaction to apathy, and complete hopelessness to depression.

Lazarus (1966) describes four classes of response that indicate stress is being experienced: reports of disturbed affect, motor-behavioural reactions, changes in the adequacy of cognitive functioning, and physiological changes. Disturbed affect may be depression or anxiety, and motor-behavioural reactions can involve increased muscle tension, speech difficulties, various facial expressions, and behavioural reactions such as attack and avoidance. Changes in the adequacy of cognitive functioning can involve the effects of stress on “perception, thought, judgement, problem solving, perceptual and motor skills, social adaptation,” and defensive thought processes (p. 7). Impaired cognitive functioning can cause individuals to misinterpret reality. Physiological changes include autonomic nervous system arousal (such as increased heart rate and blood pressure), and adrenal hormone secretions.

As a result of their exposure to radiation, nuclear test veterans are threatened by potential radiation-related illness (and possibly death). They anticipate future harm based on present cues of undiagnosable symptoms, friends who are ill or who seem to have died prematurely from cancer, and information about the harmful effects of radiation. If this threat of illness was certain, the motives of living a healthy life (and perhaps living at all) would be thwarted. However, there is no certainty of danger. The difficulty nuclear veterans experience is an inability to cognitively appraise their situation due to a lack of reliable and sufficient information (Vyner, 1988), resulting from the invisibility and ambiguity discussed above. Consequently, they cannot successfully adapt. Due to this inability to adapt to and master the threatening post-exposure situation, the nuclear veterans likely remain in a state of ongoing stress. This long-term stress produces “wear and tear,” taxing psychological resources.

The Present Study

A review of the literature has shown the common consequence of exposure to radiation is experiencing chronic stress. This results from the threat of developing a radiation-related illness, especially cancer, and the potentially fatal effects. According to Lazarus' (1966, 1999) stress and coping paradigm, to adapt successfully to a threat, appraisal must take place. However, if one cannot ascertain definite danger from the threat due to ambiguous stimulus cues (such as a lack of information), the threat cannot be accurately appraised. An exposee then cannot hope to adapt successfully to his situation, experiencing continual stress, which manifests as disturbed affect, and changes in the adequacy of cognitive functioning (Lazarus, 1966).

The aim of the present study was to examine the psychological effects of exposure to radiation on the NZ nuclear test veterans. There is little research examining the psychological impact of exposure on nuclear veterans; it is a neglected area. Furthermore, there have been no investigations into the psychological status of the NZ veterans. The present study is the first to develop a psychological profile of these men. Based on past research, it was expected that the present sample of NZ nuclear veterans would be experiencing chronic stress as a result of their exposure to radiation. Stress is known to result in depression, poorer perceived health, and impaired memory. Thus, the following was hypothesised:

1. The Exposed group would have more depressive symptoms, with higher scores on average on the Geriatric Depression Scale than the Control group. Stress is thought to result in impairment of the feedback loop controlling levels of CRH and consequently cortisol, in the brain (Claes, 2004). High brain cortisol levels can create changes in the HPA axis that increase a person's risk of developing depression (Michelson et al., 1995; Tafet & Bernadini, 2003). There is also a link between increased cortisol and the decreased serotonin activity contributing to the development of depressive symptoms (Tafet & Bernardini, 2003).
2. The Exposed group would perceive their health to be worse than that of the Control group, with lower scores on all eight subscales of the SF-36, a frequently used scale assessing health-related (physical and mental) quality of life. According to Lazarus (1966), stress can affect perception and result in an individual distorting reality. Remennick (2002) found the self-

reported mental and physical health of Chernobyl survivors to be significantly worse than that of a control group. Thus, chronic stress is known to affect perceived health.

3. The Exposed group would perceive their memory to be worse than that of the Control group, shown through lower scores on average on the Memory Assessment Clinics Self-Rating Scale, a test that assesses self-reported memory performance in everyday life. Elevated cortisol levels due to chronic stress can damage and destroy neurons in the impairment of encoding, retrieval, and long-term memory (Bremner et al., 1996; McEwen, 1995).

With age, education, income, alcohol consumption, and previous trauma known to be associated with depression, perceived health, and memory difficulties (see Method section), the study planned to assess the effects of these covariates, should differences appear between the Exposed group and a Control group of age-matched men.

CHAPTER FOUR: STUDY I METHOD

Participants

Participants were 50 male New Zealand naval nuclear test veterans (Exposed group) and 50 male age-matched Controls. All participants were North Island residents, and were not compensated for their participation.

Exposed group. Contact was made with the veterans through the NZNTVA chairman. The inclusion criterion was exposure to at least one blast in the Operation Grapple testing programme. (One participant was excluded as his name was not on Grapple records.) There were two types of exclusion criteria. The first involved potential damage to DNA⁹ (through other forms of exposure). Participants were excluded if they met the following three criteria: 1) Service in another theatre of war or nuclear related area; 2) exposure to toxic substances¹⁰ for more than one year; and 3) having undergone radiation treatment or chemotherapy.

The second type of exclusion criteria controlled for other factors. The following five criteria excluded participants: 4) Aged over 75 years (to avoid the confounding effects of age); 5) Airforce non-ground staff (as air crew are exposed to cosmic radiation while flying in planes, which confounds exposure); 6) too ill to participate; 7) death subsequent to survey completion; and 8) resident in the South Island (there were insufficient research funds to cover trips to interview eligible South Island residents). Those from the Exposed group considered too ill to participate were judged so by the NZNTVA chairman.

Control group. Controls were obtained through regional Returned Services Associations (RSA) and the assistance of Exposed participants through personal contact. Controls were age-matched individually where possible, and matched to the mean age of Exposed participants within each region. The inclusion criterion in this case was service in the Armed Forces or Police force, or some form of compulsory military training, to control for the *healthy soldier effect*. Due to strong demands for physical, psychological, and medical fitness in military selection and subsequent service, those who have been involved in military service will generally be fitter and healthier than civilians (Medical Follow-up Agency, 1995, as cited in

⁹ The Method provided is for the multi-disciplinary study mentioned in the Preface, which also included research on DNA damage. Consequently, some of the exclusion criteria relate specifically to this part of the study.

¹⁰ These included asbestos, tanalised timber, oil or petrol tanker fumes, intensive microwave radiation, road transport industry dust and chemicals, and radiography work.

MacDonald, 1997). Additionally, this criterion was used to control for cognitive ability, as McLay and Lyketsos (2000) found veterans had significantly less cognitive deterioration resulting from the ageing process than civilians after 11.5 years. This result remained even after controlling for the socio-demographic variables of age, sex, ethnicity, and education.

All exclusion criteria for the Exposed group also applied to the Controls. However, those too ill to participate were judged so by the project Research Officer (J. Blakey). Additional criteria included: 1) Service on HMNZS Pukaki or HMNZS Rotoiti post Operation Grapple (due to possible ship contamination from radiation); 2) higher age than the regional mean for Exposed participants (age matching was important to control for age effects); 3) high educational level, to control for effects on psychological tests and general lifestyle (e.g., a surgeon was excluded); 4) recent immigration to New Zealand (to control for exposure to background radiation); and 5) no compulsory military training.

The study was reviewed and approved on a national basis by the Manawatu-Whanganui Ethics Committee, and by the Massey University Human Ethics Committee, PN Protocol 01/61. Local kaumātua (respected Māori elders) were consulted to ensure culturally appropriate procedures were followed, particularly in the handling and disposal of blood samples.

Primary Measures

The following measures were selected because they were recently used with a large NZ war veteran sample (Alpass, Long, Pachana, & Blakey, 2003; Blakey, 2007), enabling comparison with these normative data. Additionally, the tests all have sound reliability and validity. They were administered through postal survey (see Appendix A; only the parts of the survey relevant to this study are included) and face-to-face interview (see Appendix B).

Modified Mini-Mental State Examination. The Modified Mini-Mental State Examination (3MS; Teng & Chui, 1987) is a shortened version of the widely used Mini-Mental State Examination (MMSE). The MMSE was originally developed as a screening test for dementia (Teng & Chui, 1987). The 3MS covers a broader range of cognitive functions, assesses a greater difficulty level than the MMSE, and extends the range of scores, making it more sensitive (Teng & Chui, 1987). The modifications made enable more detailed discrimination between respondents and cognitive abilities to take place (Bravo & Herbert, 1997). The 3MS tests temporal and spatial orientation, attention (registration and mental

reversal), immediate, delayed, and remote memory, language (naming, reading, fluency, repetition, and writing), abstraction, and construction (Nadler, Relkin, Cohen, Hodder, Reingold, & Plum, 1995), with lower scores indicating cognitive impairment. The 3MS has shown strong internal consistency of .82, and sensitivity and specificity values of 87% and 85% in discriminating between those with no cognitive impairment and those with Alzheimer's Disease (Tombaugh, McDowell, Kristjansson, & Hubley, 1996). Nadler et al. (1995) report high internal consistency of .90, test-retest reliability of .92, and sensitivity of 93%, but low specificity of 43%.

In the present study the 3MS was used as a screening tool for assessing cognitive impairment. A cut-off score of 79 was reported to detect dementia in adults aged 61 to 93 with high sensitivity and specificity (Teng, Chui, & Gong, 1990 cited in Nadler et al., 1995). Those below this cut-off may not have been able to complete the scales accurately. Whilst one participant scored 78, he was included in the analysis due to falling within the age- and education- specific mean reference value of a large older adult sample ($n=7754$; Bravo & Herbert, 1997). The 3MS was administered in the interview (see Appendix B).

Geriatric Depression Scale. The 15-item Geriatric Depression Scale (GDS; Sheikh & Yesavage, 1986) is a shortened version of the original 30-item GDS. This self-report inventory was developed specifically for use with an elderly population. The scale includes 15 items such as, "Are you basically satisfied with your life?" and "Do you feel that your life is empty?" requiring a Yes/No response. A cut-off score of 5 is most frequently used (Almeida & Almeida, 1999; Bijl, van Marwijk, Ader, Beekman, & de Haan, 2005; Haworth, Moniz-Cook, Clark, Wang, & Cleland, 2007), and may indicate depression.

The 30-item (Long Form) GDS has a high reported internal consistency of .94 (Cronbach's Alpha), and a satisfactory 1-week test-retest reliability of .85 (Yesavage, 1986). In the current study Cronbach's alpha was .84, similar to the internal consistency of .80 reported by Chattat, Ellena, Cucinotta, Savorani, and Mucciarelli (2001). The 15-item version correlates highly ($r = .84$; Sheikh & Yesavage, 1986) with the long form of the GDS in successfully differentiating depressed and non-depressed participants. The GDS correlates well with other measures of depression, such as the Zung Self Rating Scale for Depression, and the Hamilton Rating Scale for Depression (Sheikh & Yesavage, 1986). The GDS was administered in the interview (see Appendix B).

SF-36 Health Survey. The Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36; Ware, 1997) is a measure of health-related quality of life. It is a “generic” measure, assessing universal health concepts (Ware, 1997). It consists of eight subscales: Physical Functioning, Role-Physical (role limitations resulting from physical health), Bodily Pain, General Health, Vitality (energy and fatigue), Social Functioning, Role-Emotional (role limitations resulting from mental health), and Mental Health (see Appendix C for a list of subscale items). Participants rate the degree to which they are limited in activities of daily living for physical or emotional reasons, the experience of bodily pain, their perceived health, and their emotional experience. Results are scored using standardised comparisons, with scales ranging from 0 to 100. Higher scores indicate better self-reported health. Participants also rate their general health compared to one year ago (the Health Transition Item), with a higher score on this item being negative.

For 14 studies using the SF-36, the median reliability coefficients of all eight subscales equalled or exceeded .80, except for the Social functioning scale (.76; Ware, 1997). In the present study, the following Cronbach alpha coefficients were obtained for the subscales: Physical Functioning, .88; Role-physical, .92; Bodily pain, .94; General health, .85; Vitality, .86; Social functioning, .84; Role-emotional, .91; and Mental health, .89. Along with high reliability coefficient estimates, a further advantage of using the SF-36 is that New Zealand norms are available for comparison from the 2002/2003 New Zealand Health Survey (Ministry of Health, 2004). The SF-36 was administered in the interview (see Appendix B).

Memory Assessment Clinics Self-Rating Scale. Crook and Larrabee’s (1990) Memory Assessment Clinics Self-Rating Scale (MAC-S) was developed to assess memory in everyday life. The first of two subscales focuses on a person’s ability to remember particular types of information (Ability Scale), such as “the name of a person just introduced to me,” and “telephone numbers or address codes that I use on a daily or weekly basis.” Participants rate their memory ability on a 5-point Likert-type scale from (1) *Very Poor* to (5) *Very Good*. The second subscale focuses on the frequency with which various memory problems occur (Frequency of Occurrence Scale), such as “having difficulty recalling a word I wish to use,” and “dialling a number and forgetting who I was calling before the phone is answered.” Participants rate these items from (1) *Very Often* to (5) *Very Rarely*. The Ability and Frequency scales have 18 and 20 items, respectively.

A factor analysis identified five factors for each subscale: Remote Personal Memory, Numeric Recall, Everyday Task-Oriented Memory, Word Recall/Semantic Memory, and Spatial/Topographic Memory for the Ability Scale; and Word and Fact Recall or Semantic Memory, Attention/Concentration, Everyday Task-Oriented Memory, General Forgetfulness, and Facial Recognition for the Frequency of Occurrence Scale (Crook & Larabee, 1990). (The factors and item clusters of each subscale are shown in Appendix C.) The five factors of each scale accounted for 59.7% and 54% of the variance for the Ability and Frequency scales, respectively (Crook & Larabee, 1990), with the structure being very similar to that of the original analysis (Winterling, Crook, Salama, & Gobert, 1986). In the current study, factor analysis was not performed due to the small sample size. However, Cronbach alpha coefficients were high at .93 and .94 for the Ability and Frequency scales, respectively.

The MAC-S also includes four Global Memory Items: 1) "In general, as compared to the average individual your age,¹¹ how would you describe your memory?" (rated *Very Poor* to *Very Good*); 2) "How would you describe your memory, on the whole, as compared to the best it has ever been?" (rated *Much Worse* to *Much Better*); 3) "Compared to the best your memory has ever been, how would you describe the speed with which you now remember things?" (rated *Much Slower* to *Much Faster*); and 4) "How much concern or distress do you feel about your memory at this time?" (rated *Very Serious Concern* to *No Concern*).

Crook and Larabee (1990) consider the advantages of the MAC-S to be the stable factor structure (unaffected by age and sex), scale brevity, and broad coverage of self-report factors. The Ability and Frequency items were administered in the postal survey, while the global items were administered in the interview (see Appendixes A and B).

Covariate Measures

Age. Age was selected as a covariate because ageing is known to affect mental health, memory, and physical health. While older adults are not commonly diagnosed with depressive disorders, they report more depressive symptoms (Blazer, 2001), and these symptoms increase particularly in men aged 60 to 80 (Barefoot, Mortensen, Helms, Avlund, & Schroll, 2001). Additionally, recall memory is known to decline after the age of 55 (Zelinski & Burnight,

¹¹ The wording "your age" was included to ensure that the reference group for this question was the same age cohort.

1997). SF-36 scores on the physical health subscales decrease with increasing age (Ministry of Health, 2004).

Participants' date of birth was collected (see Appendix A) and their age at the time of the interview was used for all analyses. When age-matching with Control participants, the age of Exposed participants when they completed the initial NZNTVA Research Questionnaire (see Appendix D) was used.

Education. Education was included as another covariate. It is a key factor determining both psychological and physical health (Ministry of Health, 2000; Wilkinson & Marmot, 2003), as people who are less educated are at a greater risk for ill health. Higher SF-36 scores have been observed in individuals with higher education (as a measure of socioeconomic status; Ministry of Health, 1999). In the present study, participants were asked "What is your highest educational qualification?" and were given a number of response options (see Appendix A). Responses to the "Other" option were matched to the existing levels. This information was collected in the postal survey.

Living situation. Information on living situation was collected for socio-demographic reasons, but was initially considered as a covariate as a crude measure of social support. Strong social support has a protective effect on health (Wilkinson & Marmot, 2003), and is an effective buffer against stress (Thoits, 1995). Participants were asked whether they lived with their spouse/partner, with a list of other options (see Appendix A). However, this variable was later dropped as a covariate due to very similar patterns for both groups (see Results section). This information was collected in the postal survey.

Income. Income was selected as a covariate representing socioeconomic status. Lower socioeconomic status relates positively to health risks such as smoking, high blood pressure, and hazardous patterns of alcohol use (Ministry of Health, 2004). Additionally, higher SF-36 scores have been observed in higher income samples (Ministry of Health, 1999). Further, those with a lower family income have been known to make more visits to their General Practitioner (GP), perhaps indicating they perceive their health as worse than those with a higher income (Ministry of Health, 1999). The total gross income of participants and other household members in the previous 12 months was combined to obtain the total household income. This information was collected in the interview (see Appendix B).

Alcohol consumption. Alcohol consumption is considered a health-related risk factor, contributing to a number of physical illnesses, including cirrhosis of the liver, high blood pressure, stroke, and cancer (Ministry of Health, 2004). Excessive consumption can result in various mental disorders, such as alcohol abuse and dependence, amnesia, psychosis, and dementia (US Department of Health and Human Services, 1997, as cited in Ministry of Health, 1999). Those with heavier drinking patterns tend to rate their health as worse than low-to-moderate drinkers (Ministry of Health, 1999). One sixth of NZ adults have shown “potentially hazardous” drinking patterns (Ministry of Health, 2004, p. 69), with men twice as likely to report this pattern. Additionally, veterans have been shown to have more hazardous drinking patterns than the general population (Goldberg, Richards, Anderson, & Rodin, 1991). Thus, alcohol consumption was selected as a covariate.

The Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) was administered to collect information on participants’ drinking habits. The AUDIT’s 10 items cover hazardous alcohol consumption, abnormal drinking behaviour, and problems caused by alcohol consumption and the adverse effects of drinking (Ministry of Health, 2004). Questions from each category include, “How often do you have a drink containing alcohol?”, “How often during the last year have you found that you were not able to stop drinking once you had started?”, and “How often during the last year have you had a feeling of guilt or remorse after drinking?” (See Appendix A). Questions are scored from 0 to 4, with a maximum total score of 40. Larger scores indicate more hazardous patterns of alcohol consumption. The most common cut-off used is 8 (Conigrave, Hall, & Saunders, 1995), with those scoring 8 or higher being more likely to experience social or mental problems (Conigrave, Saunders, & Reznik, 1995).

Three questions were omitted from the present use of the AUDIT (see Appendix A), due to its use as a screen for patterns of alcohol consumption, rather than investigating it as a health issue. However, total scores (minus the three items) were still calculated for this test, with a maximum total of 28. This information was collected in the postal survey.

Smoking. Smoking is an obvious risk factor for poor health (Ministry of Health, 2004), and is associated with increased rates of cancer, heart disease, stroke, and chronic respiratory diseases (Doll, 1998). It is also the “major cause of preventable death in developed countries” (World Health Organisation, 1997). Smoking adversely affects objective health (which can

subsequently affect mental health) and self-reported health. In the 1996/97 NZ health survey, non-Māori males who were current smokers rated their perceived physical and mental health as significantly poorer than never-smokers, on all scales of the SF-36. There were no significant differences between groups for Māori males.

Tobacco consumption questions were modelled on those of the 1996/97 New Zealand Health Survey (Ministry of Health, 1999), and covered current (and if relevant, past) smoking habits (see Appendixes A and B). The average number of tobacco products (from cigarettes, cigars, and pipes) consumed per day was multiplied by 365 days, and then the number of years smoked, to obtain the total amount of tobacco consumed over the person's lifetime. One cigar and one pipe full were considered equivalent to one cigarette. Smoking data were collected in the postal survey.

Trauma. Trauma was included as a covariate due to the known associations between trauma and depression, memory impairment, and perceived health. Higher levels of depression have been reported in those exposed to trauma (Vrana & Lauterbach, 1994), and lifetime trauma has been shown to have adverse effects on the physical health of older adults (Krause, Shaw, & Cairney, 2004). Furthermore, trauma affects the hippocampus, and can thus impair memory (Payne, Nadel, & Britton, 2004).

The Traumatic Events Scale (TES; Flett, Millar, Long, & MacDonald, 1998) is a 12-item self-report scale including questions regarding military combat, sexual abuse, assault, theft by force, accident, natural disaster, and traumatic death or injury of a loved one, with a Yes/No response (see Appendix B). Following data collection, the first question in the TES, "Have you ever been engaged in military combat?" was subsequently dropped from analysis. The author became aware that at least one participant had considered his exposure to a bomb blast "combat," and subsequently answered "Yes" to this question. The TES was administered in the interview.

Procedure

Selection. In July 2001, the NZNTVA chairman sent out a questionnaire with a letter and newsletter explaining the research (see Appendix D) to all veterans on the NZNTVA mailing list (approximately 200), to obtain volunteers for the study and collect various exposure

information. Of the 151 nuclear veterans who responded (approximately a 75% response rate), 63 were excluded due to the criteria explained above, leaving 88 suitable for inclusion.

The present study involved a quasi-experimental design with a stratified random sampling procedure (by North Island region). Exposed potential participants were classified as residing in one of the following regional areas of the North Island: Wellington/Kapiti, Central North Island, Bay of Plenty/Waikato, Auckland, and Northland, to control for any differential environmental radiation exposure. Fifty participants were then randomly selected by region by January 2002. The number of men selected from each region was based on the proportion of the total potential pool. Table 2 shows the number of volunteers, potential participants, and randomly selected participants from each region for the Exposed group. It also shows the mean age of selected participants by region, which ranged from 65.0 to 70.0 years.

Table 2

Number and Mean Age of Exposed Volunteers, Potential Participants, and Selected Participants by Region.

| Code | Region | Volunteers (n) | Potential (n) | Selected (n) | Mean Age (years) |
|------|-----------------------|-------------------|------------------|-----------------|---------------------|
| A | Wellington/Kapiti | 13 | 5 | 3 | 67.0 |
| B | Central North Island | 16 | 12 | 9 | 65.6 |
| C | Bay of Plenty/Waikato | 17 | 13 | 7 | 70.0 |
| D | Auckland | 70 | 46 | 25 | 66.2 |
| E | Northland | 13 | 12 | 6 | 65.0 |
| | Total | 129 | 88 | 50 | |

Five Exposed participants withdrew from the study for various reasons, and the researchers withdrew 1 participant due to a recent diagnosis of Alzheimer's Disease. They were subsequently replaced by another 6, randomly selected from the potential participants list.

Controls were obtained locally in the Central North Island through the RSA (see advertisement and letter to local veterans in Appendix D), with the help of the NZNTVA chairman (see newsletter in Appendix D). Exposed participants assisted in obtaining controls from other

regions through local RSAs and personal contacts. An article inviting participation in the study (see Appendix D) was printed in the general RSA Review in April 2002, and in the Auckland regional RSA Review in August 2002. Due to a poor response from the Auckland area, further attempts to obtain appropriate age-matched controls from this region were made through the RSA Head Office in Wellington (see letter in Appendix D), contact with Field Supervisors in Auckland and Northland, a Second NZ Regiment reunion newsletter (along with a supporting letter from the Regiment's committee chairman; see Appendix D), and the Waiheke Island Rotary. Additionally, community newspapers in Auckland were approached, but were subsequently not utilised, as personnel involved wished to control the information presented, and would not use standardised information agreed to by the ethics committee. The Control volunteers either completed a NZNTVA Control Group Form (see Appendix D), or telephoned the research number and were screened by the Research Officer or assistant (see Massey University Control Group Questionnaire in Appendix D).

Overall, 135 Controls volunteered to participate. Of these, 83 failed to meet the inclusion criteria, leaving a pool of 52 potentials. Table 3 shows the number of Control volunteers, potential participants, and selected participants, as well as the mean age of selected participants by region. Due to the restricted pool of volunteers, Controls could not be randomly selected. The mean age for this group ranged from 64.9 to 67.3 years.

Table 3
Number and Mean Age of Control Volunteers, Potential Participants, and Selected Participants by Region.

| Code | Region | Volunteers (n) | Potential (n) | Selected (n) | Mean Age (years) |
|------|-----------------------|-------------------|------------------|-----------------|---------------------|
| A | Wellington/Kapiti | 4 | 3 | 3 | 65.7 |
| B | Central North Island | 35 | 17 | 16 | 64.9 |
| C | Bay of Plenty/Waikato | 19 | 8 | 7 | 66.4 |
| D | Auckland | 61 | 19 | 19 | 67.3 |
| E | Northland | 16 | 5 | 5 | 66.0 |
| | Total | 135 | 52 | 50 | |

As a result of difficulties obtaining suitable participants, and the attrition of 3 selected Controls, it was not possible to obtain the total number of Controls needed from the Northland and Auckland areas. Therefore, extra local (Central North Island) Controls were used to complete numbers. Table 4 shows the regional make-up of the participant pool.

Table 4
Regional Make-up of Participant Pool for Exposed and Control Groups

| Code | Region | Exposed (n) | Control (n) |
|------|-----------------------|----------------|----------------|
| A | Wellington/Kapiti | 3 | 3 |
| B | Central North Island | 9 | 16 |
| C | Bay of Plenty/Waikato | 7 | 7 |
| D | Auckland | 25 | 19 |
| E | Northland | 6 | 5 |
| | Total | 50 | 50 |

Data collection. The postal survey booklet (see Appendix A) was completed and piloted on the NZNTVA chairman in March 2002. Data collection began locally with the Central North Island participants, and were collected over a 14-month period from May 2002 to July 2003. Each participant was sent a survey (with a personalised letter and Information Sheet; see Appendix E), and given approximately one month to complete it. Follow-up telephone calls were made to encourage completion within this time. Consent Forms (see Appendix E) were attached as part of the survey, and those who chose not to participate returned the survey.

One issue in this research phase was the collection of retrospective covariate data over the life-course, mainly through the postal survey. Berney and Blane (1997) reported that “some types of life-course information can be collected by conventional survey methods with levels of recall accuracy of around 80%” (p. 1520). However, as the detail of the desired information and the time lapse increase, the level of accuracy decreases. To improve recall, participants can construct a time line of important personal life events they remember accurately (such as the year they married), using these as anchors for other events and memories (Fredenreich,

1994). Berney and Blane (1997) found this “life-grid” approach helped older adults recall socio-demographic information from their youth to a “useful degree of accuracy” (p. 1519) when it was compared with archival data recorded 50 years earlier. To reduce recall bias in the current study, participants were sent a Life Events Grid to construct before completing the survey (see Appendix E).

Following receipt of the completed surveys, the research officer travelled to each region to perform the interviews, and collect a blood sample from each participant for chromosomal analysis. Generally, participants were interviewed within one month of returning their survey. Interviews were conducted in the participant’s home, or an office at the local RSA, and took approximately one hour. The research assistant coded all survey booklets and interviews in consultation with the Research Officer and principle investigators. For regions A, B, and C, data collection for the Exposed and Control groups was contiguous. However, for regions D and E, data were collected from the Exposed and then Control participants, due to the difficulty in obtaining Controls.

Analysis

The Statistical Package for the Social Sciences (SPSS Inc., 2002), Version 11.5 was used to analyse all data. The family-wise significance level was .05. Group comparisons were carried out using *t*-tests for independent groups, and Analyses of Covariance (ANCOVAs) were used to assess the impact of the covariates on the dependent measures. Cohen’s *d* statistic (Cohen, 1988) was used to assess effect sizes (ESs) associated with group mean differences. An ES of 0.20 is considered small, 0.50 medium, and 0.80 large (Cohen, 1988, p. 40).

CHAPTER FIVE: STUDY I RESULTS

Participant Demographic Information

The age of participants (at the date of their interview) ranged from 58 to 76¹² years, with the mean age for the Exposed and Control groups being 65.9 years ($SD = 3.10$) and 66.5 years ($SD = 3.75$), respectively. Of the 100 participants, 82% identified as NZ European, 11% as NZ Māori, and 7% as Other ethnicity (English or Irish immigrant). There was a similar proportion of Māori in each group, but all those endorsing “Other” were Controls. The majority of the Exposed participants (72%) had completed less than 3 years, or from 3 to 5 years at secondary school, with 26% holding a trade/professional certificate or diploma. Only 2% had received a university qualification. Of the Control group, 58% had completed less than 3 years, or from 3 to 5 years at secondary school, with 28% holding a trade/professional certificate or diploma. Also, 12% of this group had received a university qualification. The mean gross annual income was \$33,929 and \$48,378 for the Exposed and Control groups, respectively.

Preliminary Analysis

Prior to analysis, the dependent variables were examined using SPSS for accuracy of data entry, missing values, and fit between their distributions and the assumptions of multivariate analysis. The assumption of normality was violated for the distributions of the GDS, six of the SF-36 subscales, and one MAC-S variable for both the Exposed and Control groups. These were not transformed due to difficulties interpreting transformed variables. However, *t*-tests are reasonably robust to violations of this assumption (Tabachnick & Fidell, 2000).

One case in the Control group was a univariate outlier¹³ for the SF-36 Physical Functioning subscale, 2 cases for Role-Physical, 2 for Social Functioning, 1 for Role-Emotional, and 1 for Mental Health. Additionally, 1 case was an outlier for the first global memory question of the MAC-S. There were no univariate outliers in the Exposed group. Using Mahalanobis distance with $p < .001$ (19 degrees of freedom – GDS, 8 SF-36 subscales, 10 MAC-S factors), 1 case in the Exposed group was identified as a multivariate outlier. However, after careful inspection, it was decided to leave these outliers in the analysis.

¹² Due to difficulties acquiring suitable participants for the study, three people fell outside the originally proposed range of 60-75 years.

¹³ For the purposes of the present study, a univariate outlier is defined as a case with a standardised (*z*) score ≥ 3.29 ($p < .001$, two-tailed test; Tabachnick & Fidell, 2000).

Screening Tool

Modified Mini-Mental State Examination (3MS). Distributions for the 3MS scores of both the Exposed and Control groups were very close to normal. Table 5 shows the means and standard deviations (*SDs*) of these scores for both groups.

Table 5
Means (M) and Standard Deviations (SD) for the 3MS

| Scale | Group | | | |
|-----------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Total 3MS | 90.82 | 4.86 | 91.68 | 4.42 |

The means for both groups indicate similar average cognitive ability. An independent-samples *t*-test revealed no significant difference between the two groups, $t(97) = .925$, $p = .36$. The minimum scores were 78 and 81, for the Exposed and Control groups, respectively. As stated earlier, the participant who scored 78 was included due to his score being in the average range for his age and education (according to normative data in Bravo & Herbert, 1997).

Dependent Measures

Geriatric Depression Scale (GDS). The first hypothesis of this study concerned the effects of group membership on depressive symptoms. The Exposed group was expected to exhibit more symptoms, with higher scores on average on the GDS than the Controls. Table 6 shows the means and *SDs* of GDS scores, *t*-test statistics, and Cohen's *d* for the two groups.

Table 6
Means (M), Standard Deviations (SD), t-test Statistics, and Cohen's d for the GDS

| Scale | Group | | | | Sig. | <i>d</i> * |
|-------|----------|-----------|----------|-----------|-------|--------------|
| | Exposed | | Control | | | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| GDS | 3.92 | 3.50 | 0.90 | 0.97 | <.001 | 1.18 ± .42** |

Note. **d* = ES for *t*-tests. ** 95% confidence limits.

As Table 6 shows, the mean GDS score for the Exposed group was over 4 times the mean Control group score. Neither reaches the cut-off score of 5 which would possibly indicate depression. However, 36% of the Exposed participants compared with 0% of the Control participants scored 5 or above. Also, the Exposed group *SD* was over 3 times greater than that of the Control group. When values greater than 3 standard deviations from the mean were removed from the Exposed group, the *SD* was still over 2 times greater than that of the Control group. This difference appears to be the result of greater overall variability in Exposed group scores, rather than a few high scores.

There was a significant difference in scores for the Exposed ($M = 3.92$, $SD = 3.50$), and Control participants ($M = .90$, $SD = .97$), $t(57) = 5.88$, $p < .001$,¹⁴ $d = 1.18 \pm .42$, showing the Exposed participants were exhibiting considerably more depressive symptoms on average than the Control participants. The effect size was very large.

SF-36 Health Survey (SF-36). The second hypothesis concerned the effects of group membership on perceived health-related quality of life. Exposed participants were expected to perceive their health as worse than the Control participants, shown through lower scores on the SF-36 subscales, and a higher score on the Health Transition Item. Table 7 shows the group means and *SDs* for the eight SF-36 subscales, and the reported Health Transition Item.

Table 7 shows the mean scores for the Exposed group were lower than those of the Control group on all eight subscales; Exposed participants perceived their health to be worse than Controls. Similarly, the Exposed group mean for the Health Transition Item was higher than the Control group mean, indicating Exposed participants perceived their current health compared to a year ago to be worse than Controls. Additionally, 30% of Exposed participants compared with 6% of Control participants considered their health to be worse, while 8% of Exposed participants and 14% of Control participants considered their health to be better than it was a year ago. Finally, 62% of Exposed participants compared with 80% of Control participants reported their health was “about the same” as it was one year ago. Again, *SDs* in the Exposed group were generally much larger than those of the Control group, showing greater variability in scores.

¹⁴ All *t*-test statistics reported are from calculation with equal variances not assumed.

Table 7

Means (M) and Standard Deviations (SD) for the SF-36 Subscales and the Reported Health Transition Item

| SF-36 Subscale | Group | | | |
|------------------------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Physical Functioning | 71.00 | 22.45 | 85.90 | 15.87 |
| Role-Physical | 64.50 | 43.48 | 90.50 | 25.20 |
| Bodily Pain | 64.24 | 26.72 | 74.50 | 25.70 |
| General Health | 54.90 | 23.49 | 78.86 | 14.69 |
| Vitality | 58.30 | 23.38 | 77.10 | 12.21 |
| Social Functioning | 81.25 | 24.78 | 92.75 | 16.58 |
| Role-Emotional | 73.33 | 41.51 | 96.00 | 15.99 |
| Mental Health | 77.84 | 21.09 | 90.24 | 10.45 |
| Health Transition Item | 3.20 | .73 | 2.88 | .66 |

Note. Lower scores indicate perceived poorer functioning, except for the Health Transition Item.

The *t*-test statistics and effect sizes for each of the eight subscales are shown in Table 8. There were significant differences between the means of the Exposed and Control groups for each subscale. Exposed participants perceived their health as worse on each factor than Control participants. Effect sizes ranged from reasonably small at .39 for bodily pain, to large values of 1.01 for vitality, and 1.22 for general health.

Table 8

t-test Statistics, Cohen's *d* Values, and Confidence Limits for the SF-36 Subscales

| SF-36 Subscale/ Item | <i>df</i> | <i>t</i> | Sig. | <i>d</i> | Limits |
|----------------------|-----------|----------|-------|----------|--------|
| Physical Functioning | 88.17 | 3.83 | <.001 | 0.77 | ± .41 |
| Role-Physical | 78.58 | 3.66 | <.001 | 0.73 | ± .41 |
| Bodily Pain | 97.85 | 1.96 | .053 | 0.39 | ± .39 |
| General Health | 82.25 | 6.12 | <.001 | 1.22 | ± .42 |
| Vitality | 73.88 | 5.04 | <.001 | 1.01 | ± .42 |
| Social Functioning | 85.55 | 2.73 | .008 | 0.55 | ± .40 |
| Role-Emotional | 63.23 | 3.60 | .001 | 0.72 | ± .40 |
| Mental Health | 71.68 | 3.73 | <.001 | 0.75 | ± .41 |

Memory Assessment Clinics Self-Rating Scale (MAC-S). The final hypothesis concerned the effects of group membership on perceived memory. The perceived memory of those in the Exposed group was expected to be worse than the Control group, shown through lower scores on the MAC-S (on the Ability and Frequency factors as well as the Global Items).

Table 9 shows the Exposed group mean for each factor in the two scales was lower than the Control group mean. On average, Exposed participants rated their memory as worse than Control participants. Also, while the Exposed group mean values were smaller, the *SDs* were all larger than those of the Control group, showing greater variability among scores.

Table 9
Means (M) and Standard Deviations (SD) for the Factors of the MAC-S

| Factor | Group | | | |
|--------------------------------------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| Ability Scale | | | | |
| Remote Personal Memory | 13.82 | 3.29 | 15.16 | 2.40 |
| Numeric Recall | 13.30 | 3.55 | 13.96 | 2.77 |
| Everyday Task-Oriented Memory | 15.34 | 2.81 | 16.04 | 2.19 |
| Word Recall/Semantic Memory | 11.28 | 2.03 | 11.66 | 1.97 |
| Spatial/Topographic Memory | 11.52 | 2.64 | 12.38 | 1.75 |
| Frequency of Occurrence Scale | | | | |
| Word and Fact Recall/Semantic Memory | 16.36 | 3.97 | 17.96 | 3.03 |
| Attention/Concentration | 17.42 | 3.87 | 18.86 | 3.06 |
| Everyday Task-Oriented Memory | 13.32 | 3.56 | 15.16 | 2.38 |
| General forgetfulness | 13.02 | 2.04 | 13.72 | 1.47 |
| Facial Recognition | 10.40 | 2.38 | 11.68 | 2.13 |

Table 10 shows the Exposed and Control group means and *SDs* for the four Global Items. Again, the Exposed group means are lower than those of the Control group on each of the global items, indicating ratings of poorer perceived memory performance by the Exposed group. Exposed participants also appeared to be more concerned on average about their

memory, than Control participants. Ten percent of the Exposed group versus 2% of the Control group rated their memory as poor “compared to the average person their age,” 22% versus 18% rated it as fair, and 68% versus 80% rated it as good or very good. For “memory compared to the best it has ever been,” 58% of the Exposed group versus 50% of the Control group considered their memory to be worse, 40% versus 46% rated it the same, and 2% versus 4% rated it as better than the best it had been.

Table 10
Means (*M*) and Standard Deviations (*SD*) for the Global Memory Items of the MAC-S

| Global Memory Item | Group | | | |
|--|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> |
| In general, as opposed to the average individual, how would you describe your memory? | 3.74 | 0.85 | 3.94 | 0.74 |
| How would you describe your memory, on the whole, as compared to the best it has ever been? | 2.38 | 0.64 | 2.54 | 0.58 |
| Compared to the best your memory has ever been, how would you describe the speed with which you now remember things? | 2.24 | 0.56 | 2.40 | 0.54 |
| How much concern or distress do you feel about your memory at this time? | 3.64 | 1.01 | 4.22 | 0.86 |

With “speed of memory now compared to the best it has ever been,” 70% of the Exposed group compared with 62% of the Control group considered it to be slower, 30% versus 36% rated it the same, and 0% compared with 2% rated it as faster. Finally, in terms of the “amount of concern/distress about memory,” 6% of the Exposed group compared with 2% of

the Control group expressed serious concern, 50% versus 22% had some concern, and 44% compared with 76% had rare concern or no concern at all.

The only Global Item that yielded a significant mean difference was concern or distress about memory, $t(96) = -3.09$, $p = .003$, $d = .62$. However, the other three items had small effect sizes of .25, .26, and .29, respectively. Taken together, these results indicate that there is a small but consistent difference in the way the Exposed participants perceived their global memory compared to Controls.

The t -test results and associated effect sizes for the 10 MAC-S factors can be seen in Table 11. There was a significant difference between the two means for the Remote Personal Memory factor of the Ability scale, with a medium effect size. Even though none of the other Ability factors reached significance, all had small associated effect sizes. Additionally, there were significant differences between the Exposed and Control group means for all five of the Frequency of Occurrence factors. The magnitude of the differences in the means for all of these factors ranged from reasonably small (.39) to medium/large (.61).

Table 11
t-test Statistics and Cohen's d Values for the Factors of the MAC-S

| MAC-S Factor | df | t | Sig. | d | Limits |
|------------------------------------|-------|-------|------|------|-----------|
| Ability Scale | | | | | |
| Remote Personal Memory | 89.64 | -2.33 | .022 | 0.47 | $\pm .40$ |
| Numeric Recall | 92.50 | -1.04 | .303 | 0.21 | $\pm .39$ |
| Everyday Task-Oriented Memory | 92.54 | -1.39 | .168 | 0.28 | $\pm .39$ |
| Word Recall/Semantic Memory | 97.89 | -.95 | .344 | 0.19 | $\pm .39$ |
| Spatial/Topographic Memory | 85.12 | -1.92 | .058 | 0.38 | $\pm .40$ |
| Frequency of Occurrence Scale | | | | | |
| Word & Fact Recall/Semantic Memory | 91.59 | -2.26 | .026 | 0.45 | $\pm .40$ |
| Attention/Concentration | 93.06 | -2.07 | .041 | 0.41 | $\pm .40$ |
| Everyday Task-Oriented Memory | 85.44 | -3.04 | .003 | 0.61 | $\pm .40$ |
| General forgetfulness | 89.23 | -1.97 | .052 | 0.39 | $\pm .40$ |
| Facial Recognition | 96.83 | -2.83 | .006 | 0.57 | $\pm .40$ |

The Ability and Frequency of Occurrence factors were condensed to produce one total score for each scale (an acceptable way of analysing the MAC-S; Feher, Mahurin, Inbody, Rogers, Crook, & Pirozzolo, 1989, as cited in Crook & Larrabee, 1990) in order to perform analyses of covariance (see below). For the Ability scale, the mean scores were 65.26 ($SD = 12.59$) for the Exposed group, and 69.20 ($SD = 8.56$) for the Control group. The difference between the means approached significance, with a moderately small effect size, $t(86) = 1.83$, $p = .071$, $d = .37$. For the Frequency of Occurrence scale, the mean scores were 70.52 ($SD = 14.26$) for the Exposed group, and 77.38 ($SD = 9.91$) for the Control group, $t(87) = 2.79$, $p = .006$, $d = .56$, showing the Exposed group to have poorer self-reported memory on the Frequency of Occurrence items.

Preliminary Analysis of Covariates

Prior to analysis, covariates were examined using SPSS for accuracy of data entry, missing values, and fit between their distributions and the stringent assumptions underlying ANCOVA. Variables for both groups were examined separately. The distributions of the covariates education, income, alcohol consumption, smoking, and trauma violated the assumption of normality for both the Exposed and Control groups (while age was not affected). However, they were not transformed due to noted difficulties with interpreting transformed variables, which is an accepted option (Tabachnick & Fidell, 2000). The single missing values for income and the AUDIT score were replaced by the variable mean for the relevant group. There were two univariate outliers, one for income and one for the AUDIT, both in the Control group. These values were left in the data file for analysis. No cases were identified as outliers using Mahalanobis distance with $p < .001$ (5 degrees of freedom – GDS, Physical Functioning, Mental Health, Ability scale total, and Frequency scale total). Descriptive statistics were calculated to examine the covariates, and determine their suitability.

Living situation. Table 12 shows the different living situations of participants in each group. These were very similar in both groups; therefore, this variable was dropped as a covariate.

Age. As previously reported, the mean age was 65.9 years ($SD = 3.10$) and 66.5 years ($SD = 3.75$) for the Exposed and Control groups, respectively. While there was only a marginal difference between the means, making it unnecessary to control for this variable, age was included as a covariate as a precaution.

Table 12
Living Situation of Participants by Group

| Living Situation | Exposed (%) | Controls (%) |
|---------------------------------------|-------------|--------------|
| With Spouse/Partner only | 68 | 76 |
| With Spouse/Partner & Family | 12 | 4 |
| With Relatives | 2 | 0 |
| Alone | 10 | 16 |
| With Other Adults | 2 | 4 |
| Rest Home/Nursing Home/Veterans' Home | 2 | 0 |
| Other | 4 | 0 |
| Total | 100 | 100 |

Education. The education data in this study were categorical not continuous, due to the way they were measured. To control for any education effects, the data were recoded into the categories of no school qualifications, school qualifications, and post-school qualifications. Education was then used as a second independent variable in the analyses of covariance. Table 13 shows the educational make-up for each group.

Table 13
Educational Make-up of the Exposed and Control Groups

| Highest Education | Exposed (%) | Controls (%) |
|---|-------------|--------------|
| Less than 3 years at high school | 52 | 36 |
| From 3 to 5 years at high school | 20 | 22 |
| School qualifications, UE, and above | 0 | 2 |
| Trade certificate, Professional certificate, or diploma | 26 | 28 |
| University degree, diploma, or certificate | 2 | 12 |

Table 13 shows that a greater proportion of the Control group (12% compared to 2%) obtained a university qualification. In contrast, a greater proportion of the Exposed group (52% compared to 36%) achieved less than 3 years at high school. The Control group appeared more highly educated on average than the Exposed group, leading to the need to control for these effects.

Income. The mean income for the Exposed group was \$33,929 (SD = \$15,089), and for the Control group, \$48,378 (SD = \$31,074). The Exposed group mean income was smaller by almost \$15,000 than that of the Control group, $t(71) = 2.96$, $p = .004$. Income was thus included as a covariate.

Alcohol consumption. The mean AUDIT scores were 2.20 (SD = 2.39) for the Exposed group, and 2.20 (SD = 3.10) for the Control group. While the average drinking habits for both groups appeared to be the same, the Control group had a larger range (16) on the AUDIT than the Exposed group (10). Thus, this variable was included as a covariate. Two Exposed participants (4%) scored equal to or higher than the cut-off of 8 on the AUDIT (with total scores of 9 and 10), as did 3 Control participants (6%, with total scores of 8, 9, and 16).

Smoking. The mean amount of lifetime total tobacco smoked was 192,596 units for the Exposed group, and 97,449 units for the Control group. Clearly, there was a large difference between the two groups, with the Exposed group having consumed almost twice as much tobacco as the Control group, $t(90) = 3.28$, $p < .001$. This result, and the knowledge that current and ex-smokers tend to rate their physical and mental health as poorer than non-smokers (Ministry of Health, 1999) resulted in smoking being a covariate.

Trauma. The mean TES scores were 1.88 (SD = 1.55) for the Exposed group, and 1.22 (SD = 1.18) for the Control group. However, due to confounding, the first item, "Have you ever been engaged in military combat?" was dropped from analysis. The subsequent mean scores were 1.56 (SD = 1.49) for the Exposed group and .94 (SD = 1.11) for the Control group, $t(92) = 2.40$, $p < .05$, with the Exposed group experiencing more trauma on average than the Control group. With Item 1 removed, the result remained significant at the .05 level. Therefore, TES scores were included as a covariate.

Analyses of Covariance

In performing analyses of covariance only the Physical Functioning and Mental Health subscales of the SF-36 were used. According to a researcher from the Ministry of Health, these “perform well as summary measures of physical and mental health” (M. Tobias, personal communication, December, 2004). Additionally, the factor items of the MAC-S Ability and Frequency of Occurrence Scales were collapsed into a total score for each scale. Preliminary checks were conducted to ensure there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariates.

GDS. A two-way between-groups analysis of covariance was conducted to compare scores on the GDS for the Exposed and Control groups. The independent variables were Group and Education (no school qualifications, school qualifications, and post-school qualifications), with GDS scores as the dependent variable. Age, income, alcohol consumption, smoking, and trauma were used as the covariates. The only assumption violated was homogeneity of variances.

When the effects of the covariates were removed, the difference between the Exposed and Control group means on the GDS remained significant, $F(1,89) = 16.99$, $p < .001$, partial $\eta^2 = .16$ (Table 14 shows the mean comparisons). The main effect for Education and the interaction effect were not significant. Trauma had the highest contribution, explaining 9% of the variance in GDS scores. Each of the other covariates accounted for less than 1.5% of the variance.

Table 14
Unadjusted and Adjusted Means and Standard Errors for the GDS

| Result Type | Group | | | |
|--------------------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> |
| Unadjusted (N=100) | 3.92 | 0.49 | 0.90 | 0.14 |
| Adjusted (N=100) | 3.59 | 0.42 | 1.07 | 0.40 |

Table 14 shows that the effect of the five covariates was not very great; the adjusted means do not differ greatly from the unadjusted means. The Exposed group’s adjusted mean was lower

than the original mean, showing slightly less depressive symptomatology, while the Control group's mean was higher, showing slightly greater depressive symptomatology.

SF-36. A two-way between-groups analysis of covariance was conducted to compare scores on the Physical Functioning subscale of the SF-36 for the Exposed and Control groups. The independent variables were Group and Education, and the dependent variable was scores on the Physical Functioning subscale. Age, income, alcohol consumption, smoking, and trauma were used as the covariates.

When the effects of the covariates were removed, the difference between the Exposed and Control group means on the Physical Functioning subscale was non-significant, $F(1,89) = 3.02$, $p = .09$, partial $\eta^2 = .03$. The main effect for Education and the interaction effect were not significant. Smoking had the largest effect on the outcome, accounting for 4.2%. Trauma accounted for 2.7%. Each of the other covariates accounted for 2% or less of the outcome.

Table 15

Unadjusted and Adjusted Results for the Physical Functioning Subscale of the SF-36

| Result Type | Group | | | |
|--------------------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> |
| Unadjusted (N=100) | 71.00 | 3.18 | 85.90 | 2.24 |
| Adjusted (N=100) | 74.87 | 3.15 | 82.91 | 3.00 |

Table 15 shows that again, the adjusted means are very close to the unadjusted means, with the covariates not having much effect. The mean of the Exposed group rose slightly, indicating marginally better physical functioning, and the mean of the Control group dropped, indicating marginally poorer physical functioning.

A two-way between-groups analysis of covariance was also conducted to compare scores on the Mental Health subscale of the SF-36 for the Exposed and Control groups. The independent variables were Group and Education, with the dependent variable being scores on the Mental Health subscale. Age, income, alcohol consumption, smoking, and trauma were used as the covariates. The only assumption violated was homogeneity of variances.

When the effects of the covariates were removed, the difference between the Exposed and Control group means on the Mental Health subscale remained significant, $F(1,89) = 4.21, p = .04$, partial $\eta^2 = .05$. The main effect for Education and the interaction effect were not significant. Trauma had the largest effect on the outcome, accounting for 12% of the variance. The other covariates each accounted for less than 3% of the variance.

Table 16

Unadjusted and Adjusted Results for the Mental Health Subscale of the SF-36

| Result Type | Group | | | |
|--------------------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> |
| Unadjusted (N=100) | 77.84 | 2.98 | 90.24 | 1.48 |
| Adjusted (N=100) | 80.04 | 2.61 | 87.89 | 2.48 |

As Table 16 illustrates, the means were not substantially affected by the covariates. The mean for the Exposed group increased slightly, indicating worse mental health while the mean for the Control group decreased slightly, indicating better mental health.

MAC-S. A two-way between-groups analysis of covariance was conducted to compare scores on the Ability scale of the MAC-S for the Exposed and Control groups. The independent variables were Group and Education, with the dependent variable being Ability scores. Age, income, alcohol consumption, smoking, and trauma were the covariates.

When the effects of the covariates were removed, the difference between the Exposed and Control group means on the MAC-S Ability scale remained non-significant, $F(1,89) = .63, p = .43$, partial $\eta^2 = .01$. The main effect for Education and the interaction effect were not significant. Trauma had the largest effect on the outcome, but this was very small, at 1.8%. The other covariates each accounted for less than 1% of the variance. Table 17 shows the mean comparisons.

Another two-way between-groups analysis of covariance was run to compare scores on the Frequency of Occurrence scale of the MAC-S for the Exposed and Control groups. The independent variables were Group and Education, with the dependent variable being

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Frequency scores. Age, income, alcohol consumption, smoking, and trauma were the covariates. The only assumption violated was homogeneity of variances.

Table 17
Unadjusted and Adjusted Results for the MAC-S Ability Scale

| Result Type | Group | | | |
|--------------------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> |
| Unadjusted (N=100) | 65.26 | 1.78 | 69.20 | 1.21 |
| Adjusted (N=100) | 66.19 | 1.80 | 68.30 | 1.72 |

When the effects of the covariates were removed, the difference between the Exposed and Control group means on the MAC-S Frequency scale was non-significant, $F(1,89) = 1.52$, $p = .22$, partial $\eta^2 = .02$. The main effect for Education and the interaction effect were not significant. Smoking was the highest contributor, accounting for 3.8% of the variance. Each of the other covariates accounted for 2% or less of the variance. Table 18 shows that the adjusted means barely differ from the unadjusted means.

Table 18
Unadjusted and Adjusted Results for the MAC-S Frequency of Occurrence Scale

| Result Type | Group | | | |
|--------------------|----------|-----------|----------|-----------|
| | Exposed | | Control | |
| | <i>M</i> | <i>SE</i> | <i>M</i> | <i>SE</i> |
| Unadjusted (N=100) | 70.52 | 2.02 | 77.38 | 1.40 |
| Adjusted (N=100) | 72.14 | 2.01 | 75.79 | 1.92 |

In summary, the ANCOVAs run on each of the dependent measures demonstrated that the effects of age, education, income, alcohol consumption, smoking, and trauma were collectively very small. There were only minor changes in mean scores once the effect of these covariates (and the independent variable of education) was removed.

CHAPTER SIX: STUDY I DISCUSSION AND CONCLUSIONS

The aim of the present study was to discover whether the NZ nuclear test veterans were experiencing chronic stress as a result of their exposure to nuclear radiation. This was expected to manifest in more depressive symptomatology (greater GDS scores), poorer perceived health (lower SF-36 scores), and poorer self-reported memory (lower MAC-S scores) than the Control group. The results showed that all three of these hypotheses were supported. The Exposed group mean GDS score was higher than the mean for the Control group. Similarly, the Exposed group means on the eight subscales of the SF-36 were all lower than those of the Control group. Finally, the Exposed group means for the Remote Personal Memory factor of the Ability Scale, and all five factors of the Frequency of Occurrence Scale of the MAC-S were lower than the Control group means. While the remaining four factors of the Ability Scale did not reach significance, small effect sizes were present for each. These differences remained for depressive symptoms and perceived mental health when the covariates of age, education, income, alcohol consumption, smoking, and previous trauma were controlled for. However, the difference between the mean scores of the two groups on the Physical Functioning SF-36 subscale and the Frequency of Occurrence scale became non-significant. Despite this, small effect sizes were present for Group. Thus, in as much as depressive symptoms, perceived health, and perceived memory deficits can be taken as symptomatic of chronic stress, it is clear that the NZ nuclear veterans were worse off in this respect than their non-exposed counterparts.

Depressive Symptoms

The mean GDS score for the Exposed group was higher than that of the Control group, showing the Exposed group was experiencing greater depressive symptomatology on average than the Control group. This result is consistent with studies of nuclear accident populations. Chinkina and Torubarov (1991) found that participants with Acute Radiation Syndrome from the Chernobyl accident had adverse mental states characterised by high levels of depression. The authors believed this was a direct result of the stress of the disaster. Similarly, Havenaar et al. (1999) found residents in the direct vicinity of Chernobyl (6 to 7 years post-accident) to have higher self-reported levels of psychological distress than a control group 1000 km away (measured by the General Health Questionnaire, which has a depression subscale; LoBello, 1998). (However, no differences were found between the two groups in the prevalence of

psychiatric disorders.) Again, the researchers concluded that these symptoms resulted from psychological stress rather than radiation exposure. Remennick (2002) found levels of depression to be higher in Chernobyl exposees who immigrated to Israel than in non-exposed immigrants. Similarly, Green et al. (1994) found depression symptoms had one of the two highest symptom ratings on the Psychiatric Evaluation Form by residents of Fernald at both their “worst” and the current time of assessment, even though these ratings decreased over time. Additionally, the present findings are consistent with Green et al.’s (1994) hypothesised syndrome, the Informed of Radioactive Contamination Syndrome, which includes depression as one of its characteristics. Furthermore, Baum et al. (1983) found that residents of the TMI area showed greater depressive symptomatology on the SCL-90-R and the BDI, than the three control groups. (These results did not reach statistical significance. However, numbers in each group were small, $n=24$ to 38). Once again, the researchers proposed chronic stress as the reason for these findings. Also, comparing this result to a sample of NZ war veterans ($n=1249$, mean age=79 years; Alpass et al., 2003; Blakey, 2007) indicates greater depressive symptomatology in the nuclear veterans.

The present results are consistent with Lazarus’ (1966) theory that disturbed affect indicates a person is experiencing stress. The explanation provided for depression is that this emotion results from a secondary appraisal of hopelessness, where the individual believes that nothing can be done to prevent or reduce harm. This appraisal results in a coping process of inaction, and depression is the resulting affective state (Lazarus, 1966).

Van den Bout et al. (1995) presented a psychosocial stress model of pathways linking stress to illness behaviour. After a nuclear accident, individuals realise it may be possible to develop a radiation-related disease, and then become sensitive to their physical sensations, labelling these as symptoms. They believe radiation has produced these symptoms, and then diagnose symptom constellations as a disease. This results in anxiety and depressive reactions, as people worry about their health and that of their children. It may be that the depressive symptoms in the NZ veterans has developed through this pathway, as a result of the stress following their exposure.

Presenting a physiological explanation, Claes (2004) reports there is a general trend in the stress-depression literature that abnormalities of the HPA axis are present in those with depression. Chronic stress causes the excessive and chronic secretion of CRH (corticotropin-

releasing hormone) resulting in impairment of the HPA system. Secretion of CRH is not adequately suppressed by the normal negative feedback loop, resulting in high cortisol levels. If this elevation is chronic, pathophysiological changes may be produced in the HPA axis placing the individual at risk for depression and other disorders (Tafet & Bernardini, 2003). These high cortisol levels have been observed in depressed individuals. There is also a proposed link between high cortisol levels and the decreased activity of serotonin, a known feature of depression (McEwen, 1995; Tafet & Bernardini, 2003). Increased cortisol levels may decrease the number of serotonin receptors, and thus healthy serotonin levels, contributing to the development of depressive symptomatology (Tafet & Bernardini, 2003).

Perceived Health

The Exposed group means on the eight subscales of the SF-36 were all lower than those of the Control group, showing that Exposed participants perceived their physical and mental health to be poorer on average than Control participants. This is consistent with the research of Havenaar et al. (1999) who found subjective health to be poorer in Chernobyl exposees than in controls. Similarly, Collins and Bandeira de Carvalho (1993) found that radiation-exposed residents of Goiania, Brazil had a lower level of perceived overall health than a control group. They concluded these exposees were experiencing stress as a result of their exposure, characterised by uncertainty about their future health, a fear of cancer, and a diminished quality of life. Further, Remennick (2002) found the self-reported mental and somatic health of Chernobyl survivors to be worse than that of controls.

The mean Control group scores for each SF-36 subscale except Bodily Pain are higher than those for men 65 years and older in the NZ Health Survey (Ministry of Health, 1999, 2004). Conversely, the Exposed group mean scores on the subscales are lower than the general population of men this age. Over the long term, veterans appear to have more health problems than those who have not performed military service (Adena, 1989). While this is contrary to what might be expected from the healthy soldier effect, if this is the case, we would expect various health issues to exist in both groups of veterans; they would have lower means on each subscale (i.e., more health problems) than the general population of similar-aged men. However, the Exposed group still generally perceives their health to be worse than the Control group. The nuclear veterans also have lower mean scores for Bodily Pain, General Health, Vitality, and Mental Health than an older sample of NZ war veterans (n=approximately 650; Blakey, 2007; only scores on the Physical Functioning and Role-Physical subscales were

substantially higher in the nuclear veterans). All of the Controls' scores were higher than this sample.

It is possible that the poor self-reported health of the nuclear test veterans can be attributed to altered or distorted perception. Lazarus (1966) believes that changes in the adequacy of cognitive functioning resulting from stress can include affected perception and the misinterpretation of reality. Living with the ongoing stress of ambiguity and uncertainty about their exposure and health, and the adaptive dilemmas faced seem feasible contributors to distorted perception. Certain belief systems they may hold can be a lens through which they see the world (Vyner, 1988); if they believe they have been harmed by radiation, this almost certainly will influence their perception of both their mental and physical health.

Experiencing depressive symptoms could also influence the veterans' perception. Beck's (1967) cognitive triad characterises depression as a negative view of self, the world, and the future. In a sense, there is a negative distortion of reality. Consequently, it could be assumed that one's health would also be perceived negatively, or at least worse than it actually is, especially if there were other grounds for concern. Alternatively, if the men are in a state of anxiety, they may view the self as an object of threat, the world as the locus of threat, and expect threat in the future (Beck, 1967). This perception, combined with existing concern over their health, may cause them to be hypersensitive to any problems or perceived impairment.

Perceived Memory

Means for the Remote Personal Memory factor of the MAC-S Ability Scale and all five factors of the Frequency of Occurrence Scale were lower for the Exposed group than for the Control group. While the remaining four factors of the Ability Scale did not reach significance, small effect sizes were present for each. The finding that self-reported memory problems were greater in Exposees compared with Controls is consistent with previous research examining cognitive functioning. Chinkina and Torubarov (1991) found individuals with Acute Radiation Syndrome had reduced cognitive ability. Similarly, Three Mile Island residents performed worse on cognitive tasks (proof-reading and embedded figures) than three control groups (Baum et al., 1983). Exposed residents of Goiania also showed worse cognitive performance on a "maze" test than a control group (Collins & Bandeira de Carvalho, 1993). These results provide support for Lazarus' (1966) theory that stress affects the adequacy of cognitive functioning. The present results show this decline in cognitive functioning can be specifically

related to (self-reported) memory deficits. The Exposed group's results were very similar to those of a sample of NZ war veterans (n=1249; Alpass et al., 2003). It is possible these men were also experiencing ongoing stress related to their war experiences.

The probable chronic stress experienced by many NZ nuclear veterans over the past (approximately) 20 years may have contributed to memory impairment. The hippocampus, which plays a key role in memory, is very sensitive to the circulation of cortisol (McEwen, 1995). In chronic stress situations, where cortisol levels remain high over a long period of time, the functioning of neurons in the hippocampus is disturbed, and neuron loss can occur (Akil & Morano, 1996; McEwen, 1995). This can result in long-term memory impairment. Chronic stress is also known to disrupt working memory (Bremner et al., 1996). The MAC-S contains items measuring both short and long-term memory. While loss of neurons in the hippocampus is known to occur with ageing (McEwen, 1995), in the present study age did not appear to contribute significantly to MAC-S scores in the Exposed group. It appears likely, then, that the self-reported memory impairment observed in the nuclear veterans results from the chronic stress they are under.

Theoretical Interpretation

It seems that the NZ nuclear test veterans investigated in the current study are experiencing chronic stress. This is manifested in disturbed affect (depressive symptoms), poorer perceived health, and perceived memory impairment. But what is the explanation for this reaction? What mechanisms are at work to produce these stress responses?

Psychological Mechanisms

Primary and secondary appraisal. Within Lazarus' (1966) stress and coping paradigm, the stress the veterans are experiencing appears to come from two sources. Firstly, they appraise their situation as threatening. They have been exposed to nuclear radiation and have become aware of the dangers of this over time. Thus, they anticipate future harm – radiation-related illness or disease. This has present cues, such as unexplainable and undiagnosable symptoms, and the perceived premature deaths of other nuclear veterans from cancer. The threat of illness has personal significance as it thwarts the veteran's motive to live a healthy and long life. This primary appraisal of threat produces stress.

It must be clarified here that the initial bomb test itself is not perceived as a threat, because at the time of the exposure many of the men believed their health was not in any danger (R. Sefton, personal communication, January, 2004). It is the perceived threat of illness that has arisen over approximately 20 years as they have been informed (usually by the media) of the dangers of radiation exposure, and considered the potential harm to themselves.

Secondly, stress is produced through secondary appraisal, in which individuals determine which coping strategy they will use from those they have available. If this strategy is successful, it will allow individuals to adapt to and reduce the threat, along with their stress reactions to it (Vyner, 1988). According to Vyner (1988), information-seeking is a common mode of coping behaviour used. Having information can enable people to adapt to and have a sense of control over a threatening situation. However, the very nature of the exposure experience is ambiguous and uncertain. The inherent uncertainty resulting from medical and environmental invisibility is intensified by the fact that much of the information needed to successfully adapt is impossible to obtain (Vyner, 1988). Thus, adaptation cannot take place, and the men may live in an ongoing state of stress.

Adaptation and hypervigilance. Vyner (1988) presents a general theory of the stress response to invisible contaminant exposure. Concerns about being exposed may result simply from the knowledge of exposure, or because an individual has developed an illness over the years post-exposure. Attempts to adapt in this situation may include obtaining information about the health effects of radiation, and being vigilant about one's health. However, without the necessary empirical information to adapt successfully to a threat, individuals may appraise their situation on the basis of whatever information is available, including the knowledge of past exposure to radiation. Attempts to adapt then result in the construction of non-empirical belief systems to appraise and adapt to exposure, which may reduce stress by resolving the ambiguity of their situation. A self-diagnostic belief system may develop, characterised by the perception that exposure to the contaminant was dangerous, had serious effects on the veteran's health, and caused any major illnesses.

Attempts to adapt can also result in hypervigilance about health as a form of protection from the threat of illness (Vyner, 1988). This can become a preoccupation or obsession with that threat. The continual lack of mastery in this situation can lead to fixation with the effects of the exposure on one's health. According to Vyner, this fixation to the "mental representation"

(Vyner, 1988, p. 110) of the experience can become a traumatic neurosis, or PTSD. The exposed person lives in “an imagery of the world and self in which [he or she] has been contaminated and harmed by the exposure” (p. 120). This state does not reflect the actual exposure event, but is described by the non-empirical belief system that has developed (Vyner, 1988). (However, for reasons explained in the Introduction, it is unlikely that the nuclear test veterans are experiencing PTSD.) Accordingly, coping in this case becomes more pathological (Lazarus, 1966).

Radiation Response Syndrome. As previously described, Vyner (1988) also presented the theory that the nuclear test veterans he interviewed had developed Radiation Response Syndrome (a belief system based on a self-diagnostic belief, and behavioural symptoms expressing this). The development of this syndrome was the third of three phases characterising the distinctive post-test experience. In the asymptomatic phase, the veterans were generally healthy and lived normal lives. They had no major illnesses that were undiagnosable or untreatable. In the symptomatic phase, they developed illnesses their doctors could not diagnose or treat, which became a major part of their lives. They had questions about their illness that could not be answered, but did not believe radiation had harmed them, or was related to their current health problems. After the Department of Defense or the media informed the veterans of the dangers of radiation exposure, the syndrome phase then developed, consisting of four symptom processes: (1) discomfort with the mystery surrounding their exposure; (2) preoccupation with the radiation’s effects on their health; (3) a number of identity conflicts as a result of life changes subsequent to exposure; and (4) the development of a belief system about radiation.

The belief system is based on the self-diagnostic belief in having or developing a radiation-caused illness, which Vyner believed the veterans developed to resolve the mystery of their exposure and obtain closure. This enabled them to adapt to their threatening situation. Several themes are contained in this belief system, including a veteran’s belief that he is dying of a radiation-related disease, and that he will die early, disrespect for the medical profession, concern about the health of future generations, anger at the government, guilt at this anger, the belief in being used as guinea pigs, and that others think they are crazy (Vyner, 1988). The veteran sees the world through this belief system, and acts it out through a preoccupation with his health, and a number of identity conflicts. Preoccupation with health and radiation exposure can result in a loss of social relationships, sometimes including marriage, and

difficulty keeping a job. The identity conflicts involve moving from being healthy to unhealthy, from perceiving oneself as patriotic to perceiving oneself as unpatriotic, and from being socially connected to isolated (Vyner, 1988). This syndrome may characterise the stress response, contributing to the manifestations observed in the present study.

Relevant to the self-diagnostic belief, and non-empirical belief systems in general, is the assertion from Lazarus (1966) that belief systems become more central in determining appraisal in situations of high ambiguity. The purpose of these belief systems, as previously described, is to enable adaptation to highly ambiguous, threatening situations. He also states that in ambiguous situations, there is “maximum latitude for idiosyncratic interpretations” (p. 118), that is, the interpretation will be based on the individual’s psychological make-up. Thus, the development of a self-diagnostic belief is more likely in the ambiguous situation of exposure to ionising radiation, but is dependent upon an individual’s particular personality characteristics.

Other Aspects of Chronic Stress

The literature suggests that high anxiety for those exposed to nuclear radiation is a prominent characteristic. It seems plausible that the chronic stress the nuclear test veterans are under could be a state of ongoing anxiety about their health. According to Lazarus (1966) “Anxiety is the inevitable initial accompaniment of being threatened” (p. 322). Thus, it can result from both primary and secondary appraisal (if the latter can take place). When a threat is ambiguous (i.e., there is uncertainty about what can be done to reduce the appraised danger) or a person cannot identify an “agent of harm” (p. 174), no direct action can be taken to protect oneself. Because there is no clear evidence that a reaction of attack, avoidance, or appraisal of hopelessness is warranted, the anxiety is not transformed and remains the primary affect or reaction experienced. When this is the case, Lazarus states that “self-initiated defences which distort the object situation” (p. 322) become necessary. In the case of the nuclear veterans, this may include the non-empirical belief system, and in particular, the self-diagnostic belief. It is possible these are distortions of a situation in which radiation exposure has not resulted in ill health effects. The harm to health can never be certain due to biological invisibility (lack of a biological marker for radiation damage).

Another factor that may be contributing to the stress responses of the nuclear veterans is their anger at the government for allowing their exposure and not fully acknowledging the risks

involved, and the belief they have not been adequately compensated for this service to their country. Many of the NZ nuclear veterans believe they were used as “guinea pigs,” and were not properly informed of the dangers, nor protected from them by their government (R. Sefton, personal communication, January, 2004). Many are trying to obtain compensation from the NZ and British governments for illnesses they believe were caused by radiation. However, medical invisibility makes it difficult for these governments to acknowledge radiation-related health effects (Vyner, 1988).

Limitations

Any applied investigation such as the present one has limitations, some severe. In hindsight, some limitations could perhaps have been avoided, but others are an inherent feature of being required to collect data in the field using less than perfect measures.

Procedural Issues

One of the procedural issues in carrying out this research was the lack of random selection in the Control group. There were two reasons for this. First, it was extremely difficult to obtain suitable Control participants, particularly from the Auckland region. It is possible that veteran politics prevented other armed service veterans from participating (non-nuclear veterans may not consider these Exposed men as veterans because they did not participate in active combat). Some men declined because of the need to have a blood sample collected. Additionally, several volunteers were excluded due to the stringent exclusion criteria, substantially reducing the potential pool of participants. Thus, while random selection could be used to select Exposed participants, it was not possible to randomly select Controls. All suitable men who volunteered were included to complete group numbers.

Secondly, with a lack of potential Control participants, keeping to the exclusion criteria was difficult. Controls were included who should have been rejected, for instance, British immigrants, one participant with no compulsory military training, and one with no armed service experience. Also, results showed the Controls differed from the Exposed group on a number of factors. The first was education, known to influence mental and physical health. The nature of volunteers is that they are altruistic and more likely to have a higher level of education. Also, this may have caused them to make more informed lifestyle choices regarding their mental and physical health. The Control group also had a greater mean income

than the Exposed group, another indicator of socioeconomic status known to affect health (see Method section). Thirdly, Control group members had experienced fewer traumatic experiences on average over their lifetime than the Exposed group, and this could have confounded results on all three measures.

While aiming to exclude those who had been involved in military combat, this was not always possible. Sixteen Exposed and 14 Control participants answered “Yes” to this question on the Traumatic Events Scale. The results could have been confounded by combat exposure (in both groups), known to be an extremely traumatic experience, and as such would influence scores on all measures. However, as trauma was controlled for in the ANCOVAs, and made only small contributions to the variance, it is unlikely this factor had any major effect.

Design Faults

A number of design faults were present in the current study. The major issue was the use of self-report measures to collect information. Subjective data can be coloured by perception and memory, with the potential for biased results. In this study it was not possible to access medical records for objective verification. Additionally, memory problems could result in the information being unreliable. It is essential that future studies utilise objective memory tests instead of, or in addition to, self-report measures.

Furthermore, the data of the nuclear test veterans may be biased. With the desire to receive government recognition and compensation for their exposure, it may have been in their interest to portray their health negatively. There is no way of partialling out this kind of bias (which could be entirely unconscious) from the responses that would be provided if the men have developed the belief systems described above.

Relating to the specific tests used, because this was an applied study it would have been useful to use more clinical and objective measures of the three constructs of depression, self-reported health, and memory. Sheikh and Yesavage (1986) state the GDS is “not a substitute for observer-rated scales such as the HRS-D [Hamilton Rating Scale for Depression] or for in-depth interviews” (p. 171), and that because of the subjectivity of the scale, it should not be used for diagnostic classification. Additionally, various subtests of the Fourth Edition of the Wechsler Adult Intelligence Scale (WAIS-IV), such as *Arithmetic* and *Digit Span*, or the Third Edition of the Wechsler Memory Scale (WMS-III) could have served as more appropriate and

objective memory tests than the MAC-S. Despite these issues, however, Zelinski, Gilewski, and Thompson (1980) report that self-reported memory issues correlate reliably with memory performance in healthy older adults.

Collection of smoking and alcohol consumption data also raised issues. Information regarding participants' current smoking habits and smoking history was collected, but only information regarding participants' current alcohol consumption was collected; there is no knowledge of their drinking history. Thus, there was no way of judging whether past drinking behaviour was of concern, and could have affected their memory, and current physical and mental health status. Also, the self-reported smoking data were not reliably measured due to reliance on participants' memory of when they began smoking, and their lifetime smoking habits. It is therefore unlikely that the information received was completely accurate.

Additionally, the small sample size was a limitation. As this was a pilot study, only 50 participants could be included in each group due to strict selection criteria, a limited budget, and time constraints. Thus, power was restricted in the statistical analysis. This was shown in the sizeable effect sizes reported, even though some results did not reach significance. If effect sizes had not been calculated, it may have seemed there were no differences between the two groups on many of the memory factors. Had the sample been larger, these effects would have produced statistically significant outcomes.

The final, and perhaps most substantial limitation is the fact that the data collected and measures used were not specifically informed by the literature of this area. The measures were selected for the study to parallel the work of Alpass et al. (2003) and Blakey (2007) on New Zealand war veterans. However, while this sample shared similar characteristics (demographic features and possibly exposure to a toxic substance if they served in Vietnam), their experience was considerably different to that of the nuclear test veterans, particularly as it involved combat exposure. Using the SCL-90-R, frequently used in previous studies, would have enabled direct comparison with studies of other radiation exposure populations.

Additionally, while the constructs measured of depression, perceived health, and perceived memory seem appropriate given previous research, a number of other important factors have been highlighted, and data collected on these would have been very valuable. These factors are potential mediators of the person–environment transaction in the production of general

and toxic exposure-related stress, and include social support (Green et al., 1994; Lazarus, 1966, 1999; Thoits, 1995), a sense of control (Lazarus, 1966, 1999; Collins, 1992; Vyner, 1988), coping strategies (Lazarus, 1966, 1999; Green et al., 1994), and self-efficacy (Lazarus, 1966, 1999). However, with limited time and a limited budget, it was not possible to collect more data. In any event, this may have been unwise as the survey and interview used in the present study took up a considerable amount of participants' time.

Implications

Various researchers contributing to the literature on ionising radiation exposure have made recommendations regarding factors that could help these populations adapt to and cope with their situation. These include increased information (Collins, 1992) and understanding (Prince-Embury, 1992) about the exposure event, greater perceived control (Collins, 1992), and the need for veterans to make sense of their situation or to “find meaning” in their experiences (Murphy et al., 1990; Garcia, 1994). So how might this be done? Havenaar et al. (1999) consider the role of doctors to be vital in helping exposees cope with the stress. The development of services to provide support and education to both the exposed groups and health professionals is also recommended.

Vyner (1988) describes a need for doctors to avoid Dysfunctional Medical Relationships (DMRs). A DMR is a relationship between a doctor and a patient who has been exposed to an invisible contaminant (and is concerned about the health effects), consisting of two key elements: 1) Patients feel their medical needs are not being fully addressed, and 2) the doctor's approach is making the psychological effects of the exposure worse (iatrogenesis). This is usually because doctors take a *treatment approach* to apparent illnesses, as they have been trained to do. However, nuclear test veterans may have undiagnosable symptoms with uncertain pathology. Or, they may believe they have been harmed by radiation and that an illness may be developing internally, despite there being no current visible signs. Thus, they need their doctor to take a *preventive vigilance* approach, as they themselves are doing. This involves the doctor being genuinely concerned about the potential health effects of exposure, and understanding and respecting patients' needs to be continually vigilant about their health (Vyner, 1988).

In the past, the psychological stress nuclear veterans have experienced subsequent to exposure may have been exacerbated, due to the pronouncement by doctors that they are hypochondriacs (Vyner, 1988). In this situation, the exposed men feel their doctors do not share their concern about being vigilant over the health effects of exposure. Thus, doctors may contribute to their failure to adapt. Vyner (1988) recommends doctors tell these patients they are aware of the contaminant's invisibility, they will not assume the presence or absence of harm to their health, they will provide ongoing monitoring of their health, and that they should be honest and open regarding their thinking about patients' health. In particular, the thoughts shared must be observation-based. This approach may then enable patients to be open-minded about the health effects of exposure, help them feel the doctor is concerned about their situation, and thus ward off preoccupation and hypervigilance. In doing this, the negative psychological effects of the exposure may be prevented and/or treated.

The present findings and the explanation given for them apply more widely than to this study alone. They have implications for other populations experiencing chronic stress. It is not only likely these responses will be present in other toxic exposure populations; these responses are expected to generalise to those caring for loved ones with a terminal or other illness (such as cancer, Alzheimer's disease, or following stroke), parenting a child with a severe disability (such as Autistic Disorder or intellectual disability), living with a disability or chronic health problem (such as HIV/AIDS, pain, arthritis, heart disease), chronic occupational stress, ongoing marital problems, ongoing financial problems (especially poverty), ageing, and adjustment disorders in general. The chronic stress reactions of any of these populations could be explained by Lazarus' (1966) stress and coping paradigm, with threat being appraised and adaptation made difficult due to uncertainty and a lack of resolution.

The chronic stress experience is an ongoing process of coping with uncertainty, and closure cannot be obtained. Thus, as Lazarus (1999) states, there is a need to live with and manage the experience. "Coping may not be capable of terminating the stress, but the person can often manage it, which includes tolerating or accepting the stress and distress" (p. 147). There is a great need for clinical psychologists and other health professionals to assist nuclear test veterans and others experiencing chronic stress to successfully adapt to living with uncertainty. This includes helping them to accept these conditions of life in a way that minimises the negative stress responses of disturbed affect, poor perceived health, and perceived impairment in memory function.

Conclusions

In conclusion, this study has revealed that the NZ nuclear test veterans are experiencing chronic stress, manifested through greater depressive symptomatology, poorer perceived health, and poorer perceived memory performance than a Control group of non-exposed men. It is believed that this chronic stress is a direct result of an inability to adapt to the threat of illness from their exposure to nuclear radiation in the Operation Grapple nuclear weapons testing programme.

STUDY II:
Acceptance and Commitment Therapy
For Nuclear Exposure-Related Health Anxiety

CHAPTER SEVEN: FROM CHRONIC STRESS TO HEALTH ANXIETY

Introduction

The Nature of the Stress in the Nuclear Exposure Literature

Study I proposed that the NZ nuclear test veterans were exhibiting chronic stress as a consequence of their past radiation exposure. If it is stress these men are experiencing, a door of complexities is opened, resulting in further questions regarding the form or nature of this stress. The nuclear exposure literature presents many different types of exposure-related stress, including the knowledge of being exposed (experienced proximally or distally), a lack of information about the exposure and its effects, ongoing uncertainty, the invisible threat of illness, anxiety and worry about one's own current health and future development of radiation-related illness, sensitivity to physical sensations, health problems, undiagnosable symptoms, lack of proof for a link with exposure, preoccupation with health and radiation, fear of genetic damage, anxiety about the health of future generations, identity conflicts, lack of perceived control, and invalidation of experiences and health problems (by governments, medical professionals, society, family, and friends) (Baum et al., 1983; Collins, 1992; Collins & Bandeira de Carvalho, 1993; Garcia, 1994; Green et al., 1994; Lifton, 1967; Murphy et al., 1990; Prince-Embury, 1992; Remmenick, 2002; Stiehm, 1992; van den Bout et al., 1995; Vyner, 1983, 1988). This range of factors over multiple studies indicates that chronic stressors can take many forms.

The literature also mentions a number of consequences of the stress of exposure. These include greater psychological distress and symptomatology, particularly depression and anxiety, distorted self-assessment, reduced cognitive ability, poorer perceived mental and physical health, the development of exposure-related belief-systems (self-diagnostic), information seeking, increased medical consumption, greater physical illness (non-radiation related), high catecholamine levels, and a generally diminished quality of life (Chinkina & Torubarov, 1991; Green et al., 1994; Havenaar et al., 1999; Remmenick, 2002; van den Bout et al., 1995; Vyner, 1983, 1988). The next section will focus on one such negative outcome, the finding that the nuclear test veterans perceived their health to be poorer in general, compared with both a control group of men with military experience, and the general NZ male population (men aged 65 years and over in the NZ Health Survey; Ministry of Health, 2004).

Chronic Stress Leading to Altered Perception: Poorer Perceived Health

Lazarus (1966) asserts that stress results in changes in the adequacy of cognitive functioning, often manifested through the alteration of perception, thought, and judgement. Thus, it is possible that stress could alter the perception of one's health, such that subjective health reports become increasingly negative. It is important to note that for some, it is very likely poor perceptions of health are accurate. With the known health effects of radiation exposure (Bertell, 1985; Upton, 1998), there is a real possibility that some of the men have been physically damaged. However, it is also likely that for others, physical health is not so poor as it is believed to be. As previously discussed, nuclear exposure populations have perceived their health to be worse than that of a comparison group (Collins & Bandeira de Cavalho, 1993; Havenaar et al., 1999; Remmenick, 2002), a finding believed to result from toxic exposure stress affecting cognitive functioning. One Chernobyl study (Havenaar et al., 1999) included an objective health assessment, with exposed participants showing more physical illness than controls, but these illnesses were not radiation-related. Unfortunately, objective measures of health status were not taken in the other studies reviewed, or in Study I, so comparisons of perceived versus objective health status cannot be made.

Whether or not health perception is accurate, it would be expected that if the nuclear veterans perceived themselves to have poorer physical health, there would be concern about the implications of this. This concern may relate to illnesses already developed, or that the veterans fear they may develop. With the literature presenting the threat of illness as such a key characteristic of post-exposure stress, the questions follow, *"Do the nuclear test veterans experience anxiety about the effects of the radiation on their health? Is their health (especially if perceived as poor) frequently on their minds?"* One could conceive that an unknown health factor may be more significant as a form of stress than other aspects of a stress experience, such as uncertainty about dose exposure. Therefore, if one's health is perceived as poor, it follows that one would become more preoccupied and concerned with it. We could realistically expect this poorer perceived health, and the ambiguity surrounding their future health status to bring about significant anxiety, which according to Lazarus (1966) inevitably comes with threat, and is another form of affective disturbance experienced under stress.

Poor Perceived Health Leading to Anxiety

Perceived physical health is related to anxiety in younger populations (Fortenberry & Wiebe, 2007; Gregor, Zvolensky, & Yartz, 2005; van der Windt, Dunn, Spies-Dorgelo, Mallen,

Blankenstein, & Stalman, 2008; Yartz, Zvolensky, Gregor, Feldner, & Leen-Feldner, 2005). Additionally, perceived health is associated with anxiety in older adults. This is accepted as a natural phenomenon, given the increasing mortality that comes with age, with health worries recognised as a common concern of older adults (Hunt, Wisocki, & Yanko, 2003).

Farmer and Ferraro (1997) found that poor perceived health resulted in distress (incorporating anxiety/worry) in older adults over a period of time, as well as the opposite causal link, in which greater distress led to poor perceived health. Monopoli and Vaccaro (1998) found poorer perceived health was associated with higher levels of health anxiety in older adults. Frazier and Waid (1999) observed that poorer perceived health was significantly correlated with increased health-related anxiety and distress, and that health perceptions predicted 8% of the variance in health anxiety. Links between variables such as perceived health and anxiety were stronger than links between physical health status and anxiety. Benyamini, Idler, Leventhal, and Leventhal (2000) also found a link between perceived health and anxiety, observing that higher negative affect (which appeared to include anxiety) predicted poorer future self-assessed health. Most recently, Andrew and Dulin (2007) investigated the relationships between self-reported health, and anxiety and depression in 208 elderly New Zealanders. Self-reported health predicted 14% of the variance in anxiety, and anxiety correlated positively with (poorer) self-reported health.¹⁵

Poor perceived health could result in anxiety; but is anxiety about health one of the mechanisms through which chronic stress leads to poorer perceived health? While the literature appears to confirm that chronic stress can lead to anxiety, as can poor self-reported health, it also provides evidence for the opposite relationship. It is understandable that under stress, perception is affected which may lead nuclear veterans to perceive their health as poor, resulting in anxiety, which perpetuates the altered perception. Alternatively, altered perception under stress could cause veterans to become increasingly worried and preoccupied about their health because of the exposure, leading them to watch it ever more closely. They may then perceive it as worse because they are attuned to every possible abnormality, in turn perpetuating the anxiety. While testing issues of causality was beyond the scope of this research, whatever the causal direction of the variables, poor perceived health and anxiety are inextricably linked.

¹⁵ The key aspect of Andrew and Dulin's (2007) study was the investigation of experiential avoidance as a moderating variable between self-reported health, and depression and anxiety. This variable and its relation to anxiety will be explored later in this study.

Anxiety and Health Preoccupation in Nuclear Exposure Populations

In the nuclear exposure literature, anxiety is constantly observed in exposed populations. Some researchers (Chinkina & Torubarov, 1991; Stiehm, 1992) speak of it generically, while others (Baum et al., 1983; Collins, 1992; Collins & Bandeira de Carvalho, 1993; Green et al., 1994; Lifton, 1967; Murphy et al., 1990; Remmenick, 2002; van den Bout et al., 1995; Vyner, 1988) specify the type of anxiety observed, describing it as anxiety/fear/worry/concern about health and the development of radiation-related illness (especially cancer) in oneself and future generations.

Additionally, researchers have alluded to, if not explicitly described, an intense preoccupation with health, which appears to be a highly prominent characteristic of this experience. Constant worry about developing cancer and other radiation-related illness, and over-attentiveness to physical symptoms was observed in one population (Lifton, 1967). In another, researchers witnessed a cyclical pattern of sensitivity to physical sensations resulting in health anxiety (when a radiation-related disease was self-diagnosed), which perpetuated altered perception, and thus led to further sensitivity and anxiety (van den Bout et al., 1995). Life for these exposees was characterised by “living in the constant fear that health effects will inevitably appear soon or later” (p. 227). A syndrome observed in a further population was often characterised by anxiety (among other emotional disturbances), and extensive health worry (Green et al., 1994). The health preoccupation theme is also evident in qualitative studies of nuclear veterans (Garcia, 1994; Murphy et al., 1990), and suggests that health concerns dominate life post-exposure.

Vyner (1988) included a “preoccupation dynamic” (p. 128) as part of the RRS observed in nuclear veterans, believing they acted out their self-diagnostic belief system through preoccupation with the health effects of radiation, and identity conflicts. The preoccupation dynamic involved obsession with the following factors: the veteran making sense of his exposure experience; proving the exposure caused any illness he has; occasionally needing to prove he is definitely sick; convincing the Veterans Administration (or Affairs), family, friends, and society that these issues are real; and spending a great proportion of time consumed with these matters (either thinking or talking about them). According to Vyner, this consuming preoccupation was involuntary, and could lead to unemployment and social isolation.

Janis (1982) talks of preoccupation as *hypervigilance* in his theory of decision making under stress. Vyner (1988) draws on this in describing preoccupation as a characteristic coping response of populations exposed to invisible environmental contaminants (nuclear testing, nuclear accidents, occupational exposure, and environmental toxic waste). In normal vigilance, individuals believe mastery of a threat is possible (Janis, 1982), but vigilance increases in situations where an individual receives a warning, experiences fear, and there are ambiguous signs regarding their vulnerability. This leads to hypervigilance, in which individuals believe that escape from the threat is both possible and impossible. Hypervigilance can develop into a health obsession or fixation, in an attempt to protect oneself from the threat of illness (Vyner, 1988). Their behaviour keeps them “on the lookout” for any indicator of illness, that it may be discovered at the earliest possible moment. Based on Janis’s (1982) description we might expect that people who are hypervigilant about their health become very sensitive to all signs of illness threat, find it difficult to concentrate because they are worrying about getting ill, constantly search for and evaluate new sensations or symptoms, and expend great amounts of time and energy responding to the threat because they are focused on irrelevant (as well as relevant) information.

It is not difficult to relate the experience of preoccupation or hypervigilance to the NZ nuclear test veterans. It is possible that any vigilance behaviour they developed post-Grapple may have increased following later media notification of the potential health effects of radiation. This warning likely led to a fear response, perhaps motivating them to become highly sensitive to new or unusual physical symptoms. Taking on the self-diagnostic belief would assist with maximal hypervigilance and potential mastery of this situation, but ultimately result in preoccupation (Vyner, 1988). When mastery of the threat of developing radiation-related illness is not possible, attempts to adapt are likely to result in preoccupation with health and physical symptoms. This preoccupation or hypervigilance, in clinical psychological terms, could be considered *health anxiety*.

Health Anxiety

Description

Health anxiety or “intense illness worry” (Walker & Furer, 2006, p. 598) is theorised to exist on a continuum (Salkovskis, 1989). In its severe form it is known as hypochondriasis, and is defined in the DSM-IV-TR as “preoccupation with fears of having, or the idea that one has, a

serious disease based on the person's misinterpretation of bodily symptoms" (APA, 2000, p. 507). Thus, there are two types of fear, the fear of already having a serious disease, and the fear of developing one in the future (Salkovskis & Warwick, 2001; Taylor & Asmundson, 2004); however, the first is generally more prominent in severe health anxiety (Salkovskis & Warwick, 2001). The preoccupation persists despite medical reassurance and in the absence of a full medical explanation, has been present for at least 6 months, and causes significant distress or life impairment, personal, social, or occupational (APA, 2000). Individuals perceive their bodily sensations as signs of serious illness (Salkovskis, 1989; Salkovskis & Bass, 1997), and the strength of this misinterpretation of threat determines the severity of the health anxiety (Salkovskis, 1996). People with health anxiety also tend to fear death, and in some cases, ageing (APA, 2000; Furer, Walker, & Stein, 2007; Taylor & Asmundson, 2004).

Classification

There is controversy over the underlying pathology of hypochondriasis and its classification, in particular, its categorical rather than dimensional classification based on descriptive features (Furer et al., 2007; Taylor & Asmundson, 2008). Currently it is classed as a somatoform disorder, of which the general feature is physical symptoms that have no medical, drug-related, or other psychiatric basis (APA, 2000). However, the most common alternative and often preferred proposal is that it be classed as an anxiety disorder, due to shared characteristics and comorbidity (Noyes, 2001; Salkovskis & Warwick, 2001). Hypochondriasis shares clinical features with panic disorder, obsessive-compulsive disorder, and generalised anxiety disorder, and its treatment has developed from the approaches to these disorders (Salkovskis & Bass, 1997; Taylor & Asmundson, 2008; Walker & Furer, 2006). Consistent with the anxiety disorders, depressive symptomatology is commonly comorbid with hypochondriasis (APA, 2000; Monopoli, 2005; Salkovskis & Bass, 1997). The area of health anxiety has not been widely researched, but this is gradually changing with an increased recognition of its comorbidity with other anxiety disorders (Furer et al., 2007; Noyes et al., 2004).

Health Anxiety in Older Adults

While prevalence rates of hypochondriasis in the general (US) population range from 1 to 5% (APA, 2000), the prevalence amongst older adults is reported to be approximately 10% in community samples (Blazer & Houpt, 1979; more recent statistics could not be found). The experience of hypochondriasis is often more frequent amongst the elderly (Blazer, Hybels, &

Hays, 2004; Lindsay & Marudkur, 2001). However, there is debate around this due to prevalence estimates being affected by varying definitions (i.e., measurement of primary versus secondary hypochondriasis; Logsdon-Conradsen & Hyer, 1999; Monopoli, 2005). It may be expected that for older adults, worrying about one's health is more common (Bravo & Silverman, 2001; Hunt et al., 2003) because they face real issues of morbidity and mortality in themselves and those close to them (Furer et al., 2007). Higher levels of hypochondriasis in this age group have been associated with lower education levels, lower reported health quality, and lower income (Monopoli, 2005; Monopoli & Vaccaro, 1998), but these associations are not established (Monopoli, 2005).

In older adults, hypochondriasis is frequently comorbid with mood and anxiety disorders, particularly depression (Koenig & Blazer, 2004), and can be difficult to differentiate and diagnose due to the somatic expression of mental disorders in this age group (Monopoli, 2005). The etiology of this disorder has been conceptualised in a number of ways, including as a form of social communication from older individuals who feel unheard and unsupported, or of channelling psychological energy from worries to health concerns (Monopoli, 2005).

Health anxiety in older adults is fairly common (Blazer & Houpt, 1979), and may be elevated in military veterans with exposure to chemical and biological weapons (Noyes et al., 2004). It could be expected to be more prevalent, then, in older adults from a nuclear exposure population, given their preoccupation with health.

Health Anxiety in the Nuclear Test Veterans

The nuclear veteran experience is different from that of the usual clinical population with health anxiety, and may preclude a diagnosis of hypochondriasis in this population. First, the veterans have justification for believing they may develop radiation-related illness, given their exposure. They do not and cannot know for certain whether they have been harmed by nuclear radiation; no medical specialist can confirm or disconfirm this. Thus, there is a real and continued threat to their physical integrity, and health anxiety, in their experience, is not characterised by the irrational or distorted beliefs recognised as underpinning other types of disordered anxiety. They may not be misinterpreting bodily symptoms at all (Criterion A), and there cannot be any "appropriate" medical evaluation and reassurance in their situation (Criterion B), due to the various types of exposure invisibility, ambiguity, and uncertainty described in Study I (particularly latency uncertainty - knowing that one was exposed but not

knowing whether any damage done will result in future disease; Vyner, 1988). It may not be accurate to consider their health anxiety “excessive or unreasonable” (APA, 2000, p. 504).

Vyner (1983, 1988) argued that the nuclear veterans he studied were not hypochondriacs. His first explanation was the functional, non-organic basis of hypochondriacal symptoms, while a number of his participants had organic illnesses. His second explanation was that while hypochondriacs appear to be searching for a particular illness, nuclear veterans are searching for answers about illnesses they already have, or fear the development of. Vyner reported the experience of the nuclear veterans he studied had a characteristic pattern (interestingly, almost identical to that described by the NZNTVA chairman - see p. 7) showing a clear progression in terms of the development of health anxiety in this population. It is unlikely the nuclear veterans could be exhibiting clinical hypochondriasis. Additionally, the health anxiety can be linked to a specific event, rather than the chronic “trait-like” presentation typical of hypochondriasis (APA, 2000, p. 506). The term health anxiety, then, more accurately captures their experience and the basis for their symptom presentation.

Cognitive Behavioural Theory of Health Anxiety

The cognitive behavioural theory of health anxiety states that the key psychological mechanism in health anxiety is the ongoing misinterpretation of bodily symptoms and sensations as indicators of serious pathology (Salkovskis, 1989; Salkovskis & Bass, 1997). Thus, individuals catastrophise, believing physical symptoms to be a greater threat than they actually are, and it is the *meaning* of these symptoms that causes the distress (Salkovskis & Warwick, 2001; Salkovskis, Warwick, & Deale, 2003). Salkovskis and Warwick (2001) also note that people with health anxiety misinterpret other variations of bodily anatomy and physiology, as well as health information. People with health anxiety may also believe that certain illnesses (such as cancer) are more likely to develop, or that current illnesses are more serious than they really are (Furer et al., 2007; Salkovskis, 1989; Taylor & Asmundson, 2004).

A key characteristic in anxiety disorders is that of threat (Salkovskis, 1996; Salkovskis & Warwick, 2001), and in the case of health anxiety, health threat. The following factors are believed to influence appraisal of the severity of this threat: the perceived likelihood of illness, the perceived cost/burden and “awfulness” of the illness, one’s perceived ability to cope with and influence the illness (such as feeling they cannot avoid it or affect its progression), and

perception of the helpfulness of external factors (e.g., medical help). These factors are proposed to interact in the following way to produce varying levels of health anxiety:

| | | | |
|-----------|---|---|---|
| | Perceived likelihood of illness | X | Perceived cost, awfulness and burden of the illness |
| Anxiety = | Perceived ability to cope with the illness | + | Perception of the extent to which external factors will help (rescue factors) |

(Salkovskis & Bass, 1997, p. 317; Salkovskis & Warwick, 2001, p. 205). In the nuclear veterans' case, it is possible that an increased perceived likelihood of illness due to radiation exposure, reduced perceived ability to cope with the illness (due to age and declining physical and immune function), and high perceived cost or awfulness of the illness (i.e., death may be more likely) may result in vulnerability to higher levels of health anxiety.

The cognitive model of health anxiety. Wells (1997, p. 135) proposes the cognitive model of health anxiety shown in Figure 4. In this model, previous experiences lead to the development of dysfunctional assumptions or "schemas." These experiences are usually of illness (or unexpected symptoms) in oneself or others, but may also include parenting style (Taylor & Asmundson, 2004), negative experiences with the medical profession, media illness information, and other stressful life events (Bravo & Silverman, 2001; Furer et al., 2007; Noyes, 2005; Salkovskis & Warwick, 2001; Taylor & Asmundson, 2004). Personality traits also influence schema development (Costa & McCrae, 1985; Forsyth, Parker, & Finlay, 2003; Noyes et al., 2004). Of direct relevance to the nuclear veterans, a study of Gulf War veterans (some of whom may have been exposed to chemical and biological weapons) found that lower education level, number of pre-war physical conditions, negative temperament, lack of social support, and perceived life stress were risk factors for hypochondriacal concerns in this population (Noyes et al., 2004).

Schemas developed may include, "The pains in my stomach mean I have an undetected cancer" (Salkovskis & Bass, 1997, p. 318), and "If I don't stay vigilant and keep checking for symptoms, I might miss the fact that I am really ill" (adapted from Salkovskis & Warwick, 2001). Schemas are activated by a critical incident, which in the nuclear veterans' case could have been media notification that radiation exposure may have damaged their health, and hearing of the premature deaths from leukaemia, or unexplained health problems of other

nuclear veterans (R. Sefton, personal communication, 2001). These beliefs contribute to the negative automatic thoughts associated with health anxiety, primarily involving the misinterpretation of bodily symptoms and sensations (Wells, 1997).

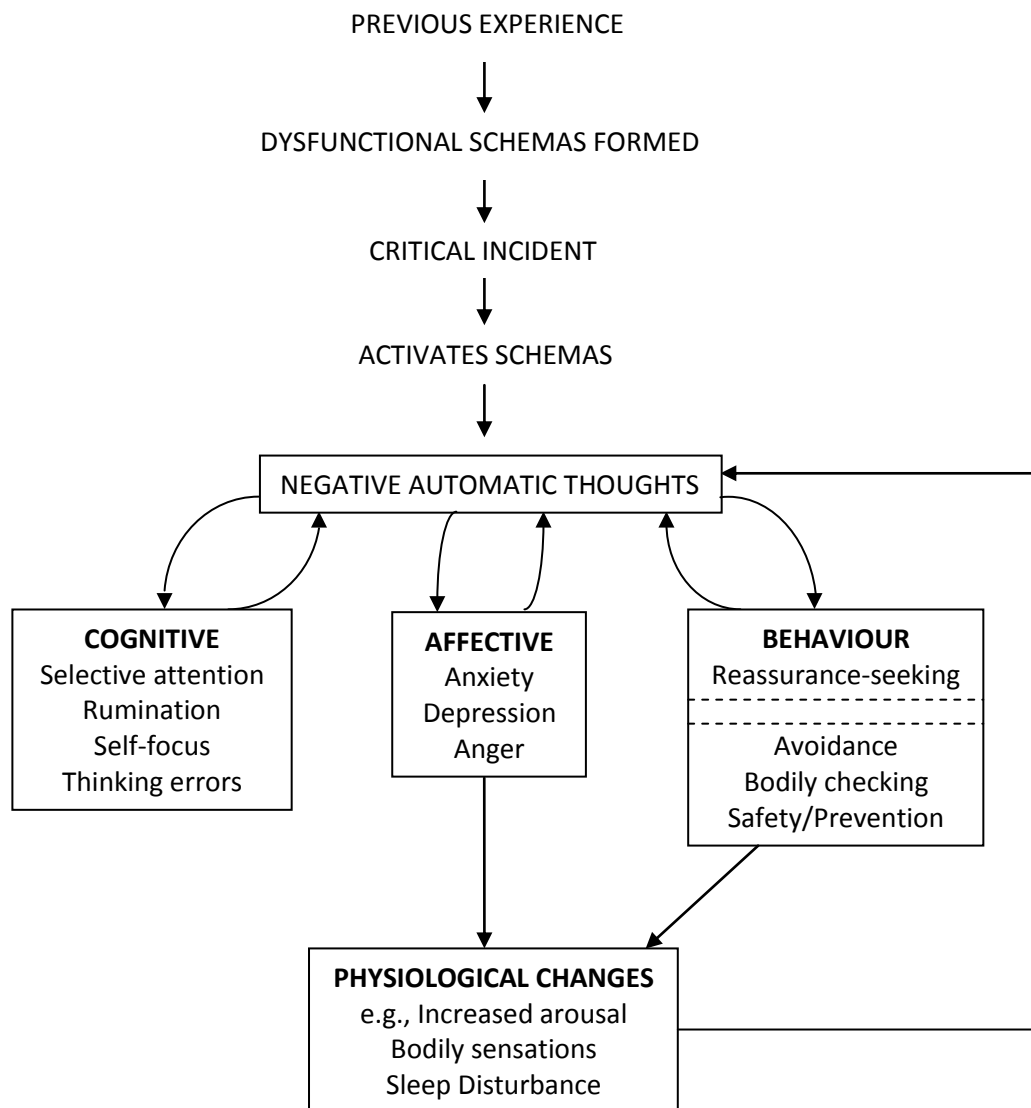


Figure 4. The cognitive model of health anxiety (adapted by Wells, 1997, from Salkovskis, 1989, and Warwick & Salkovskis, 1990).

These thoughts and images feed into the cognitive, affective, behavioural, and physiological aspects which perpetuate health anxiety (Salkovskis, 1989; Salkovskis & Warwick, 2001; Taylor & Asmundson, 2004; Warwick & Salkovskis, 1990; Wells, 1997). Cognitive factors include selective attention to the body and illness-confirming information (confirmatory bias), and

discounting evidence to the contrary, which can lead to misinterpretation of normal bodily experiences. Rumination or worry may be present, as well as altered perception, with health anxiety known to correlate more strongly with health perceptions than with objective health indicators (Frazier & Waid, 1999; Hollifield, Paine, Tuttle, & Kellner, 1999). Additionally, Noyes et al. (2004) observed that a greater perceived threat of illness increased hypochondriacal concerns. Affective factors are influenced by negative schemas and automatic thoughts, and include anxiety, which can lead to depression, and sometimes anger/irritability.

“Safety-seeking behaviours” include avoiding illness-related situations such as exercise, sick people, medical professionals, and media information. Bodily checking, searching for signs of illness, as well as probing or manipulation can occur. Such behaviours can “create” symptoms by exacerbating normal sensations. Additionally, reassurance seeking from family, friends, and doctors (often asking for extensive and unnecessary evaluations, and receiving conflicting information), and researching illnesses are common behaviours. Clients may also try to prevent health threats by relying on *safety signals* (e.g., always living close to a hospital). While these behaviours often provide short-term anxiety relief, they serve to increase health preoccupation. Finally, physiological factors involve the misinterpretation of increased autonomic arousal from anxiety, heightened awareness of bodily sensations and changes, and anxiety-related sleep difficulties. (Information taken from Furer et al., 2007; Noyes, 2005; Salkovskis & Warwick, 2001; Taylor & Asmundson, 2004; Wells, 1997.)

Treatment¹⁶ for Health Anxiety

Based on a well-established and widely accepted theoretical model, with a growing body of treatment research, Cognitive Behavioural Therapy (CBT) is considered to be one of the most promising, if not the most effective treatment for health anxiety and hypochondriasis (Taylor & Asmundson, 2008; Taylor et al., 2005). Easily translated into an intervention from its model (Furer et al., 2007), it usually consists of the following core strategies:

- 1) Psychoeducation about the cognitive behavioural model of health anxiety (specifically tailored to the client), including client self-monitoring of symptoms and thoughts, and education about common physical symptoms;

¹⁶ Pharmacological treatments (particularly Selective Serotonin Reuptake Inhibitors; SSRIs) have been found to be effective for hypochondriasis (Noyes, 2005; Taylor, Asmundson, & Coons, 2005). However, as the current study does not incorporate medication as an adjunct to psychotherapy, pharmacological interventions will not be discussed here (see Fallon, 2001, and Taylor et al., 2005 for further information regarding medication).

- 2) Cognitive interventions, involving reappraisal or restructuring of dysfunctional assumptions and beliefs, refocusing attention, and other strategies (such as acceptance of physical symptoms, the possibility of illness, and the reality of death, verbal reattribution, worry management, use of imagery, critically evaluating health information in the media, and a focus on overvalued ideas and delusions if necessary);
- 3) Behavioural interventions, involving exposure to illness worries (and perhaps fear of death), bodily symptoms, and external triggers to target avoidance (using behavioural experiments), with response prevention to target bodily checking and reassurance seeking;
- 4) Building life satisfaction and enjoyment to enhance quality of life (involving goal-setting, scheduling pleasant events, mindfulness, and promoting healthy living); and
- 5) Relapse prevention, involving the development of a maintenance programme (reviewing gains and helpful strategies) and planning for setbacks

(taken from Furer et al., 2007, Taylor & Asmundson, 2004, Warwick & Salkovskis, 2001, and Wells, 1997). Taylor and Asmundson (2004) also include stress management as part of their approach, and acceptance and mindfulness have recently been incorporated as components of CBT for health anxiety (Furer et al., 2007).

While published studies on the use of CBT for health anxious older adults have not been found, a number of researchers and clinicians have expressed belief in its efficacy with this population (Agronin, 2004; Furer et al., 2007; Lindesay & Marudkur, 2001; Logsdon-Conradsen & Hyer, 1999; Snyder & Stanley, 2001; Taylor & Asmundson, 2004), based on studies of CBT for other anxiety disorders in older adults.

Issues with a CBT Approach to Health Anxiety in the Nuclear Test Veterans

Changing “dysfunctional” beliefs. Despite the fact that CBT has substantial support as an effective treatment for health anxiety, it does not seem appropriate for the unique situation of nuclear test veterans. Essentially, one of the key focuses of CBT is on changing what are considered to be the “dysfunctional” beliefs maintaining health anxiety, and making these more “realistic” or “adaptive” (Furer et al., 2007; Taylor & Asmundson, 2004). This involves helping clients to consider alternative, less threatening, and “more convincing” (Salkovskis & Warwick, 2001, p. 204) explanations for symptoms they may currently have, in particular, the explanation that these could have a psychological rather than a physical basis (Furer et al., 2007; Warwick & Salkovskis, 2001).

However, this becomes problematic when the client's beliefs are realistic, based on an accurate appraisal of their situation, such as in the case of the nuclear veterans. They are in a situation where there is no way of proving or disproving the possibility that exposure to nuclear radiation has affected their health. Thus, it would seem unproductive to attempt to challenge and change beliefs the veterans may hold about whether they were harmed, or may develop a physical illness in the future. Similarly, presenting an alternative, psychological explanation for their symptoms may be unfeasible. Vyner (1988) explains that ignoring or denying the potential threats of exposure is not possible for exposees. While CBT would not dismiss or deny this threat, it is important that it is acknowledged as a reality of the nuclear veteran's situation; he may not be "misinterpreting" at all. He needs help to acknowledge both the possibility that the radiation may have affected him, and his anxiety about this, and to live a full life with this knowledge. (Recently, the issue of whether it is necessary to challenge dysfunctional thoughts in CBT has been raised, due to inconsistencies in the CBT literature, particularly the finding that cognitive change may not be predictive of outcome. See Longmore and Worrell, 2007 for a discussion.)

Perpetuating the "control agenda". A further reason CBT is unsuitable for the nuclear veterans comes from Eifert and Forsyth's (2005) assertion that standard CBT tends to focus on "symptom alleviation as a therapeutic goal¹⁷... set within a mastery and control framework" (p. 5). This implies that the anxiety symptoms are the problem (making anxiety in itself a disorder rather than an adaptive part of human experience), and must be regulated. Therapists therefore help clients learn to "gain control" over their anxiety and associated symptoms, encouraging the belief that to be happy and enjoy life, they need to improve at "mastering" anxiety and other uncomfortable thoughts and feelings. Ultimately, attempts to extinguish, get rid of, manage, or reduce anxiety perpetuate the emotional regulation strategies of control, suppression, avoidance and escape. Control then becomes the problem, rather than a helpful solution (Eifert & Forsyth, 2005; Hayes, Strosahl, & Wilson, 1999).

Hayes et al. (1999) and Eifert and Forsyth (2005) argue that due to the categorical, symptom-focused classification system of the DSM-IV-TR, anxiety disorders are considered distinct from one another. Thus, a further problem with CBT is that it does not recognise or target the

¹⁷ Proponents of CBT have recently argued against this criticism. See Hofmann and Asmundson (2008) for a response.

processes that make normal, adaptive human anxiety disordered, processes which are common to *all* anxiety disorders, and indeed, to psychopathology in general.¹⁸

Additionally, this symptom focus can miss the *context* - how the disordered anxiety is restricting the person's life (Eifert & Forsyth, 2005). The literature demonstrates that preoccupation with health can severely restrict and narrow an individual's life focus. Consequently, teaching the nuclear veterans to manage and control health anxiety may restrict them further, encouraging this to remain the focus of their lives. It is important that therapy prevents health anxiety from affecting quality of life, and from holding the veterans back from pursuing the things they value. Therefore, a therapeutic approach is needed that will enable them to live a meaningful life *with* their exposure history, and the issues they are currently facing.

Taylor et al. (2005) state that, "Little is known about how treatment protocols need to be adapted or modified for special populations of health-anxious people..." (p. 300). As such, traditional CBT techniques are contra-indicated for the nuclear test veteran, because the belief driving the anxiety is not necessarily irrational or distorted. It is likely that a more productive mode of approaching such a clinical situation is with a treatment that encourages the veteran to become more accepting and less avoidant of his distressing thoughts and emotions about the possible health consequences of radiation exposure. Once these internal experiences are more welcome, the client will likely be more able to move towards valued life goals that are often neglected in the presence of chronic worry (Hayes et al., 1999). Acceptance and Commitment Therapy, a relatively new approach derived from CBT, has the potential to be effective for this "special population."

¹⁸ However, this problem is starting to be addressed in CBT for emotional disorders. See Barlow, Allen, and Choate (2004) for a discussion.

CHAPTER EIGHT: THE “ACT” APPROACH

The Theoretical Basis of Acceptance and Commitment Therapy

The “Third Wave”

Acceptance and Commitment Therapy (pronounced as one word, “ACT”; Hayes et al., 1999) is part of the “third wave” of behaviour therapy (Hayes, 2004; Hayes, Masuda, & De Mey, 2003). The first wave involved behaviour therapy, with the emergence of operant and classical conditioning, and the second, with the addition of cognitive strategies, CBT; ACT has developed from both approaches (Hayes, 2004; Hayes, Masuda, Bissett, Luoma, & Guerrero, 2004; Hayes et al., 1999). ACT encourages clients to acknowledge and be willing to experience, rather than avoid, unwanted thoughts, feelings, memories, and bodily sensations (internal or “private” experiences), and commit to living a valued and meaningful life (Hayes et al., 1999). Psychological pain is approached with kindness and compassion, and recognised as a universal, inevitable, and necessary part of being human (Eifert & Forsyth, 2005; Hayes et al., 1999). While CBT is a very change-oriented approach, ACT focuses on balancing change with acceptance (Eifert & Forsyth, 2005).

Third wave treatment approaches include Dialectical Behaviour Therapy (DBT; although Hofmann & Asmundson [2008] report Linehan disagrees with this classification), Functional Analytic Psychotherapy (FAP), Integrative Behavioural Couples Therapy (IBCT), and Mindfulness-Based Cognitive Therapy (MBCT; listed in Hayes, 2004; Hayes et al., 2003). These third-generation therapies emphasise “acceptance, mindfulness, cognitive defusion, dialectics, values, spirituality, and relationship” (Hayes et al., 2003, p. 3), and tend to be more experiential rather than didactic (Hayes, 2004; Hayes et al., 2003). While ACT maintains components of behavioural and cognitive behavioural therapy that are known to be effective, including a focus on cognition and emotion, exposure, response prevention, and behavioural activation (Eifert & Forsyth, 2005; Hayes et al., 1999), it also incorporates these new components from experiential therapy, meditative, and spiritual approaches (Hayes, Masuda et al., 2004; Hayes et al., 1999). Anomalies in the current literature, such as debate over whether cognitive change is a necessary part of CBT, are reported to have provided space for this third wave (Hayes, 2004).

A Contextual Approach

ACT was developed due to dissatisfaction with traditional behavioural therapy and CBT. ACT rejects “mechanistic” models of human behaviour (e.g., that humans are like a computer with parts that can be organised and replaced, bad with good), which underlie many forms of behavioural and cognitive behavioural treatment.¹⁹ Hayes et al. (1999) report that instead of analysing the mechanistic elements of behaviour, or “symptoms,” ACT focuses on the function of behaviour (or symptoms - thoughts, feelings, and actions) in its historical and situational context, an approach known as *functional contextualism*. For example, the function of excessive domestic cleaning behaviour could be different in different contexts (e.g., to gain a sense of control over one’s life, or because one feels a need to keep up appearances).

Taking a functional contextualist approach, the focus of therapy becomes whether certain beliefs and behaviours are “workable” (i.e., effective) for clients in a particular context. For example, is a woman’s adherence to the belief that she is “not strong enough” workable for her in situations where she wishes to be more confident and assertive? ACT aims not to change the *form* or content of internal experiences, but the context in which these take place, thus changing the *function* of symptoms. One of the key problematic contexts for humans is in taking thoughts literally (the “context of literality”; Hayes, 1987, p. 343). This will be explained below, but first the process of how we come to take thoughts literally (or fuse with them), through our development of verbal rules, will be explained.

Language – A Cause of Human Suffering

Within the functional contextualist philosophy is the belief that language is responsible for human suffering. This is because humans think relationally, and have the ability, using language, to form arbitrary (non-related) relationships between any objects in the environment (such as “the same as, similar to, better than, opposite of, part of, cause of and so on”; Hayes & Smith, 2005, p. 18). These relationships can control or govern our behaviour; for example, the rule that if we study we are more likely to pass an exam could control our study behaviour. These relations are bidirectional (known as *relational frames*), as what we learn in one direction, we derive in the other (Hayes et al., 1999). In the previous example, if we learn that studying is related to passing an exam, we will also conclude that passing an exam is related to studying. This theory, developed from research on language and cognition, is known as Relational Frame Theory (see Hayes, Barnes-Holmes, & Roche, 2001).

¹⁹ Proponents of CBT have recently argued against this criticism. See Hofmann and Asmundson (2008) for a response.

The ability to think relationally, in the form of imagination, enables us to learn things without having to actually experience them. For example, a cat has to touch a hot stove once before learning it can burn, whereas Figure 5 shows a child can learn the association between “hot stove” and “burn” (and vice versa) without ever touching it, because of language (Hayes & Smith, 2005).

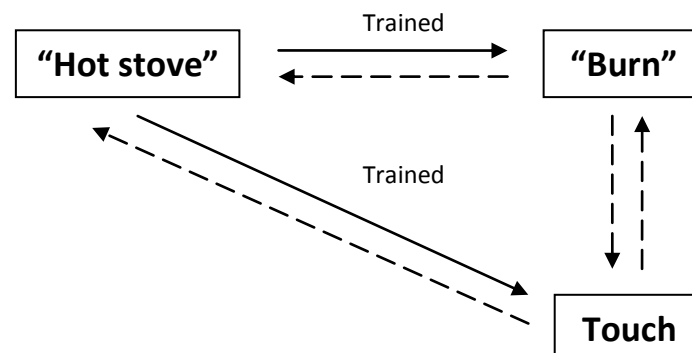


Figure 5. How language allows us to derive bidirectional relationships (with derivations indicated by dashed arrows; adapted from Hayes et al., 1999, p. 38).

In such contexts, verbal rules can be helpful, but they create problems when we apply them to our internal experiences (Hayes & Smith, 2005; Hayes et al., 1999). For example, we know that in the external world if we dislike something we can throw it away or “get rid” of it (Hayes et al., 1999). However, if we apply the rule “If you dislike something, get rid of it” to our internal world, such as anxious feelings and thoughts, we may try to get rid of these through various types of avoidance behaviour.

The ability to relate allows us to think symbolically, where thinking is symbolic of the actual events. This can be helpful in some contexts, such as imagining what we would do in a dangerous situation. However, the ability to think symbolically means we can evoke pain through thought at any time (Hayes & Smith, 2005). For example, if a friend who has died loved sunsets, the sight of a sunset, or simply the word can elicit thoughts of the friend and the associated pain and loss, because sunsets and the friend are verbally related (Hayes & Smith, 2005; Hayes et al., 1999). Our ability to form relations is probably innate, and therefore we cannot avoid psychological pain. Also, the ability to relate objects, particularly in time, can

cause us to live in what we remember from the past, or what we imagine in the future, rather than in the present (Hayes & Smith, 2005).

Thus, our linguistic abilities can be considered both “a blessing and a curse.” We can relate, label, evaluate (and so on) things in the outside world (Hayes et al., 1999). However, verbal rules can lead to rigid, inflexible control over internal experiences and ineffective behaviour, resulting in needless suffering. This can continue for years, even if our experience tells us it is unhelpful or unworkable (Hayes et al., 1999).

Cognitive Fusion

Language traps us through *cognitive fusion* (Hayes et al., 1999), as the process of continually relating and evaluating causes us to fuse with our labels (e.g., “I’m an anxious person”). We take our thoughts literally, believing them to be facts about reality; this is the “context of literality” (Hayes, 1987; Hayes et al., 1999). Hayes and Smith (2005) describe this as looking “from” thought, rather than “at” thought (p. 54). Fusion joins us with our pain, and our evaluations make pain take on a (usually) negative meaning (Hayes & Smith, 2005); our inner experiences subsequently become “threatening” (Orsillo, Roemer, Block-Lerner, LeJeune, & Herbert, 2004). If we dislike anxiety, we may label it as “bad,” and fuse with this label, believing it to be true. We may subsequently “buy into” the thought that anxiety is bad every time we experience this emotion. Similarly, if a client believes “I am a failure,” it is because he or she has fused with this cognition. Hayes et al. (1999) argue that this process causes thoughts and feelings to become “issue[s] of being” (p. 73); the client believes she “is” this label. This is especially problematic with self-evaluations or conceptualisations, as people have difficulty separating the “self” from their internal “factual” labels (Hayes et al., 1999). While there is little research specifically on cognitive fusion, Masuda, Hayes, Sackett, and Twohig (2004) demonstrated that fusion produces greater believability in, and discomfort with, negative self-referential thoughts.

The major problem with cognitive fusion is it makes us to want to avoid or escape our internal experiences to protect ourselves from the emotional pain (Hayes & Smith, 2005). As a result, fusion leads to experiential avoidance (Hayes et al., 1999), and consequently impedes movement towards a valued life.

Experiential Avoidance

Experiential avoidance is a state in which a person is unwilling to experience, and attempts to change the form or frequency of, unwanted internal experiences (e.g., through avoidance, control, suppression, or escape; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). It is the natural result of taking our experiences literally (Hayes et al., 1999). If one has fused with the thought “anxiety is bad,” then predictably, attempts to avoid anxiety will follow. In the ACT framework, experiential avoidance is recognised as the core process that leads anxiety and other emotions to become “disordered” (Eifert & Forsyth, 2005; Hayes et al., 1996). Being “unwilling” to experience our natural reactions – failing to accept or acknowledge what is present – produces further, unnecessary suffering (Hayes et al., 1999). Experiential avoidance leads to both the development and perpetuation of emotional disorders (Eifert & Forsyth, 2005; Hayes et al., 1996), such as depression (Marcks & Woods, 2005), post-traumatic distress severity and comorbid psychopathology (depression, anxiety, and somatisation; Plumb, Orsillo, & Luterek, 2004; Tull, Gratz, Salters, & Roemer, 2004), anxiety disorders including GAD, specific phobia, and OCD (see Purdon, 1999), and comorbid diagnoses in those with substance abuse disorders (Forsyth et al., 2003). Experiential avoidance becomes harmful when “control efforts become overly intense and rigid, and when they are applied in situations where they do not work” (Eifert & Forsyth, 2005, p. 50; Hayes et al., 1996). It is this context of experiential control that ACT targets (Hayes et al., 1999).

Efforts to avoid internal experiences make psychological pain worse by increasing the very thing we do not wish to have (Hayes et al., 1999). Attempts to suppress unwanted thoughts can lead to an increase in their frequency (a “rebound” effect; Wegner, Schneider, Knutson, & McMahon, 1991) and continued activation of emotions associated with the thoughts (see Purdon, 1999 for a review of this literature). Marcks and Woods (2005) observed that greater efforts to suppress intrusive thoughts led to their increased frequency, greater distress, and a greater urge to do something about them compared to an acceptance approach. Similarly, attempting to inhibit emotional responses increases the target emotion. A number of studies have compared suppression (control) versus acceptance of the emotional response to inducing panic-like symptoms (by inhaling CO₂-enriched air). High experiential avoiders exhibited greater anxiety and distress, particularly when suppressing (Eifert & Heffner, 2003; Feldner, Zvolensky, Eifert, & Spira, 2003; Karekla, Forsyth, & Kelly, 2004; Levitt, Brown, Orsillo, & Barlow, 2004).

While it seems reasonable and adaptive to want to avoid pain, people can believe control or non-experience is the solution, when it is really the problem (Eifert & Forsyth, 2005; Hayes et al., 1999). When people find their internal experiences distressing, and rules govern their behaviour (e.g., “get rid of what you don’t like”), they start to fight and struggle with these experiences, and ultimately against themselves (Hayes & Smith, 2005; Hayes et al., 1999). Being caught in the struggle to avoid keeps people from living in the present moment, and pursuing what is important to them. Life becomes very narrow as a result (Hayes et al., 1999).

Unclear Values and Unworkable Action

The hold language can have on humans because of verbal rules, their literal interpretation, and efforts to avoid experiencing, leads to *psychological inflexibility*, the core concept of the ACT theory of psychopathology. This involves being unable to change ineffective behaviour due to its rigid control by verbal rules in contexts where this is unnecessary and unhelpful (Hayes et al., 1999). Living to avoid or escape painful internal experiences restricts people’s lives and makes them more inflexible (Hayes & Smith, 2005). They become trapped in ways of living that are inconsistent with their values, and ultimately unworkable (Hayes et al., 1999). For example, a mother may avoid taking her children to the park, or shopping at a shopping centre because she fears having panic attacks in these places. She sacrifices quality time with her children in the service of avoiding anxiety. Continual efforts to avoid, resulting from adherence to unhelpful verbal rules, can lead people to put their lives on hold until they figure out how to get rid of their problematic private experiences (Hayes & Smith, 2005; Hayes et al., 1999).

The ACT Conceptualisation of Anxiety Disorders

The ACT approach to anxiety disorders states that anxiety stems from people attempting to avoid their own anxious internal experiences, or negative affect, which leads them to avoid certain people, places, objects, and situations because these elicit negative affect (Friman, Hayes, & Wilson, 1998). Thus, the key issue is “a fear of fear (Chambless & Gracely, 1989) *and doing everything possible to avoid experiencing the fear*” (Eifert & Forsyth, 2005, p. 9, emphasis in original). According to Orsillo et al. (2004), anxiety becomes disordered when people are unwilling to experience normal anxiety (including worries, the emotion itself, and bodily sensations). They fuse with these private events (e.g., “I can’t cope,” “Anxiety is horrible,” or “I’m having heart pains - I’m going to die!”), viewing them as threatening, and engage in attempts to reduce, control, or eliminate them. Avoidance attempts are usually

experiential (worry, hypervigilance) and behavioural (checking, avoiding anxiety-provoking situations). While these attempts may reduce anxiety in the short-term, they are unworkable in the long-term, increasing and perpetuating it. Experiential avoidance is then applied more rigidly in the wake of increased anxiety, and leads to psychological and behavioural inflexibility – disordered emotion and a life lived in the service of avoidance (Orsillo et al., 2004).

The ACT Approach to Psychotherapy

Rather than taking the view that psychological health is being “free of disordered emotional and cognitive responses” (Hayes et al., 1999, p. 75), the ACT approach views psychological flexibility as the key health indicator. Because cognitive fusion and experiential avoidance are the key processes leading to psychological inflexibility and the primary barriers to valued action, they are the chief targets of ACT (Hayes et al., 1999). ACT teaches the psychological skills of acceptance, cognitive defusion, the self as context (explained below), contact with the present moment, values, and committed action (Hayes, Luoma, Bond, Masuda, & Lillis, 2006) to help clients move *with* their pain, rather than away from it (Hayes et al., 1999).

Cognitive Defusion

ACT aims to defuse literality through *cognitive defusion* or *deliteralisation* (Hayes et al., 1999). Reducing fusion with, or the “believability” of thoughts as truths about reality, changes clients’ relationship to them (Hayes & Smith, 2005). By distancing from and seeing thoughts objectively – as “just thoughts” - their (derived) function or meaning is changed, and their threatening nature reduced (Hayes & Smith, 2005; Orsillo et al., 2004). The aim is not to change thought content or frequency, or to restructure beliefs, but to help clients stop taking them literally. This enables clients to only use rule-governed behaviour when it benefits them (such as when applying directions or performing a task; Hayes et al., 1999).

To get around literality, ACT uses language in metaphorical and paradoxical ways (Hayes et al., 1999). It also describes rather than evaluates, such that the thought “I am a failure” becomes “I am having the thought that I am a failure.” Techniques taught to reduce fusion include mindfulness, which can involve watching distressing thoughts go by using visualisation, describing and categorising them, repeating them quickly out loud many times until they lose meaning and just become sounds, or externalising/objectifying thoughts by giving them a certain form (Hayes et al., 2006; Hayes et al., 1999).

To help clients separate from their internal experiences, particularly self-conceptualisations, they are encouraged to view themselves as the “context” for these experiences, a neutral and constant entity that holds all of their internal content as it comes and goes (Hayes et al., 1999). By developing their “observer self,” not judging or evaluating, clients can be aware of what is going on internally, but not attached to it (Hayes et al., 2006); they can look *at* their thoughts, rather than *from* them (Hayes & Smith, 2005). Mindfulness, metaphors, and experiential exercises are used to develop the sense of *self as context* (Hayes et al., 2006). Essentially, cognitive fusion techniques aim to change clients’ understanding of their internal experience. This helps them to be less at the mercy of negative thoughts and more able to effect meaningful change.

Acceptance

ACT teaches that acceptance is the alternative to experiential avoidance, and helps clients to actively embrace unwanted internal experiences. *Willingness* (a synonym for acceptance) to be present and to experience is taught as a way to outwork acceptance (Eifert & Forsyth, 2005; Hayes et al., 1999). Willingness is a stance of fully accepting, without regulation, any feelings, emotions, memories or sensations that arise, particularly in situations that evoke these intensely, and in the presence of cognitions that negatively evaluate this content (Eifert & Forsyth, 2005). Rather than being passive, as in resignation, tolerance, or self-defeat (Hayes & Smith, 2005; Hayes et al., 1999), this acceptance is active, encouraging clients to “make space” (Eifert & Forsyth, 2005, p. 163) for these experiences as natural responses to life problems – even if this brings emotional pain (Hayes & Smith, 2005; Hayes et al., 1999). Thus, the focus of ACT is on *feeling* better, rather than feeling *better* in terms of reducing the frequency of experienced thoughts and emotions. Any reduction of negative affect is a positive by-product rather than a goal (Eifert & Forsyth, 2005; Hayes et al., 1999).

Acceptance encourages contact with the present moment, and full participation in life (Hayes et al., 2006; Hayes et al., 1999) by seeking to undermine control in the context of thoughts and emotions, and the internal struggle this produces (Hayes et al., 1999). Willingness to “let go” of the struggle to avoid through experiencing, is the alternative to control (Eifert & Forsyth, 2005; Hayes et al., 1999). In letting go, clients become less stuck in the past and future, and more able to stay in touch with the present (Eifert & Forsyth, 2005; Hayes et al., 1999).

Acceptance and willingness are practised in the service of “healthy action” (Hayes & Smith, 2005, p. 122) that moves clients closer to valued goals (Hayes et al., 1999). Willingness, in this sense, is also a choice to act in an effective and value-based way in the presence of uncomfortable internal stimuli. ACT teaches that being present with these internal experiences gives a person freedom to choose new, effective ways of responding to them; thus the goal of willingness is to become flexible and to move toward a more valued life (Hayes & Smith, 2005). Metaphors, visualisation, experiential exercises (exposure), and mindfulness teach clients how to willingly observe, describe, and feel (Hayes et al., 1999).

Mindfulness

ACT uses *mindfulness*, a form of meditation taken from Buddhist practise, to achieve acceptance and defusion by teaching clients to live in the present moment, and to observe their experiences objectively, without judgement and evaluation (Eifert & Forsyth, 2005; Hayes et al., 1999). Thus, thoughts and feelings are not judged as good or bad but are seen from a neutral standpoint, and clients are encouraged to show kindness and compassion towards themselves and their internal experiences (Eifert & Forsyth, 2005). This process of non-judgemental experiencing decreases the threat of private experiences (Orsillo et al., 2004). It aids defusion by helping to develop the observer self.

Values and Committed Action

To target unworkable behaviour and restricted, inflexible living, ACT focuses on values to help clients choose value-based directions in life, and move forward, taking uncomfortable internal experiences with them (Eifert & Forsyth, 2005; Hayes et al., 1999). The ACT therapist helps clients to clarify their values in a number of different domains (Eifert & Forsyth, 2005; Hayes et al., 1999). Living according to values is a powerful motivator for change, and “makes the hard work of therapy worthwhile” (Eifert & Forsyth, 2005, p. 42). While acceptance and defusion are key components of ACT, they are really a means to the end of value-based action (Hayes et al., 1999; Hayes et al., 2006).

Once values in each domain are identified, these are ranked in terms of importance to the client. Valued intentions (e.g., “to be a loving partner” in the area of intimate relationships), associated goals, and specific actions are then developed. *Committed action* involves the client making behaviour changes that lead to valued short, medium, and long-term goals (Hayes et al., 2006). Barriers to goal achievement are acknowledged and problem-solved by

changing these into goals, and psychological barriers are addressed with the other ACT skills (Hayes et al., 2006). Most methods of behaviour change can be applied in this phase of therapy, from an ACT perspective (e.g., exposure, goal-setting, skill development). In achieving these goals through behavioural exercises and homework assignments, the client gradually develops and expands effective behaviour patterns. This process turns the client's values into concrete change behaviours (Hayes et al., 1999). Verbal regulation is thus applied in contexts where it is useful, and where control is possible – in the realm of actions or behaviour (Hayes et al., 1999), refocusing the client toward what can be changed (Hayes, Masuda et al., 2004).

Summary – ACT in a Nutshell

In summary, ACT holds that a client's difficulties stem less from the presence of psychological symptoms and more from their avoidance and subsequent lack of movement towards life goals. Thus, there are two core goals of the ACT approach: 1) to encourage acceptance of the full experience of being human by embracing unwanted thoughts, emotions, memories, and bodily sensations; and 2) the choice to live and committed action towards a value-based life (Eifert & Forsyth, 2005). Consequently, ACT is about balancing acceptance with meaningful change (Eifert & Forsyth, 2005; Hayes et al., 1999).

ACT and the Nuclear Test Veterans

Why Use ACT?

As previously discussed, ACT's focus is not on reducing or eliminating anxiety, but on helping clients live a life they value, taking their anxiety *with* them (Hayes et al., 1999; Twohig, Masuda, Varra, & Hayes, 2005). It is not about evaluating or judging certain beliefs as dysfunctional or irrational, and changing these, nor is it about learning to “master” or control anxiety. For these reasons, ACT may be particularly helpful for clients who are very avoidant of their negative internal experience, for addressing psychological problems that are chronic in nature, or unresponsive to cognitive change techniques, and in situations where there is no “solution,” or a change/control approach is not feasible. Health anxiety subsequent to nuclear radiation exposure is a psychological condition that is not necessarily unrealistic or cognitively distorted. With the known effects of radiation on health (Bertell, 1985; Upton, 1998), the exposed individual can be left feeling anxious about having been physically damaged, which is difficult to cognitively refute, even in the presence of a current clean bill of health. As a consequence, the nuclear veterans' health anxiety stems from the possibility of real and

continued threat to their physical integrity. ACT, therefore, appears very suitable for their situation.

ACT for Older Adults

In addition, ACT may have specific utility as a psychotherapeutic treatment among older adults as there are multiple stressors that arise in late life that are not necessarily “controllable,” and because successful coping among elderly adults has been shown to be more “accommodation focused” (Heckhausen, 1997). Additionally, older adults tend towards more passive (avoidant) emotion-regulation strategies (e.g., suppression) in situations that are more emotionally salient (Blanchard-Fields, Casper Jahnke, & Camp, 1995; Blanchard-Fields, Stein, & Watson, 2004), and may tend to use emotion regulation more often than younger adults (Charles & Carstensen, 2007; Consedine & Magai, 2006). Previous research has also indicated that experiential avoidance, specifically targeted in ACT, is a strong moderator between health concerns and anxiety amongst older individuals in NZ. It is a predictor of mental health problems in this age group, particularly anxiety (Andrew & Dulin, 2007). Thus, experiential avoidance seems a very fruitful target for treatment approaches in older adults, particularly given the higher prevalence of health concerns amongst this age group. Andrew and Dulin (2007) state:

...interventions that specifically target avoidance processes revolving around health problems may be beneficial for older adults. At the least, the results from this study provide justification for further exploration of ACT as a treatment for late life anxiety and depression. (p. 602)

It has also been suggested that older adults from NZ may be particularly likely to use avoidant coping strategies due to their pioneering background, a culture that “did not normally favour public displays of emotion” (King, 2003, p. 407). While there is not a lot of strong evidence, it is generally understood that stoicism, a form of emotional control, is encouraged in NZ, particularly among males, and is more prevalent in older adults. Thus, the nuclear veterans may exhibit stoic attitudes to the expression and acknowledgement of emotional difficulties, and to help-seeking. Stoicism originates from the Hellenistic philosophical movement in Greek and Roman history (around 300 B.C.; Sherman, 2005), in which a central view was that although humans may not have control over external circumstances, they could control their internal relation (i.e., attitude or reaction) to these circumstances (Sherman, 2005), and in particular their emotional response. To orthodox stoics, emotions, particularly fear, were seen

as weakness and vulnerability because they were irrational, and were to be eliminated (Sherman, 2005). The idea of internal experiences being under our control remains part of the modern concept of stoicism. Thus, in some cultures efforts to deny, suppress, and control emotion (Wagstaff & Rowledge, 1995) are often actively encouraged and reinforced, in the service of avoiding open emotional displays and vulnerability (Judd, Komiti, & Jackson, 2008). Along with a lack of emotional expression, stoicism tends to incorporate the belief that one should be self-reliant, and not seek help for problems, particularly if mental health-related (Judd et al., 2008). In keeping with this, older adults are less likely to use mental health services, often seeking help from their GP (Nordhus, Nielsen, & Kvale, 1998).

Higher levels of stoicism have been observed in older adults of both genders (Murray et al., 2008; Yong, 2006), which may suggest a cohort effect. Cohort differences involve individuals being born in a particular birth year (or being of a certain generational group), and consequently defined by the various attitudes, beliefs, and personality attributes they are socialised into. These tend to remain stable during the ageing process and set cohort members apart from those born at different points in time (Knight, 2004). With NZ being described as a country that did not encourage emotional expression (King, 2003), this type of mindset may be stronger in those who have lived in this culture over a longer period of time, particularly earlier cohorts than the Baby Boomer generation. Indeed, Blanchard-Fields (1998) notes that for those growing up during the Great Depression, suppression and stoic coping was somewhat adaptive. However, it is also important to recognise that as emotionality may be less intense in older age, older adults may generally express less emotion (Knight, 2004). Alternatively, this cohort may not recognise symptoms of psychological distress, as Oakley Browne et al. (2006) state,

It is possible different age cohorts have different conceptualisations or explanations for episodes of psychological distress or clusters of mental symptoms. People from more recent cohorts may be more likely to interpret such episodes as attributable to mental disorder, while people from older cohorts may interpret such episodes as expected reactions to circumstances and not perceive them as indicative of mental disorder. (p. 67)

This could make older adults less likely to recognise or seek help for, symptoms of anxiety disorder.

Additionally, the military is a population in which stoic coping is strongly prevalent and often encouraged (Sherman, 2005). In their naval service, although not involving active combat, the present participants spent considerable time in this type of environment, where they may have been actively encouraged to ignore their emotions. Military service at a formative age (late adolescence/early adulthood) may have led to the attitudes of controlling emotion and hiding or denying emotional difficulties becoming strongly fixed in the nuclear veterans. Thus, the presence of all these factors – being male, NZ older adults, and military service may make this cohort particularly susceptible to stoic expression, leading them to present well, and avoiding admitting they may need assistance with emotional health.

While widely accepted, and in some contexts highly valued, Sherman (2005) recognises stoicism becomes a problem when the strong stance of over-control and attempting to eliminate emotions leads us to deny our humanity. A number of research findings provide support for reducing experiential avoidance in the form of unhelpful stoicism in older adults. Stoicism is related to negative attitudes towards help-seeking for mental illness, and lower subjective quality of life (Murray et al., 2008). Additionally, theory and research support experiential avoidance as a vulnerability to psychological distress (particularly anxiety; Kashdan, Barrios, Forsyth, & Steger, 2006), with psychological acceptance being related to increased quality of life in older adults (Butler & Ciarrochi, 2007). ACT may help to foster “healthy stoicism” (Sherman, 2005) by encouraging stoic clients to accept all of their experiences, rather than trying to suppress or control emotions and thoughts as the perceived “weaker” sides of themselves. The ACT approach of helping clients to recognise the importance of compassion, forgiveness, and vulnerability would be useful for clients who avoid these attitudes, particularly towards themselves. These factors provide further support for the choice of an ACT approach to health anxiety in the NZ nuclear test veterans, who are all in their later years.

ACT for Māori

With a small proportion of Māori nuclear veterans (estimated to be around 10%; R. Sefton, personal communication, April 16, 2009), it is important to consider how ACT may fit with the Māori cultural world-view. Research in Aotearoa/NZ will likely include Māori and Pākehā (non-Māori or European New Zealanders), with Māori making up 14.6% of the population (Statistics New Zealand, 2006a). While NZ research is likely to include participants from a growing number of ethnic groups (Prasadaraio, 2007), it is important to acknowledge Māori as the

tangata whenua (indigenous peoples, or “people of the land”; Durie, 2003). In research and practise with Māori it is paramount to recognise they may hold a different (and equally valid) view of health to that of the dominant paradigm of Western medicine. Māori thinking is holistic, and does not compartmentalise or break things down, but places them in a wider systems context (Durie, 2003). Te Whare Tapa Whā (a four-sided house) is a holistic model of health widely accepted as representing the Māori concept of health (Durie, 2003). It recognises four different elements that must be in balance to produce good health: *taha wairua* (the spiritual side), *taha hinengaro* (thoughts and feelings), *taha tinana* (the physical side), and *taha whānau* (family). These dimensions are anchored on the spiritual, rather than the physical side (Durie, 2003). Other Māori models of health have also been presented, including Te Wheke (Pere, 1984, as cited in Durie, 2003), Ngā Pou Mana (Henare, 1988, as cited in Durie, 2003), Te Pae Māhutonga (Durie, 2000), and the Meihana model (Pitama, Robertson, Cram, Gillies, Huria, & Dallas-Katoa, 2007).

Because Māori view mental health in this holistic way, mechanistic models of the psyche that differentiate the mind, body, and culture can be seen as irrelevant (Durie, 2001). Thus, there is a need for new therapeutic approaches, or modification of current approaches, that complement this view of health. In accordance with this, initiatives such as that of Bennett, Flett, and Babbage (2008) in adapting CBT for Māori are beginning to take place. While the purpose of the present study was not to investigate the fit of ACT for Māori, or to develop cultural adaptations,²⁰ it was thought this approach may appeal to Māori clients because it incorporates many domains of life (including spirituality) in its focus on values, showing potential compatibility with the Māori world-view. ACT is rooted in functional contextualism, which makes no claim on the rationality or correctness of an internal experience (such as the dimension of *wairua*; see Hirini, 1997), but instead focuses on what works for an individual given their unique context. Given this emphasis, ACT may be more palatable to Māori than a more mechanistic and somewhat evaluative therapy such as standard CBT.

An ACT Conceptualisation of Health Anxiety in the Nuclear Veterans

The nuclear veterans may not have experienced health anxiety immediately post-exposure (their nuclear testing experience apparently did not concern them at the time; R. Sefton, personal communication, 2001). However, the early loss of nuclear veteran comrades

²⁰ The general focus of the present research was to investigate the usefulness of the ACT protocol in its current form with both Māori and Pākehā. In addition to examining whether this approach was useful with older adults, we wanted to see if this particular modality would prove effective with people from another culture.

(particularly to cancer), as well as their own unexplained or undiagnosed physical symptoms, may have precipitated the development of health anxiety in these men. They may hold the belief that they too have, or will develop, radiation-related illness from the exposure, along with anxiety-provoking images of disease, pain, and death, memories of friends dying, anxious feelings, and associated bodily sensations. Cognitive fusion with thoughts such as “I have unexplainable physical symptoms, and I was exposed to radiation, so I must have cancer,” and fusion of normal bodily experiences of ageing (or related to other illnesses, such as diabetes) with such thoughts, may lead the veterans to evaluate these experiences as negative and threatening because of their associated meaning of illness and death.

Fusion may make the veterans afraid of and unwilling to experience their normal and justified health anxious thoughts, feelings, and physical sensations. They may try to avoid these through experiential avoidance in the form of suppression, control (worry), distraction, and hypervigilance for bodily sensations and symptoms, along with behavioural methods including bodily checking, reassurance-seeking from family and GPs, alcohol use, and avoiding anxiety-provoking situations. While these strategies are effective in reducing anxiety in the short-term, they are unworkable, serving to increase and perpetuate the anxious thoughts and feelings, and preoccupation with health and bodily sensations. Continued experiential avoidance leads to disordered health anxiety, and a life restricted and preoccupied with this avoidance, rather than lived according to values.

The ACT Approach to Health Anxiety in the Nuclear Veterans

In this case, ACT would help the veterans develop willingness to acknowledge and accept their health anxious experiences, which are natural and justified, and live a meaningful life unrestricted by avoidance while experiencing these. A state of *creative hopelessness* would be induced to help them recognise the costs and unworkability of attempts to control anxiety, and to encourage them to end the struggle to avoid. ACT would seek to defuse their literal belief in health anxious thoughts, so the thought “This pain in my stomach means I have cancer” becomes “I’m having the thought that this pain in my stomach means I have cancer.” Defusion through mindfulness and the techniques previously described would help change the veterans’ relationship to their anxious experiences, so they no longer seem threatening. Mindfulness would also encourage living in the present, rather than a continual focus on illness possibilities in the future. Clarifying values, and committing to value-consistent action through

exposure to anxiety-provoking situations without using experiential avoidance, would assist the veterans in making workable behaviour change.

CHAPTER NINE: ACT – EVALUATING THE LITERATURE

The General Efficacy of ACT

While research on the effectiveness of ACT is still in the early stages (Hayes et al., 2006), ACT is rapidly gaining support in the treatment of a variety of psychological problems. There are studies showing its efficacy with depression, anxiety disorders, chronic pain, distress from psychosis, eating disorders, substance abuse, smoking cessation, occupational stress, trichotillomania, skin-picking, cancer distress, stigmatising attitudes, substance abuse counsellor burnout, emotional dysregulation and self-harm, and management of epilepsy and diabetes (see Hayes et al., 2006 for a recent review). Additionally, ACT is gaining support in the treatment of children and adolescents (see Greco & Hayes, 2008).

In the most recent review and meta-analysis of the ACT data, Hayes et al. (2006) reviewed all studies with controlled methodology up to Spring 2005 (northern hemisphere). They examined the strength of ACT outcomes when compared with various conditions (alternative interventions and wait-list control). Effect sizes (Cohen's *d*) between conditions were 0.66 at both post-treatment and follow-up. Comparing ACT with clearly detailed treatments (specifically targeting the clinical problem) yielded effect sizes of 0.48 and 0.63 at post-treatment and follow-up, respectively. Comparing ACT with wait-list, treatment-as-usual, and placebo conditions produced large effect sizes of 0.99 post-treatment, and 0.71 at follow-up. Effect sizes for studies comparing ACT to CT or CBT were 0.73 at post and 0.83 at follow-up, in favour of ACT. Hayes et al. (2006) acknowledge these results should be interpreted cautiously as the studies have been compiled by ACT researchers. They concluded that overall, ACT appears to be effective for a range of problems of varied severity. Effect sizes were medium to large and in some cases were greater at follow-up, showing strong and practically significant, not just statistically significant effects.

Recently, Ost (2008) completed a methodological review and meta-analysis of third wave therapies. He compared the 13 existing ACT randomised clinical trials (RCTs) to matched RCTs (published around the same time in the same journals) for CBT, based on a number of criteria. Ost reports that the third wave RCTs for ACT were less methodologically stringent than those for CBT, with less studies using a diagnostic system. Additionally, the ACT studies had a range

of sample sizes, varied numbers of treatment completers, predominantly female middle-aged participants, more therapy hours, and shorter follow-up periods than CBT studies. Issues with study design, combining ACT with other treatments, number of therapists, not obtaining therapy adherence or therapist competence ratings, and assessment of treatment credibility were also highlighted. The meta-analysis yielded a moderate effect size of 0.68 for ACT, comparable to that reported by Hayes et al. (2006). However, according to Ost (2008), ACT does not yet fulfil the criteria for an empirically supported (well-established) treatment.

In the past, ACT has been criticised for being presented as a therapeutic approach without sufficient empirical support (Corrigan, 2001). (However, Hayes et al., 2004 point out that Corrigan's argument was not based on empirical review of the ACT literature.) Recently, Ost (2008) commented that given the first ACT manuals were developed in the early 1990s, ACT's publication rate is not very high. Ost (2008) states, "... one may wonder how long a therapy can be said to be 'young and promising' " (p. 310). It is possible that ACT (and indeed the third wave in general) represents such a paradigm shift in psychological theory that researchers and clinicians are taking time to adjust and "test the waters." Alternatively, one reviewer (J. D. Herbert, 2002) argued that Hayes and colleagues have failed to address from an ACT perspective how CT has proven so effective, given their emphasis on the problematic nature of verbal rules. Thus, CBT is still the most evidence-based psychotherapy to date (Norcross, Hedges, & Castle, 2002), which may make it difficult for avid followers of this approach to "switch tact." Furthermore, another reviewer (Evans, 2005) has argued that the presence of outcome studies does not necessarily demonstrate that ACT has anything unique to offer as a therapeutic approach.

However, while research proliferation appears slow, given it is now approximately 10 years since the publication of Hayes et al.'s (1999) original ACT manual, there has been a rapid increase in publication in recent years (Cairns, 2006; Marx, 2006). Since Hayes et al.'s (2006) review, a number of studies have been conducted, including at least 15 RCTs examining ACT compared to various conditions, a similar number of studies examining ACT alone with no comparison condition, and several studies investigating mediators of change, correlations, and individual cases (these studies were found on PsycINFO only, so there are likely to be more than this). While it is beyond the scope of this chapter to review these studies, in general they consistently show positive results for the use of ACT. Similarly, general ACT articles listed in PsycINFO have gone from approximately 139 in the period from 1986 (when ACT was first

published as “Comprehensive Distancing”) up to and including 2005, to 279 in total at the present time of writing, showing a rapid increase in scholarly writing on the topic between 2006 and March 2009 (140 articles).

Despite the criticism of Corrigan (2001) and Ost (2008) reported above, Hayes and colleagues (Hayes et al., 2006; Hayes et al., 2004) openly acknowledge the following limitations in the ACT literature: some studies are unpublished dissertations, a number of publications are case studies, the control conditions used, the use of self-report process measures that have not been well researched and validated, and the lack of large-scale efficacy trials. Hayes and colleagues have only ever described the findings of ACT studies as “preliminary,” “promising,” and “limited” (Hayes et al., 2006; Hayes et al., 2004), rather than claiming that the evidence was sufficient (J. D. Herbert, 2002). One would think that the methodological flaws in the research make the consistency of the ACT data even more impressive. Despite these issues, and in light of this evidence, it is fair to say that a strong research base for ACT is being built (Hayes et al., 2006).

How Efficacious is ACT in the Treatment of Anxiety Disorders?

Comparing ACT with Other Treatments

While still modest, the research on ACT with anxiety disorders is growing. Efficacy research is concerned with causality – whether a treatment will bring about change under controlled conditions (Chambless & Hollon, 1998; Lambert & Ogles, 2004). To date, several RCTs have taken place, most examining the efficacy of ACT compared with established treatments for anxiety disorders. This, according to Chambless and Hollon (1998) is the most rigorous form of comparison when assessing the efficacy of a new treatment approach.

Of particular relevance to the present research, Páez, Luciano, and Gutiérrez (2007) report in their abstract²¹ that they compared ACT with a cognitive control approach for 12 women with breast cancer-related anxiety. Results showed that ACT produced greater changes in anxiety, depression, quality of life, and values, mostly at 12-month follow-up. Additionally, Montesinos and Luciano (2005) compared an ACT intervention to a wait-list control condition in a clinical

²¹ Where the results of only an abstract are reported, this is because the study could not be reviewed either because it was written in Spanish, and only the abstract was available in English, or it was an unpublished doctoral dissertation not readily available to the writer. Information regarding these studies has been used in support of major studies, which were available in their full form.

trial for relapse fear in breast cancer patients. The abstract reports that most of the 8 ACT participants (all of whom received 1 individual session) exhibited post-intervention reductions in fear intensity and interference, and clinically significant reductions in emotional distress, hypochondria, and “anxious worrying” were also observed. (These changes were not observed in the 4 wait-list participants.) However, there was no change in experiential avoidance (measured with the Acceptance and Action Questionnaire [AAQ]). An increase in valued action was considered the main indicator of change, with a reduction observed in the interference of fears about valued acting, and behaviour change having increased at follow-up.

Twohig (2008) completed a randomised clinical trial comparing ACT with Progressive Relaxation Training (PRT) in the treatment of obsessive-compulsive disorder (OCD). The abstract reports that 34 individuals were randomly assigned to either treatment condition. ACT was observed to be superior to PRT in (clinically and statistically) significantly reducing OCD severity, with gains maintained at 3-month follow-up. ACT participants showed changes in “thought action fusion,” cognitive control attempts and experiential avoidance post-treatment and at follow-up. While they showed post-treatment improvement in quality of life, this was not maintained at follow-up. Working from the abstract, Twohig (2008) reports that the ACT intervention did not include in-session exposure to enable clearer comparison of the two approaches. While it is positive that ACT showed promise in the treatment of OCD, renowned as a difficult condition to treat (Emmelkamp, 2004), ACT was not compared to exposure and response prevention (ERP), one of the most empirically supported treatments for OCD (Abramowitz, 1997).

Forman, Herbert, Moitra, Yeomans, and Geller (2007) compared the effectiveness of non-manualised ACT and CT in the treatment of combined anxiety and depression. The 101 university student outpatients (80% women, aged 18 to 52 years, mean age=28 years) were randomly assigned through stratified randomisation by symptom level to either treatment condition. (This sample had the following breakdown of ethnic groups: 64.4% Caucasian, 12.9% Black, 10.9% Asian, and 3% Latino.) Of these, 32% presented with an anxiety disorder. ACT and CT were equally effective in reducing anxiety. Calculations of clinical significance (according to Jacobsen and Truax’s 1991 model) showed that 55% of those with anxiety had “recovered” post-treatment. There were no differences between the two conditions on measures of psychological flexibility (or experiential avoidance, measured by the AAQ) and mindfulness skills, with participants in both conditions showing improvements. Both

treatments also showed equal reductions in depressive symptomatology, distress, and improved clinician ratings of global functioning. The researchers concluded that while the two approaches were equally effective, they appeared to operate through different mechanisms.

Forman et al.'s (2007) research is strong, comparing ACT to the "gold-standard CBT treatment (CT)" (p. 791), using stratified randomisation (blocking on pre-treatment symptom severity), and assessing treatment adherence and therapist competence (which were high), therapist allegiance to treatment approach, and requiring therapists to carry out both forms of treatment. The use of multi-method assessment was also favourable, and guarded against shared method variance. The researchers used a heterogeneous sample with broad inclusion criteria to maximise external validity, with participant treatment expectancies being assessed. A number of therapists (n=23) were involved, with their experience and training well described. However, therapist effect on outcome between conditions was not analysed, and it is not known whether participants were randomly assigned to therapists. Despite the attempt to obtain a heterogeneous sample, 80% of the participants were female and highly educated. There was also a lack of information regarding an initial assessment measure "based on" the DSM-IV-TR (p. 780), and no treatment manual was used or detailed description provided to allow for replication. These issues aside, ACT appeared to be as effective as CT, the established treatment for disordered anxiety. While pure anxiety was not assessed, and detailed diagnoses not provided, with anxiety and depression being highly comorbid (Sadock & Sadock, 2003) this combined presentation is likely to be more reflective of client presentation in clinical settings. Along with efficacy, this study provides some support for ACT's effectiveness – utility in clinical practise (Chambless & Hollon, 1998).

ACT has also been compared with Systematic Desensitisation (SD) for mathematics anxiety (Zettle, 2003) in mature-aged university students, along with test and trait anxiety. The 37 students (30 women, 7 men, mean age=31 years) were randomly assigned to one of the conditions, receiving weekly 1-hour manualised (individual) sessions over a 6-week period. (However, 13 participants subsequently dropped out, leaving 12 treatment completers in each group. No differences were found between completers and non-completers.) Both treatments produced equal and clinically significant reductions in maths and test anxiety post-treatment, which were maintained (still with no treatment difference) at 2-month follow-up. However, SD produced greater change scores over the course of treatment, as well as a reduction in trait anxiety. Further reductions in maths anxiety were observed at follow-up in

the ACT condition, indicating that ACT may be more effective in preventing maths anxiety relapse, or may have a cumulative effect over time (Kendall, Holmbeck, & Verduin, 2004). According to Jacobsen and Truax's (1991) model, at least half the participants in each condition showed recovery or improvement in their maths anxiety post treatment (Zettle, 2003), with no differences between conditions, and changes maintained at follow-up. While participants in both conditions showed equal reductions in experiential avoidance (on the AAQ) post-treatment, which were maintained at follow-up, therapeutic change appeared to be mediated by different processes for the two approaches.

A strength of Zettle's (2003) study is the comparison of ACT with a well-established treatment for phobias (in this case maths anxiety was treated as a specific phobia; Zettle, 2003). However, SD for maths anxiety is usually a group treatment; therefore, caution is required in interpreting these results. The lack of efficacy discrimination between the two approaches may have been due to the small sample, and subsequent lack of power to detect significant effects. Manualised treatment, with a clear description allowing for replication, was another strength of this study. Conversely, treatment adherence and therapist competency were not assessed, and the author treated all participants. One reviewer (Ost, 2008) states that because Zettle was one of the initial ACT therapists (Zettle & Hayes, 1986), he may have been biased towards or have superior ability in this treatment approach. Additionally, no formal diagnosis of maths anxiety took place and inclusion criteria were not explicit. While ACT appears to have been successful in treating maths anxiety, SD produced greater therapeutic change overall.

Block and Wulfert (2000) compared the effectiveness of an ACT intervention to Cognitive Behavioural Group Therapy (CBGT) and wait-list control for social anxiety (public speaking) in university students. In this pilot study, 11 of 12 students (7 females, 4 males) who met the criteria for "phobic anxiety" (this was not clearly explained) were semi-randomly assigned to one of the conditions, with 1 student subsequently dropping out of the ACT condition. Participants in the treatment conditions received weekly 1.5-hour sessions over 4 weeks. The ACT and CBGT conditions appeared to produce equivalent results, with general reductions in social anxiety and avoidance observed over the course of treatment, while scores for wait-list participants remained the same or increased. Treatment gains were largely maintained at follow-up. Participants in both treatment conditions generally showed increased willingness to participate in academic public speaking opportunities post-treatment. ACT appeared to be more effective at maintaining increased willingness (though with a non-standardised, un-

normed test developed specifically for this study), which had increased at follow-up for most ACT participants, and decreased for CBGT participants. However, the small sample size in this study (and some inconsistent results) did not allow a conclusion about the impact or superiority of either therapy approach.

While Block and Wulfert (2000) compared ACT to an empirically supported treatment for social phobia, there are a number of methodological flaws. Participants were not fully randomly assigned, and there was no assessment of the clinical significance of results. Social anxiety was not formally assessed, and information regarding symptom severity, psychometric properties of the measures, and participant demographics was not given. Furthermore, treatment manuals were not used, treatment was not fully detailed to allow for replication, and no checks for treatment adherence or competence were completed. The use of multiple therapists (four) was favourable, but no information was given regarding therapist training and experience, and two therapists provided each approach, with small numbers precluding analysis of the influence on outcome.

Following the pilot study (Block & Wulfert, 2000), a larger study comparing ACT with CBGT for social anxiety in university students was completed (Block, 2002; see Hayes, Masuda et al., 2004). The abstract states that students received a public speaking workshop tailored to either approach. Participants in both treatment groups showed increased willingness to engage in public speaking activities, and reduced anxiety and avoidance.

While there is a need for more rigorous and larger-scale RCTs, these results are somewhat encouraging in the use of ACT with anxiety disordered populations. While only one study found ACT to be superior to another approach (Twohig, 2008), the RCTs reviewed had small samples and may have lacked power to detect significant differences in treatment outcome. According to Chambless and Hollon's (1998) criteria, ACT cannot yet be considered an empirically supported treatment for anxiety disorders due to sample sizes and other methodological issues described in these RCTs, but it could definitely be considered *possibly efficacious* (no evidence in these trials conflicts with its effectiveness in producing therapeutic change).

No Comparison Group

Three studies examined the effectiveness of ACT without a comparison group, a much less robust method of assessing a therapeutic approach. Dalrymple and Herbert (2007) studied the effectiveness of ACT for social anxiety disorder (generalised). The 19 participants (53% female, mean age=31 years, 63.9% Caucasian) were obtained through referral from a university anxiety clinic and local media. They received 12 sessions of weekly individualised therapy, based on a manualised protocol developed by the authors. Thirty percent of participants were diagnosed with a comorbid depressive disorder, and 24% with a comorbid anxiety disorder. Participants showed (statistically significant) decreases in self-reported symptom severity (fear and avoidance) post-treatment, along with decreased anxiety-related life impairment, less discrepancy between values and consistent action, and improved quality of life. Comparatively, there were no changes over a baseline period of 4 weeks. All changes were maintained at 3-month follow-up. Clinician ratings also indicated participant improvement and reduced severity post-treatment and at follow-up, along with improved social skills quality and reduced anxiety in social interactions post-treatment (which participants agreed with, based on role-play ratings). Reduced experiential avoidance (measured by the AAQ) was observed post-treatment, and participants reported greater perceived control over their emotional reactions (although this seems inconsistent with an ACT approach) and external events over the course of therapy. Effect sizes (Cohen's *d*) across all measures ranged from moderate (0.43) to very large (3.86), comparable to studies applying CBT to social phobia (Dalrymple & Herbert, 2007).

The strong diagnostic assessment, including comorbid diagnoses, and use of well-trained independent evaluators are strengths of Dalrymple and Herbert's (2007) study. Additionally, raters of the videotaped role plays were blind to the time of assessment. However, those completing the clinician ratings were not. The use of multi-method assessment measures was excellent, and effect sizes were mostly large, showing substantial therapeutic change on both specific skills/behaviours and general functioning levels (Kendall et al., 2004). However, measurement of clinically significant change was not reported. Also, a treatment manual was used, and adherence checks were conducted, including the assessment of techniques that were non-consistent with ACT. Participants considered ACT an acceptable approach. While several therapists appear to have been involved, no further information was given regarding number, training, experience, or assignment to participants. Therapist factors were not analysed, and competence does not appear to have been assessed. The small sample limits

generalisability. Despite the lack of comparison condition, the thorough assessment, strong effect sizes, and difference from baseline scores provide confidence in ACT's ability to produce change, as well as its utility.

Ossman, Wilson, Storaasli, and McNeill (2006) examined the use of a group ACT intervention with socially anxious participants. The abstract reports that of the 22 people who initially signed up for treatment, 12 participants completed the protocol, receiving 10 sessions. Participants showed reductions in social anxiety and experiential avoidance post-treatment and at follow-up, with respective follow-up effect sizes of 0.83 and 0.71. Participants also reported an increase in their effectiveness in social relationships at follow-up.

Braekkan (2007) completed a controlled comparison of ACT versus no treatment for PTSD in combat veterans. The abstract states that at baseline and 12-week assessment, the veterans differed significantly on all measures from a non-equivalent community sample control group. The veterans receiving ACT reportedly exhibited no changes in experiential avoidance, in the believability of automatic thoughts, or in PTSD symptomatology, depressive symptomatology, or life satisfaction over the course of therapy. The control group also showed no changes over the 12-week period. (The abstract did not report the number of participants.)

Twohig, Hayes, and Masuda (2006) studied the effectiveness of an ACT intervention for OCD. The 4 participants (aged 19 to 63, recruited through a university and newspaper advertisements) received treatment following baseline periods ranging from 1 to 7 weeks, in a "non-concurrent" multiple-baseline-across-participants design. (Two participants were of Caucasian and Hispanic ethnicity, 1 was Caucasian, and the other African American.) The weekly, 1-hour sessions were based on an 8-session treatment manual. Participants showed clinically significant improvements in OCD symptomatology (frequency and distress associated with obsessions) to non-clinical levels post-therapy. Additionally, all participants showed major reductions in the frequency of self-reported compulsions (such as checking, hoarding, or cleaning) over the course of therapy. Reductions were observed in experiential avoidance of and cognitive fusion with obsessions, as well as comorbid anxiety and depression. All treatment gains were maintained at 3-month follow-up. Participants considered the ACT approach highly acceptable.

Twohig et al. (2006) utilised strong treatment integrity checks, with high treatment adherence and therapist competence ratings, and no observed inconsistency with an ACT approach. Further strengths included the omission of in-session exposure to make theoretical comparisons with ERP more robust, and the clear description of treatment allowing for replication. However, while the clinical assessment interviews used DSM-IV-TR criteria to make diagnoses, formal diagnostic or behavioural measures of OCD were not utilised, neither was comorbid psychopathology formally assessed. Furthermore, the same therapist assessed and treated all participants. The authors acknowledge that placebo effects cannot be ruled out as an explanation for the results. External validity is limited due to the very small sample.

While these studies provide support for the use of ACT with various anxiety disorders, and most established a baseline for comparison, the lack of a comparison group means that non-specific effects such as the passage of time, participant expectancy of change, therapist attention and expectancy, and repeated psychological assessment still cannot be ruled out (Chambless & Hollon, 1998; Kendall et al., 2004; although the influence of these factors is less likely in multiple-baseline studies like Twohig et al.'s [2006]). Thus, it is not clear whether ACT or other factors resulted in the therapeutic change observed.

Case Studies

A number of case studies have been published providing further support for the effectiveness of ACT in treating clients with clinically disordered anxiety, this time consistently in clinical practise settings. In the earliest case examples, Hayes (1987) reported treating 12 clients with various anxiety disorders including OCD (4 clients), agoraphobia with panic attacks (5 clients), social phobia (2 clients), and panic disorder (1 client). Participants ranged in age from 28 to 60 years (9 females, 3 males) and received between 10 and 40 sessions. The length of participants' disorders in their current condition of crisis ranged from 6 months to 6 years, and the number of previous psychiatric hospitalisations ranged from 0 to 6. Hayes observed that all clients showed a reduction in their average self-reported levels of anxiety (to "individualised scenes"), with scores falling by around 4 to almost 8 points on a subjective units of discomfort scale (from 1 *No anxiety* to 10 *High anxiety*). Further details regarding treatment and maintenance of gains were not presented.

In their abstract, Montesinos, Hernandez, and Luciano (2001) report successfully using ACT to treat psychological difficulties in a 46-year-old male diagnosed with breast cancer. The client

reportedly presented with high levels of anxiety and obsessive cancer-related thoughts (along with other related concerns). He received approximately 20 sessions of therapy, showing improvement that was maintained at follow-up. Huerta, Gomez, Molina, and Luciano (1998) reported improvement in a 26-year-old woman with generalised anxiety, who was treated using ACT “strategies” (p. 752). The abstract reports she received 18 1-hour therapy sessions approximately twice a week, and her treatment gains following this intervention were maintained at 1- and 12-month follow-up. Similarly, Zaldivar and Hernandez (2001) reported success in using ACT to treat a 38-year-old woman with agoraphobic and depressive symptoms. The abstract reports she received 24 sessions of ACT (21 treatment and 3 follow-up). She showed (implied) anxiety reduction, a decrease in the verbal context of reason giving, avoidance, use of anxiolytic medication, and an increase in value-directed behaviour.

A 28-year-old man diagnosed with panic disorder with agoraphobia was also successfully treated with ACT (Carrascoso Lopez, 2000). The client received 12 1-hour sessions of therapy, which took place weekly, fortnightly, or monthly over a 5-month period. He showed a considerable reduction in anxiety post-treatment on self-report measures, and through reports that his panic attack frequency decreased from 4 (maximum) between sessions to 0 over the course of treatment, with the frequency of avoidance and escape behaviour also decreasing from 10 and 4 times, respectively, to 0. The client was discharged following the final session, but no formal follow-up was completed (due to the therapist moving cities). However, qualitative information suggested his gains were maintained. To explain an apparent inconsistency in scores, Carrascoso Lopez (2000) states that although the client’s levels of anxiety in various locations increased or remained the same, he was able to allow panic symptoms to be present with no subsequent avoidance behaviour. While the client was diagnosed in accordance with DSM-IV criteria, the assessment interviews in this study were only semi-structured. No detailed information is given on the measures, making it difficult to judge their psychometric strength, and the initial anxiety severity. Also, experiential avoidance and willingness were not measured (although the AAQ had not yet been developed). Additionally, treatment was not manualised or described in detail, and there was no formal follow-up assessment. Information regarding the therapist’s training was not provided, and competence and adherence checks were not carried out. The author speaks of using “distraction” (p. 124) which would seem incompatible with an ACT approach, although the meaning of this is unclear. Despite clinically significant change not being measured, ACT appeared to be effective in treating this client’s difficulties.

Batten and Hayes (2005) examined the effectiveness of ACT for comorbid PTSD and substance abuse. A 19-year-old woman received 17 months of ACT (with varied session frequency). She showed reductions in psychological distress, depressive symptomatology, and general psychopathology to non-clinical levels post-treatment. She also showed reduced experiential avoidance (measured by the AAQ), thought suppression, and frequency and believability of negative self-statements. Her self-reported frequency of drug use (including amphetamines, alcohol, cocaine, and marijuana) reduced from a maximum of 10 days of use per month to no use by Month 7, and was maintained, with only a slight increase during follow-up. All gains were maintained at 3-, 6-, and 12-month follow-ups. Qualitative information indicates the client increased in value-driven behaviour. While scores indicated that anxiety and trauma-related distress reduced, PTSD was not formally assessed. Maintenance of treatment gains at 12-month follow-up was especially favourable. However, all data are self-reported, and no assessment of any further treatment received during the follow-up period is mentioned. No information is given regarding the therapist's training or experience, and there was no assessment of treatment adherence or therapist competence. However, the therapist was closely supervised by the principal developer of ACT (S.C. Hayes). Despite no assessment of clinical significance, quantitative results and qualitative information indicate the client made major progress during and post-therapy.

Orsillo and Batten (2005) studied the use of ACT for PTSD and comorbid major depression in a 51-year-old male Vietnam veteran (a "composite case example," p. 105). The client initially presented with nightmares, intrusive memories, panic attacks, and extensive guilt over acts he had performed during the war. He exhibited high levels of experiential avoidance and suppression, and reported difficulties with relationships and employment. Initially, he was unwilling to discuss his Vietnam experiences as they elicited strong emotional responses in him. The authors provide qualitative support for ACT's effectiveness in treating PTSD through reports that the client exhibited increased willingness towards experiencing, and committed to valued actions in the areas of family, intimate relationships, and employment, while allowing his uncomfortable experiences to be present. He was then able to face the traumatic experiences he primarily sought therapy for. The use of clinician-administered as well as self-report measures of PTSD in this study indicates a reliable diagnosis. Also, the therapeutic process was described in detail. However, the authors do not give specific details regarding observed changes in PTSD and other symptomatology, or psychometric information. No information is given regarding the length of therapy or whether follow-up assessment took

place to examine whether gains were maintained. Additionally, information regarding treatment integrity and therapist training and competence is absent.

As with larger samples with no control condition, the influence of non-specific effects on treatment outcome in these studies is unknown, and again cannot be ruled out, particularly in single-case research. As none of these studies appear to have used a baseline period to establish symptomatology and behaviour, conclusions are even more tentative. Additionally, generalisability with case examples is clearly very limited. However, taken together these studies show that ACT has probably been effective in treating at least 17 individual cases of disordered anxiety in clinical settings. This accumulation of evidence also supports an evaluation of ACT as possibly efficacious (Chambless & Hollon, 1998).

General Summary

The literature on ACT for anxiety disorders is currently small, in need of further empirical support and expansion, and not yet methodologically strong. The issues highlighted include the lack of comparison to standard (empirically validated) treatments, diagnostic reliability, randomisation, treatment manualisation, integrity checks, therapist number and analysis of their effects, statistical power, issues with follow-up, and small, select and analogue samples of often predominantly Caucasian female university students. Additionally, in those studies that gave an age range, participants were mainly in early-mid adulthood. Despite this, however, the literature provides consistent and encouraging evidence that ACT may be applied to the treatment of these disorders. Even though symptom reduction is not the explicit focus of ACT, all but one of the studies reviewed showed that ACT was successful in reducing the primary symptomatology targeted, along with experiential avoidance and cognitive fusion, in those studies that measured these components. While not specifically investigated in these studies, ACT appeared effective with individuals of various cultures. The few studies providing information regarding ethnicity included Caucasian, African American, Asian, Latino, and Hispanic participants. ACT has been shown to be superior to Progressive Relaxation Training, and as effective as SD, established as an efficacious treatment for both phobias and mathematics anxiety, and CT, the “gold-standard CBT treatment” (Forman et al., 2007, p. 791). Further research will serve to demonstrate whether ACT can be considered superior to its well-established predecessor.

The Present Study

The present study investigated the effectiveness of a manualised ACT intervention with NZ older adults experiencing health anxiety from past exposure to the testing of nuclear weapons. Research on populations exposed to nuclear radiation through warfare, accidents, or nuclear testing suggests that preoccupation with, and anxiety regarding health is a prominent and often life-narrowing experience post-exposure (Vyner, 1988). Based on this research, it was expected that the NZ nuclear test veterans would be experiencing health anxiety. This type of health anxiety is a unique clinical situation, in that fears regarding health are justified, rather than “irrational” or “distorted,” and as such require a different approach to the well-established but change-focused CBT. ACT was developed to encourage clients to acknowledge and be willing to experience health anxiety, and to stop it from creating barriers to valued action in their lives (Hayes et al., 1999). It is therefore fitting for the nuclear veteran experience. To date, there are no prior studies documented in PsycINFO that have examined ACT in the context of radiation exposure.

The ACT approach proposes that health anxiety becomes problematic through experiential avoidance (EA) of health anxious thoughts, feelings, and bodily sensations, which mediates the relationship between normal and disordered health anxiety. Furthermore, Andrew and Dulin (2007) have recently found that EA moderates the relationship between self-reported health concerns and anxiety in NZ older adults. Thus, it would seem that EA should be the key treatment target in this population of potentially health anxious older adults. ACT was developed specifically for the purpose of reducing this emotional and cognitive avoidance.

Given the small but positive and consistent literature regarding ACT with anxiety disorders, it was proposed that ACT would be effective in reducing EA in the nuclear veterans. Furthermore, while not an explicit goal of ACT, researchers observed in most cases that the primary form of anxiety reduced over the course of the ACT treatment. Of most relevance to the present study was ACT’s effectiveness in reducing health-related anxiety in clients with breast cancer. Reductions in comorbid distress were also observed in the literature.

Additionally, to the author’s knowledge, ACT’s effectiveness with the older adult population has not yet been specifically studied. Thus, a further aim of the present study was to add to

the therapeutic literature regarding the effectiveness of ACT with this client population. This research appears to be the first to examine ACT for health anxiety in older adults.

Based on these arguments, the following specific hypotheses were developed:

1. All participants would be experiencing at least moderate levels of health anxiety at baseline, with scores of 21 or more on the Health Anxiety Questionnaire.
2. ACT would be effective in reducing EA in all participants, shown through clinically significant change pre- to post-therapy on the Acceptance and Action Questionnaire (2nd ed.). It was expected that this increase in psychological flexibility would be maintained at follow-up.
3. Reduced health anxiety levels would be observed pre- to post-therapy. While it is not the goal of ACT to reduce symptoms, the literature demonstrates that this appears to take place simultaneously, as a by-product of individuals being more willing and less avoidant. It was hypothesised that ACT would be effective in treating nuclear exposure-related health anxiety because of its effectiveness in treating cancer-related health anxiety, OCD, social anxiety, generalised anxiety, panic disorder with agoraphobia, and PTSD (see literature review), and due to the generic mechanisms underlying the psychopathology of the anxiety disorders (Eifert & Forsyth, 2005; Hayes et al., 1999).
4. ACT would reduce comorbid psychological distress in the participants, shown through post-treatment reductions on the Depression Anxiety Stress Scale and Negative Affect scale of the Positive and Negative Affect Schedule.

CHAPTER TEN: STUDY II METHOD

Participants

Study II consisted of a sample of NZ nuclear test veterans who responded to the NZNTVA chairman's initial questionnaire inviting research participation in 2001 (see Appendix D) for the "New Zealand Nuclear Test Veterans' Study: A Pilot Project" (Podd, Blakey, Jourdain, & Rowland, 2005). As in Study I, initial contact with participants was made through the chairman, who sent out a letter describing the present research on the researcher's behalf (along with a covering letter of support – see Appendix F). This letter was sent to 17 nuclear veterans living in a particular area of the North Island. Enclosed with the letter was a return-addressed freepost envelope and a form for the men to return indicating interest in the study (see Appendix F). Of the 17, 12 men returned the form, with 9 expressing interest in the research and requesting further information.²² Additionally, 1 participant indicated by post that he could not be involved, and another indicated his interest by telephone. Ten Information Sheets and Consent Forms (see Appendix F) were then sent out; 8 Consent Forms were returned with a positive response. The final group of participants consisted of 5 nuclear veterans. (Three of the 8 men who volunteered subsequently withdrew. Details regarding this are provided below.)

Criteria. The inclusion criteria were exposure to at least one blast in the Operation Grapple testing programme and current residence in the North Island of NZ. Participants were excluded if they had served in a theatre of war,²³ or there were concerns about their ability to participate fully in the programme, based on information from Study I (e.g., terminal illness). It was initially hoped there would be a sample of 9 participants, to enable selection to take place according to geographical area (i.e., more than 1 veteran in the same area) to provide the most feasible travel plan for the researcher. However, with only 8 volunteering, all participants were selected²⁴ (and all met the criteria).

²² The researcher and supervisors deemed it necessary to determine the feasibility of the research with the nuclear test veterans before proceeding with the process of obtaining ethical consent. However, ethical advice was sought from John O'Neill, chairman of the Massey University Human Ethics Committee (Southern A) during this preliminary stage (J. O'Neill, personal communication, March 20, 2006).

²³ This was to avoid combat involvement, and post-traumatic stress symptoms that may accompany this. It was desired that the therapy be specifically focused on health anxiety related to nuclear testing exposure.

²⁴ Only participants from one North Island area were selected, due to limited funds being available for travel.

Measures

The Health Anxiety Questionnaire. The Health Anxiety Questionnaire (HAQ; Lucock & Morley, 1996; see Appendix G) was developed, based on a cognitive-behavioural analysis of health anxiety, to identify those with persistent health anxiety. It consists of four factors: health worry and preoccupation, fear of illness and death, reassurance-seeking behaviour, and interference with life. The measure contains 21 items such as “Are you worried you may get a serious illness in the future?” and “Do you ever find it difficult to keep worries about your health out of your mind?” Participants rate these items on a 4-point Likert-type scale from 0 *Not at All or Rarely* to 3 *Most of the Time*. Scores below 21 indicate low health anxiety, scores from 21 to 31 moderate, and scores above 31 high levels of health anxiety (based on Lucock, Morley, White, & Peake, 1997, and Quadri & Vakil, 2003).

The HAQ has strong psychometric properties. In a sample comprising lay people, student nurses, medical outpatients, and clinical psychology outpatients, the HAQ had an internal consistency of .92, and test-retest reliability of .87 for the lay group (6 weeks) and .95 for the clinical psychology group (4 to 7 weeks; Lucock & Morley, 1996). Split-half reliability ranged from .77 for the student nurse sample to .94 for the psychology outpatients. The HAQ discriminated reasonably between the four groups. It also discriminated between those with and without a diagnosis of hypochondriasis, who had comparable levels of anxiety and depression. Correlations between the HAQ and the State-Trait Anxiety Inventory-T (trait version) were .38 for clinical psychology outpatients, and .64 for medical outpatients. The HAQ correlated .42 with the BDI (clinical psychology outpatients).

The HAQ was selected because it assesses a range of health-related anxiety, rather than hypochondriasis specifically (Walker & Furer, 2006). In view of the factors previously discussed, a measure with a broader focus seemed appropriate. The HAQ is useful for assessing health anxiety in community and broader clinical samples (Walker & Furer, 2006).

The Acceptance and Action Questionnaire, Second Edition. The second edition of the Acceptance and Action Questionnaire (AAQ-II; Hayes, Bond, et al., unpublished, as cited in Hayes, 2005, p. 6; see Appendix G) is a measure of experiential avoidance. It was recently developed based on feedback regarding the AAQ-I (Hayes, Strosahl et al., 2004), and has simpler items than all of the AAQ-I versions (Hayes, 2005). The measure consists of 10 items such as “I’m afraid of my feelings” and “Worries get in the way of my success.” Items are rated

on a Likert-type scale from 1 *Never True* to 7 *Always True*, with higher scores indicating greater experiential avoidance. Items 1, 6, and 10 are reverse scored to control for acquiescence. For the purposes of this study, scores from 0 to 25 indicate low experiential avoidance, 26 to 50 moderate, and 51 to 70 high experiential avoidance. The AAQ-II was specifically selected over the AAQ for this study based on the knowledge that NZ older adults had difficulty comprehending the original 16-item version (D. Andrew, personal communication, 2006).

Psychometric data on the AAQ-II have yet to be published, but preliminary data (AAQ-II; Hayes, Bond et al., unpublished, acknowledged in Hayes, 2005, p. 8) indicate reliability of the AAQ-II across six data sets ranged from .81 to .87 (validation samples ranging from n=206 to 854). The variance accounted for by one factor ranged from 40 to 46%, and all but one item loaded on this factor at >.40. The AAQ-II (if scored so that higher scores indicate greater psychological flexibility) correlates -.75 with the BDI-II, -.59 with the BAI, and “at least to a medium extent” (Hayes, 2005, p. 8) with the SCL-90-R subscales. Correlations with the Depression Anxiety Stress Scales are -.59, -.48, and -.56, respectively.

The Depression Anxiety Stress Scales. The Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995; see Appendix G) is a measure of three constructs: depression, anxiety, and stress. It has both a 42 and a 21-item form, with the DASS-21 score transformable for comparison with DASS-42 norms (the DASS-21 was used in this study). The items are split evenly among the three constructs. The Depression scale measures dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The Anxiety scale measures autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The Stress scale focuses on levels of chronic, non-specific arousal, and measures difficulty relaxing, nervous arousal, being easily upset/agitated, irritable/over-reactive, and impatient. Ratings are summed to produce a score out of 42 for each individual scale (DASS-21 scores are doubled). The respective DASS scales contain items such as “I felt down-hearted and blue,” “I was worried about situations in which I might panic and make a fool of myself,” and “I tended to over-react to situations.” Participants rate the extent to which they have experienced symptoms in the past week on a 4-point severity/frequency scale from 0 *Did not apply to me at all*, to 3 *Applied to me very much, or most of the time*. Higher scores indicate increasingly severe levels of depression, anxiety, and stress. The severity ratings for each scale are shown in Table 19.

Table 19
DASS Severity Ratings (Lovibond & Lovibond, 1995, p. 26)

| | Z score | Percentile | Depression | Anxiety | Stress |
|------------------|-----------|------------|------------|---------|---------|
| Normal | < 0.5 | 0 - 78 | 0 - 9 | 0 - 7 | 0 - 14 |
| Mild | 0.5 - 1.0 | 78 - 87 | 10 - 13 | 8 - 9 | 15 - 18 |
| Moderate | 1.0 - 2.0 | 87 - 95 | 14 - 20 | 10 - 14 | 19 - 25 |
| Severe | 2.0 - 3.0 | 95 - 98 | 21 - 27 | 15 - 19 | 26 - 33 |
| Extremely Severe | > 3.0 | 98 - 100 | 28+ | 20+ | 34+ |

The DASS was normed on 1044 males and 1870 females aged 17 to 69 years, from six non-clinical samples, including university psychology and nursing students, blue and white collar employees, myocardial infarction patients and their matched controls, and insomniacs who had volunteered for treatment (Lovibond & Lovibond, 1995a). Internal consistency of the DASS-42 scales is high, at .91, .84, and .90 for the Depression, Anxiety, and Stress Scales, respectively, and .81, .73, and .81 for the DASS-21 scales. Test-retest reliability (2 weeks) is adequate, at .71 for Depression, .79 for Anxiety, and .81 for Stress (Brown, Chorpita, Korotitsch, & Barlow, 1997). The DASS Depression scale correlates .74 with the BDI, and the Anxiety scale correlates .81 with the Beck Anxiety Inventory (Lovibond & Lovibond, 1995). No test-retest information is currently available for the DASS-21.

The DASS was selected for several reasons. It was the only stress measure located focusing on chronic arousal as opposed to stressful life events, or everyday “hassles.” Given that Study I concluded some nuclear test veterans were experiencing chronic stress, it was considered an important variable to measure. The scales have good face validity, particularly for an older adult population, along with strong psychometric properties. Additionally, according to Walker and Furer (2006), it is important to monitor symptoms of anxiety and depression with brief self-report scales when assessing and treating clients with health anxiety, due to the high comorbidity between somatoform and other disorders. Furthermore, the brevity and “three-in-one” nature of the DASS-21 scales was desirable when administered as one of several research measures.

The Positive and Negative Affect Schedule. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; see Appendix G) is a widely used brief measure of mood states, with established reliability and validity and ease of administration. It was developed to measure Positive Affect (PA), which indicates how “enthusiastic, active, and alert” a person feels, and Negative Affect (NA), which indicates the extent of “subjective distress and unpleasurable engagement” (p. 1063). High PA indicates high levels of energy and concentration, and a strong sense of pleasure, with low PA indicating feelings of sadness and lethargy. Alternatively, high NA indicates the presence of aversive mood states which may include anger, guilt, or fear, with low NA indicating a sense of peace or calm.

The measure consists of two scales of 10 descriptors (Watson et al., 1988). The PA scale contains the descriptors *attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong, and active*. The NA scale contains the descriptors *distressed, upset, hostile, irritable, scared, afraid, ashamed, guilty, nervous, and jittery*. Participants rate the extent to which they experienced each mood state over a specified time period (selected by the researcher) on a Likert-type scale from 1 *Very Slightly or Not at All*, to 5 *Extremely*, yielding a score out of 50 for each scale. The time period can be selected as required from *the present moment, today, the past few days, the past week, the past few weeks, the past few years, and generally*.

Both scales have good internal consistency, with Cronbach’s alpha ranging from .86 to .90 for the PA scale, and from .84 to .87 for the NA scale (in a university student sample; Watson et al., 1988). Test-retest reliabilities (8 weeks) were moderate, ranging from .47 to .68 for the PA scale, and from .39 to .71 for the NA scale (unaffected by the temporal instructions used.) In a community sample of employees, internal consistency was .86 and .87 for the PA and NA scales, respectively, and in a psychiatric inpatient sample, .85 and .91, respectively. Test-retest reliabilities (1 week) in this sample were .81 and .79. The NA scale of the PANAS shows moderately high convergent validity with the Hopkins Symptom Checklist (an earlier version of the Symptom Checklist-90, a measure of general psychological distress), and moderate correlations with the BDI and the A-State (state scale) of the STAI. The PA scale shows mild negative correlations with these measures. Non-clinical norms largely representing the UK general adult population were recently developed (Crawford & Henry, 2004). The data were collected from 1003 adults aged 18 to 91 years. Despite being based on a non-random sample, the data are substantially more useful than the means and standard deviations produced by

the original mostly student sample, and will be used in analysing the results of this research. The PANAS was used to monitor treatment progress.

The Liverpool Stoicism Scale. The Liverpool Stoicism Scale (LSS; Wagstaff & Rowledge, 1995; see Appendix G) was developed to compare stoicism in British men and women (along with its influence on attitudes towards the poor). Wagstaff and Rowledge (1995) defined stoicism as “a) lacking in emotional involvement, b) lacking in emotional expression, and c) exercising emotional control or endurance” (p. 181). The measure also includes items capturing the aspect of not wishing to share or ask for help with difficulties. The scale consists of 20 statements such as “I do not get emotionally involved when I see suffering on television,” “I tend not to express my emotions,” “One should keep a ‘stiff upper lip’,” and “‘A problem shared is a problem halved’.” The degree of agreement with each statement is rated on a 5-point Likert-type scale from 1 *Strongly Agree*, to 5 *Strongly Disagree*. Scores range from 20 to 100, with higher scores indicating greater stoicism. Half the items are reverse scored to control for acquiescence. The LSS was developed on 32 females and 30 males aged between 20 and 50 years. The mean score for males was 59.50 ($SD = 11.30$), and the mean score for females 45.44 ($SD = 11.21$). The LSS shows strong internal consistency, with a split-half reliability coefficient of .90.

Research Design

The study was similar to a multiple-baseline design across individuals (Barlow & Hersen, 1984; Kazdin, 1998), with baseline measures being administered across participants 1 week apart (rather than simultaneously), with the first participant receiving his first baseline measures one week, the second receiving his the following week, and so on. Unlike the true design in which treatment is introduced to one participant at a time, with the length of baseline increasing for each consecutive participant, the lengths of the baseline phases did not vary. However, the recommended minimum of three baseline measures was taken for each participant (Barlow & Hersen, 1984). The full multiple-baseline design could not be conducted due to participants giving consent to participate in two “waves.” Four participants returned their Consent Forms within a week of receiving them. Two weeks after the first mail-out, a follow-up letter (see Appendix F) was sent requesting a response, either positive or negative, regarding participation. Following this, another 4 nuclear veterans agreed to participate. During this process, the collection of baseline data from the first participants who responded had already commenced, due to time constraints. All 8 participants completed the baseline measures,

with 2 withdrawing from the study after the first session due to an initial misunderstanding of what the process entailed (8 weeks of therapy was too long, and neither felt it was necessary). Another participant withdrew following the third session, reporting there were “things in the past that I would rather leave there.”

Participants received 8 therapy sessions, and were reassessed 1-week post-treatment and at 6-week follow-up. Sessions took place consecutively over 8 weeks, with 4 of the 5 participants having at least one 2-week period between sessions due to personal plans, illness, and a misunderstanding regarding meeting place. Additionally, the third participant began therapy 2 weeks (instead of 1) after the second due to unforeseen circumstances, and the fourth participant was unable to start on short notice. One participant had missed two sessions (because of cancellations and miscommunication), so Sessions 6 and 7 were combined due to time pressure. All other participants received 8 sessions.

Therapist

The researcher completed therapy with all participants. She was at the pre-internship stage of her training, having completed only a small amount of therapy in three approximately 6-week practica in various settings. She completed a 1-week training course in ACT with G. Eifert and J. Forsyth in January 2006,²⁵ and had previously applied components of the ACT approach as a therapist for another student’s research (a primarily CBT intervention). She received weekly supervision from a Senior Clinical Psychologist at Massey University.²⁶ Additionally, this supervisor was available for telephone contact during the therapy sessions.

Setting

All therapy sessions were conducted in participants’ homes (which is not uncommon when treating older adults) unless prior arrangements were made. For convenience, one participant requested the sessions take place at his local RSA, and another also gave an alternative venue. It was expected that travelling to participants’ homes or local RSA would encourage participation and programme completion (rather than participants travelling to the Massey University Psychology Clinic in Palmerston North). Additionally, it was thought this would be a more comfortable and relaxed setting for participants, and would assist in building rapport.

²⁵ *Acceptance and Commitment Therapy: How to alleviate psychological suffering and move in valued directions.* Massey University Summer Institute, Wellington, New Zealand.

²⁶ Initially, the researcher was supervised by one of the thesis supervisors (P. Dulin). However, when he relocated to the United States another Senior Clinical Psychologist continued the supervision (J. Taylor).

Procedure

After volunteering, participants completed weekly baseline measures for 3 consecutive weeks, receiving the first two sets by post. The first mail-out included a note thanking the veteran for agreeing to participate, a return-addressed freepost envelope, and a demographic questionnaire (see Appendix F), along with the HAQ, AAQ-II, DASS, and the PANAS. This set of measures was expected to take no more than 20 minutes to complete. In the following two baseline periods, only the measures were completed. Participants were asked to complete the measures and post them back on a specified date to maintain approximately a week's duration between baseline sets, and to complete them on the same day each week if possible. They were also asked to read the instructions on each page carefully and to complete every item. Despite this, some data were missing. Participants were telephoned during the baseline process to arrange a time for the first therapy session. They completed the measures a third time at the start of the first session, and completed only the PANAS at the start of each session thereafter. Each session was verbally evaluated at its conclusion based on several questions (see Appendix F). Follow-up data were collected by post. Thus, the HAQ, AAQ-II, and DASS were administered weekly during baseline (pre-treatment), 1-week post-treatment, and at 6-week follow-up, while the PANAS was administered on all of these occasions, as well as weekly, to monitor change throughout the treatment process.

The LSS was administered to each participant during Session 6. This measure was incorporated during data collection, due to the fact that several participants did not report health worries in person. For some, this conflicted with their HAQ scores, and the expected reason for research participation, as outlined in the Information Sheet. The researcher subsequently wished to investigate whether stoicism may have played a role in the coping style of these men.

Assessment Process

Due to the specific nature of this research, full initial assessments of participants did not take place. The study aimed to focus solely on health anxiety related to nuclear testing exposure, and the assessment (and treatment) of this problem alone in terms of the nature and effects on life functioning. It was therefore deemed inappropriate to perform a thorough background assessment. Additionally, it was not considered ethical to assess for trauma or other difficult life experiences, given the scope and nature of the research, and inability to provide treatment in these areas if a need was identified (and participants desired this).

Also, as participants were not from a clinical population, the aim was not to diagnose hypochondriasis, but simply to ascertain the presence of health anxiety related to the exposure. Thus, all assessment data were collected through a health anxiety-focused initial interview and self-report measures.

Treatment

Treatment consisted of an 8-session manualised ACT programme (including a final evaluation session). The majority of sessions were based on the programme from “Acceptance and Commitment Therapy for Anxiety Disorders: A Practitioner’s Treatment Guide to Using Mindfulness, Acceptance, and Values-Based Behaviour Change Strategies” (Eifert & Forsyth, 2005). Despite Eifert and Forsyth’s (2005) manual providing material for 12 sessions, due to time constraints only 8 sessions were selected for this programme. Additionally, the final four sessions (based around interoceptive exposure, such as inducing panic) were not considered relevant to this sample. While the dose-response literature indicates that at least 12 sessions are necessary for psychotherapy to be effective (i.e., for 50% of clients to show improvement; Hansen, Lambert, & Forman, 2002), some clinicians have argued that they see progress in 5 to 8 sessions (Given, 2002), and other researchers have argued that less than 12 sessions can be effective as long as the therapeutic approach is evidence-based (Sanderson, 2002). As previously indicated, ACT is accumulating efficacy support. The outline of each session in this therapy programme is shown in Table 20. Some aspects of the protocol were omitted for clients for whom the material seemed irrelevant (see Results section). Sessions were of approximately 1.5 hours’ duration and were audio-taped (to assist with the writing of detailed case notes), for which prior consent was obtained from each participant. However, the first session was of 2 hours’ duration due to initial time spent building rapport, and participants completing final baseline measures. During the therapy programme, two participants did not wish to complete the mindfulness exercises.

Ethical Considerations

It is important that therapeutic research adheres to high ethical standards. Several ethical issues pertinent to this study are described below, along with the approach taken to them. This study was reviewed and approved by the Massey University Human Ethics Committee (MUHEC): Southern B, Application 06/37.

Table 20
Structure of ACT Programme

| Session No. | Session Outline | Metaphors | Mindfulness |
|---|---|---|--|
| 1 Psychoeducation & Treatment Orientation | Introductory Information (including confidentiality) Operation Grapple Experience Assessment of Health Anxiety & Effects on Life Psychoeducation on Fear & Anxiety Treatment Focus Introduction to Mindfulness | | Centring Exercise (5 min.) |
| 2 Evaluating the Workability & Costs of Past Control Efforts | Patterns & Workability of Avoidance Costs of Avoidance Develop Creative Hopelessness | Pushing vs Pulling Door Child-in-a-Hole Feeding-the-Anxiety-Tiger | Centring Exercise (5 min.) Acceptance of Thoughts and Feelings Exercise (15 min.) |
| 3 Creative Hopelessness: Making Space for New Solutions | Control is the Problem - Letting Go is the Alternative Value-Driven Behaviour as an Alternative to Managing Anxiety | Chinese Finger Trap Tug-of-War with the Anxiety Monster Epitaph | Acceptance of Thoughts and Feelings Exercise (15 min.) |
| 4 Mindfulness, Acceptance, and Choosing Valued Directions | Learning to Accept Anxiety with Mindfulness Controlling Internal Versus External Events Exploring values | Polygraph | Acceptance of Anxiety Exercise (15 min.) |
| 5 Moving Toward a Valued Life with an Accepting, Observing Self | Self as Context Versus Content | Playing Volleyball with Anxiety Thoughts and Feelings Chessboard Anxiety News Radio | Centring Exercise (5 min.) |
| 6 Encouraging Willingness | Emotional Willingness Dealing with Intense Feelings and Thoughts Stoicism Scale & Discussion | Willingness Thermostat Bus Driver Watching Thoughts Drift By | Centring Exercise (5 min.) |
| 7 Emotional Awareness | Barriers to Values Discussion AAQ-II Discussion Naming Emotions | | Centring Exercise (5 min.) |
| 8 Evaluation | Summary of Programme Summary of Issues for Participant Global & Specific Evaluation Questions Preparation for Follow-up | | Centring Exercise (5 min.) |

Working with Māori in psychological research and practise. According to the Code of Ethics for psychologists working in Aotearoa/New Zealand (Code of Ethics Review Group, 2008), *Te Tiriti o Waitangi* (the Māori text of The Treaty of Waitangi, which takes priority over the English text) forms the basis of respect for and safe clinical psychological practise with Māori clients or research participants (Nairn, 2007). Due to the Māori and English versions of the Treaty holding different meaning and expectations (Durie, 2003), the principles of the Treaty have been recognised as a helpful way to practically apply the intentions of Te Tiriti. These principles include partnership, participation, and protection²⁷ (Royal Commission on Social Policy, 1988, as cited in Durie, 2003). Partnership involves *iwi* (tribal) government in partnership with the Crown in all areas concerning Māori. Participation involves promoting Māori participation in terms of training and employment in various disciplines, active participation in decision-making (especially at policy level), and in particular, providing support for Māori initiatives in various sectors of society. Protection involves actively protecting Māori interests to ensure Māori are given the same rights and opportunities as non-Māori (Durie, 2003).

Māori may be considered a vulnerable group in NZ (referring to Section 2.4 of the Code of Ethics regarding Vulnerability), due to the oppression resulting from colonisation (Durie, 2003; Nairn, 2007), consequent social and economic disadvantage, poorer mental and physical health than the total population (Ministry of Health, 2008; Oakley Browne, Wells, & Scott, 2006), and their minority status (Code of Ethics Review Group, 2008; Nairn, 2007). This consideration, in addition to respecting their place as tangata whenua, means NZ psychologists have a particular obligation to provide responsible care for Māori.

For application to the present study, the researcher translated the principles of the Treaty in the following way. First of all, as Māori were not the primary focus of the project, and there were so few participants (5, with 3 identifying as Māori), it was not deemed necessary under MUHEC standards for regional *iwi* to be consulted regarding the present research. However, partnership in this study was still interpreted in terms of recognising Māori as the authority on their people, and this was outworked through consulting with two cultural advisors. One

²⁷ While these principles are useful in guiding relations between Māori and Pākehā, it must be noted that in themselves they “do not capture the fundamental truth of Te Tiriti” (Nairn, 2007, p. 25). A full explication of what Te Tiriti promised Māori people in terms of *kawanatanga* (government), *tiro rangatiratanga* (sovereignty), and *oritetanga* (citizenship - equality) (A. M. L. Herbert, 2002), but the Crown and settlers failed to deliver, as well as the repercussions of Māori sovereignty being taken over (Nairn, 2007), is beyond the scope of this section. However, for further discussion of these issues refer to Black & Huygens, 2007, Gavala & Taitimu, 2007, A. M. L. Herbert, 2002; Herbert & Morrison, 2007, Love & Waitoki, 2007, and Nairn, 2007.

advisor, a *kaumātua* (respected elder) for his iwi and a nuclear test veteran, was consulted regarding the appropriate procedures to follow for Māori participants. As this man also wished to participate in the research, a NZ Māori Senior Clinical Psychologist (S. Bennett) was approached as an additional cultural advisor to allow him the freedom to do so, and to provide advice regarding practise and research issues with Māori. Both advisors were consulted prior to and during the data collection process.

Second, participation was interpreted as providing an opportunity for Māori participants to share their identity with the researcher if they chose to, in the form of *mihi* or *whakapapa* (explained below), and recognising the importance of reciprocity (Durie, 2003), the researcher offered a brief summary of her own background in return. It was hoped that providing space for them to establish their identity in this way would encourage full participation. Additionally, in the first session the researcher acknowledged her limited cultural knowledge and desire to increase this, and welcomed any input participants wished to give about this over the course of therapy. Furthermore, Māori participants were asked if they wanted to contribute to the process of each session, through starting or ending in a particular way (such as with *karakia* - prayer). Participation was also encouraged by inviting participants at the start of the programme to explain their world-views throughout the process, particularly if they felt the researcher misunderstood their perspective. Respect of participants' right to withdraw from the research, or any part of the therapy programme (such as the mindfulness exercises) was also considered relevant to this principle.

The principle of protection was outworked in several ways. First, it was interpreted as the researcher needing to protect the interests of Māori participants by recognising her own limited competence in working with them as a Pākehā therapist, and seeking cultural advice. In particular, it was important for the researcher to recognise her very limited capacity to work in the domain of wairua (S. Bennett, personal communication, November 14, 2006). Cultural supervision enabled the researcher, as a psychologist in training, to abide by Sections 1.4.1 (Sensitivity to Diversity) and 2.2.3 (Competence) of the Code of Ethics (Code of Ethics Review Group, 2008).

Adhering to guidelines provided by Māori practitioners, such as those of Hirini (1997) for counselling Māori clients, is another way to protect Māori in research and practise. Hirini (1997) reports that introductions are important to Māori, particularly in terms of

understanding identity. Because Māori are a collective culture, they may wish to establish their collective identity through having *whānau* (family) members at an interview, or by sharing their *whakapapa* (family and tribal history or genealogy). They may also wish to give their *mihi*, which is a greeting acknowledging their tribal background and relationship to the natural environment. As with all clients, it is very important to avoid stereotyping, or assuming all Māori are the same in their awareness of their cultural identity, in the meaning this holds for them, and in their world-views (Hirini, 1997). Taking care in discussing identity with Māori clients (and recognising it may take time to build trust before doing so), as well as noting verbal and non-verbal communication in these discussions, are also important factors to be aware of. Furthermore, therapists are advised to cultivate an ongoing awareness of how their own world-views as therapy providers may influence their practise with clients of other cultures (Hirini, 1997).

It is also important to recognise that psychometric tests tend to be developed on overseas populations (often in the US and UK), and often do not have NZ norms. This means there may be no appropriate comparison group when interpreting scores. Similarly, these measures are often based on a Western world-view, and may directly contradict Māori perceptions of healthy functioning, such as the measurement of assertiveness or independence as a strength, which Māori may actually view as a weakness (Durie, 1987). Thus, a number of measures may not be very relevant for use with Māori. Durie (1999) calls for a need for outcome measures that are acceptable (i.e., have face and content validity) to Māori, being holistic rather than DSM-specific. In recent years, Te Whare Tapa Whā has been used as a tool for assessment and conceptualisation of various presenting problems (such as smoking behaviour; Glover, 2005), and the Meihana model (Pitama et al., 2007), an extension of Te Whare Tapa Whā, has been presented as a more comprehensive assessment framework.

Potential harm to participants. The researcher recognised that assisting participants with health anxiety resulting from their radiation exposure had the potential to increase any distress they were already experiencing. It was possible that reflecting on the exposure could evoke troubling memories, along with associated beliefs and feelings. As an educative measure, participants were informed in the first therapy session that while discussing these issues may result in an initial increase in health anxiety, this was expected to decrease over the course of therapy. They were also told that they would be referred to their GP in the event of any concerning psychometric scores following therapy. Additionally, a Senior Clinical

Psychologist (P. Dulin, and later J. Taylor) was available for participants to contact if they experienced any distress resulting from participation in the study. Participants were also reminded that they had the right to withdraw from the research at any time. The potential benefits to participants of completing the therapy programme, such as possible reductions in health anxiety and general distress, increased quality of life, and new, effective coping strategies were thought to outweigh any risks.

Furthermore, the researcher was aware that in a therapeutic situation, distressing material unrelated to nuclear exposure could surface for participants. It was not considered ethical to assess for trauma or other difficult life experiences, as these could not be therapy targets, given the scope of the project. Consequently, the researcher decided to assess only for the presence, intensity, and effects of health anxiety on the nuclear veteran's life. Additionally, the researcher aimed to leave participants in a positive mood state at the end of each therapy session, by discussing topics they obviously enjoyed (such as their grandchildren, or sport).

Confidentiality. Confidentiality of participant identity was maintained in the treatment and use of data through assigning each a code number. Following data collection, participants were referred to by this number. Personal identifying information has not been included in this manuscript or in publications arising from this research (and some details have been changed). Additionally, data collected over the course of the project, including audiotapes, were stored in a locked filing cabinet initially in an office at Massey University, and later in the researcher's home. The data will be destroyed five years after collection (in 2011).

Data Analysis

The Reliable Change Index (Jacobsen & Truax, 1991) was used to determine clinically significant therapeutic change. According to Jacobsen and Truax (1991), this is a method for "classifying clients as 'changed' or 'unchanged'" (p. 13), and therefore indicates the practical use or impact of psychotherapy. Reliable change is calculated by subtracting the pre-test score (i.e., baseline) from the post-test score (follow-up), and dividing by the standard error of difference between the two test scores (see Appendix H). For the present research, the pre-test score was the mean of the three baseline scores, and scores for 1-week post-treatment and 6-week follow-up were both used as post-test scores, to ascertain whether change remained significant over a longer period of time. It is likely that Reliable Change Indices greater than 1.96 reflect clinically significant change (Jacobsen & Truax, 1991).

CHAPTER ELEVEN: STUDY II RESULTS

Participant Characteristics

Table 21 displays the demographic information of participants in the present study.

Table 21
Participant Demographic Information

| Name | Age | Culture | Married | Retired | Education | # of Blasts | Chronic Illnesses |
|-------|-----|------------------------------|---------|---------|---------------------------------|-------------|--|
| Tane | 68 | NZ Māori | Yes | Yes | < 3 Years of Secondary School | 4 | Diabetes High Blood Pressure Haemorrhoids Cataracts |
| Anaru | 67 | NZ Māori | Yes | Yes | 3 - 5 Years of Secondary School | 4 | High Blood Pressure Heart Trouble Skin Condition Hearing Impairment |
| Fred | 67 | NZ Pākehā | Yes | Yes | Trade Certificate | 6 | Cancer – Bladder, Prostate, Melanoma Diabetes High Blood Pressure Heart Trouble Asthma Other Respiratory Condition Kidney/Urinary Tract Problems Skin Condition Sight Impairment |
| Kingi | 66 | NZ Māori/ Other ethnicity | Yes | Yes | 3-5 Years of Secondary School | 5 | Cancer – Colorectal High Blood Pressure Stomach Ulcer Bowel Disorder Hernia Kidney/Urinary Tract Problems Arthritis Sight Impairment Hearing Impairment Herpes - Cold Sores |
| Ray | 72 | NZ Pākehā | Yes | Yes | Trade Certificate | 9 | Diabetes |

Ages ranged from 66 to 72 years ($M = 68$, $SD = 2.35$). Three participants were of NZ Māori descent, 2 were NZ Pākehā. All participants were retired, and all were married. Two participants had obtained trade/professional certificates, and 2 had completed 3 to 5 years at secondary school, with 1 participant completing less than 3 years of secondary schooling. Participants had witnessed between 4 and 9 blasts ($M = 5.60$, $SD = 2.07$) at Operation Grapple. Four of the 5 participants had a range of chronic illnesses, with the most common being high blood pressure and diabetes. Results for each case are presented individually below.

Case 1: Tane – “Give It Space”

Case Introduction

Tane was a 68-year-old man of Māori descent. He was married, and had completed less than 3 years at secondary school before joining the NZ navy. He witnessed four bomb tests at Operation Grapple. At the start of therapy, he was working 50 hours a week on average in a mostly voluntary position, and receiving a war pension for his Grapple service (which limited his wage-earning ability). He reported the following health problems: diabetes, high blood pressure, haemorrhoids, and cataracts. Tane was on a 25% war pension for prostate problems, PTSD, and diabetes, with the rate of disability²⁸ for each of these difficulties being 10%, 10%, and 5%, respectively. He had regular GP appointments, and had not received a diagnosis of radiation-related illness.

Tane reported feeling secure in his Māori identity, and undertook some important cultural activities within his *whānau* (family), including overseeing family affairs, giving advice to younger members, and generally looking out for the well-being of family members. He regularly visited his family home and iwi area to carry out responsibilities. While it was acknowledged that his culture was important, with Tane being given the opportunity to explore this, and the researchers seeking cultural advice, it was not the focus of this research. This did not appear to disadvantage him in any way.

Presenting Complaints

Tane volunteered for the research because he wanted to talk about his health concerns subsequent to his Operation Grapple exposure. He reported being “extremely” worried “all the time” about his health, rating this 10/10 (0 = *Not anxious about your health*, 10 = *Most*

²⁸ The “Rate of Disability” means the percentage of disability believed to result from that problem or illness that is related to particular military service (i.e., Operation Grapple service).

anxious you have ever felt about your health) and rating his distress about worry 7/8 (0 = *Not at all distressed*, 8 = *Extremely distressed*). His method of coping with worry was to keep as “busy as I can”, to “shut it out” of his mind. He reported working 30 to 60 hours per week, sometimes working 10 to 12-hour days, 7 days a week. When he was not distracted, either after work in the evenings, or at other times when he tried to relax, Tane would worry about the effects of the nuclear testing on his health. If he allowed himself to remember this experience or think about his worries, he found this “hard to cope with.” However, working long hours at his job to avoid his health anxiety created further problems for him in getting behind in other paperwork, and neglecting home maintenance. For example, Tane had started building a new fence around his property two years previously, but had lost the motivation to complete it. The fact that this and other necessary chores had not been completed was a further source of ongoing stress for Tane. It also seemed that although he wanted to spend more time with his wife, he was too busy distracting himself from his worries. His involvement with his work was serving the purpose of helping him avoid distressing memories and health-related concerns, and keeping him from engaging in valued activities.

Tane’s specific health worries centred around the “illness” he thought he had – a “spinal problem” he believed was probably cancer. While this had not been formally diagnosed, he described knowing something was “not right,” because there were “symptoms” in his body that were “abnormal.” He believed this because he had heard about the symptoms of military friends who were unwell. He reported experiencing sporadic back pain and muscular degeneration in his legs (which was visible), which he also attributed to the radiation exposure. However, he acknowledged the state of his legs could be linked with diabetes, and that his GP thought this was “normal.” Although Tane had not been diagnosed with cancer, he stated that if he did not have the disease already, he worried it would develop in the near future, and believed there was a “100% chance” of this occurring. He also worried about when it would be his “turn” to die, and that he would not live a long life. Tane reported he had been taking Prozac for approximately 20 years. He believed this, along with a range of physical health medication “kept [him] going.”

History – Nuclear Testing Exposure

Tane reported that at the time the nuclear testing was an “adventure” unlike anything he or his comrades had ever experienced. He said they considered it “entertainment,” rather than an experience that evoked fear or apprehension, and did not know prior to arriving in the

testing area that they would be witnessing the blasts. He described seeing the bones of his hands during the nuclear explosions. Tane stated that at the time they were told the nuclear exposure would not affect them. He believed he was initially fine after the radiation exposure, but that the health consequences took many years to develop. He reported the onset of his health anxiety being when he began to lose his nuclear testing friends to various illnesses, including cancer, in their 40s (approximately 20 years ago). He began to worry about cancer and subsequent death. He reported being diagnosed with PTSD 20 years ago, after being questioned by a “panel.” He was apparently having dreams about the bomb tests at the time, and about death. However, he said he was not experiencing these dreams at the time of the present study, and had not had any “for a while” (but could not specify a time period).

Initial Assessment Results

Initial assessment results (see Table 22) showed Tane was experiencing extremely high levels of health anxiety on the HAQ. His AAQ-II score indicated he was highly experientially avoidant. Furthermore, his DASS scores revealed high levels of general distress, including *normal* to *extremely severe* depression levels, *moderate* to *extremely severe* anxiety levels, and *normal* to *severe* stress levels. His initial PANAS scores indicated he was experiencing very high levels of NA compared to other males, with his mean baseline score placing him higher than the 99th percentile (Crawford & Henry, 2004). However, he was also experiencing high PA, with his mean baseline score placing him at the 92nd percentile. This indicated that while Tane was experiencing high levels of health anxiety and general distress, he was also able to experience engagement with life and other positive emotions.

Table 22
Tane’s Baseline Results for Each Measure

| Time | HAQ | AAQ-II | <i>D</i> | DASS | | PANAS | |
|------------|-----|--------|----------|----------|----------|-----------|-----------|
| | | | | <i>A</i> | <i>S</i> | <i>PA</i> | <i>NA</i> |
| Baseline 1 | 53 | 55 | 8 | 14 | 10 | 42 | 47 |
| Baseline 2 | 52 | 59 | 24 | 22 | 30 | 43 | 49 |
| Baseline 3 | 54 | 58 | 28 | 24 | 18 | 40 | 45 |

Note: HAQ = Health Anxiety Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; DASS = Depression Anxiety Stress Scales; PANAS = Positive and Negative Affect Schedule; PA = Positive Affect; NA = Negative Affect.

Case Conceptualisation

Tane presented with high levels of health anxiety, experiential avoidance, depression, general anxiety, and stress. It is possible he had a long-term tendency to avoid his negative internal experiences, as he had a self-confessed coping style of “bottling up.” While his nuclear testing experience did not originally concern him, the early loss of his nuclear test veteran comrades, particularly from cancer, precipitated health anxiety largely related to the belief that he, too, would develop a chronic illness stemming from the nuclear exposure, and perhaps die prematurely. He found these concerns very distressing and avoided them with high levels of distracting activity. While effective in the short-term, it is likely this avoidant-oriented coping style perpetuated the negative internal experiences, resulting in him working harder and becoming busier. This created further difficulties in terms of neglecting aspects of his life that he valued (keeping a tidy home and time with his family), which in turn gave him further worries and guilty feelings to avoid, for not completing his other duties. Tane also likely fused normal bodily experiences of ageing (or those related to other illnesses, e.g., diabetes) with the thought that he had or would develop cancer, similar to his friends from his military years.

Course of Treatment

Following assessment of Tane’s Operation Grapple experience (see Appendix I), subsequent health anxiety, and its impact on his daily life, treatment began with identifying how health anxiety had become a problem in his life. Initially, he did not identify anything “unworkable” about the way he was living. While he volunteered for the opportunity to discuss his experiences and worries, he did not appear to feel anything needed changing. He was content with the number of hours he worked, stating he “enjoyed” this, and it was not causing him problems. However, Tane acknowledged he felt his high activity level was his only coping option, “that’s about the only way I can do it.” He also recognised he was trying to avoid his worries by working long hours to “shut them out.” He believed this was a workable strategy, in the sense that while he was busy he was distracted from his worries, and was able to successfully avoid negative internal experiences. However, he agreed that when he was not busy or distracted, the worries returned. He acknowledged that long term his strategy had not worked successfully, because his worries were still present and as strong as ever. He also identified that as an avoidance strategy, working long hours caused further problems for him related to neglecting home and familial duties, which caused him distress.

As therapy continued, Tane identified that shutting out his worries was a barrier to valued action in other areas of his life, along with home maintenance. He reported that he would sometimes be “uncommunicative” at work, ignoring others when they spoke to him because his mind was so focused on his worries, which was inconsistent with how he wanted to be with others. Tane also became “downhearted” from worrying and trying to control his internal experience, which at times stopped him from enjoying life. Thus, he came to understand that his avoidance coping strategy was not only a barrier to productivity and efficiency (in terms of motivation and attending to priorities), but also to social connection, and being “present” and fully engaged with life. He realised avoidance was an ineffective strategy for getting rid of his worries, and felt he could benefit from addressing it.

Acceptance techniques, including mindfulness, were used to encourage Tane to be present with his worries. The key concept that initiated change for him came early on in therapy through mindfulness. He responded well to this from the beginning, appearing self-aware, and moderately able to articulate his inner experiences, including worries and some emotions. He immediately grasped the ideas of being aware and noticing his physical and internal experiences, along with being present with worries rather than pushing them away. From Session 2 he talked about “giving it space” (meaning his worries), and made a decision to focus on this in his everyday life. In Session 3 he reported feeling more relaxed over the previous week, as he had been actively applying this concept. Tane was asked in these exercises to make space for his specific health worries (outlined in Presenting Complaints).

Over the course of therapy, Tane started reporting that if any worries came up, he was able to allow them to be there and “just accept them.” He also reported that at times he could not “find any” worries to be present with, or bring back past memories that used to trouble him. His explanation for this was “it’s probably there already [in his mind], and it’s been accepted.” He recognised this was very different to how he would have responded in the past, and that he was becoming an “observer” of his thoughts and experiences, both in session and in everyday life. Tane enjoyed the mindfulness exercises, perhaps because they highlighted to him how different this was from his previous focus on controlling his inner experience.

Tane reported finding the idea of willingness helpful, which he learned through mindfulness and various metaphors. An idea he used to describe acceptance of his internal experiences, synonymous with giving space, was to “inwardly digest” them. He likened the *Chinese Finger*

Trap metaphor to his experience of sometimes getting into “a rut” he could not get out of, a state of being “downhearted” that he could not change. For him, the idea of inwardly digesting was about “keeping it in there and holding it,” and he expressed a desire to do this if he got into a rut again. Through the metaphors of health worries being a volleyball match inside his head, or a battle against himself (as in a game of Chess), Tane realised he had been “fighting against” himself in his mind for a long time. He learned the concept of observing the game or battle rather than taking part in it. He agreed that giving space helped him to be anchored in the storm, rather than blown about by the wind and waves of his internal experiences. He also recognised when he stopped tuning into the “radio” of his worries, he began to tune into “life in general.” Tane saw his approach to life had changed from avoidance to willingness.

Tane also claimed visible behaviour change from an early stage. He reported that after Session 1 he was motivated to complete some paperwork he was behind in, attributing this to therapy. He stated he had been able to “all of a sudden” get himself out of the “rut” of work that had built up, because his mind was relaxed. Tane also reported he had resumed work on the fence around his property after leaving this for two years. He and his wife had been working on this together, something they rarely did, due to his self-imposed long hours at work. From mid-therapy, Tane said he was “really happy in [him]self” and with his life, and had new enthusiasm and motivation for tasks at home. He reported also having the same enthusiasm for tasks at his family home during a recent visit, and believed this was a result of therapy.

Tane’s new stance toward his internal experience also affected other emotions associated with his nuclear testing experience. Over time, he described working through some of his anger over his testing involvement. His recent request for a pension increase was turned down, and while disappointed, he had decided to “let it slide,” reporting he was “not as bitter” as he was prior to therapy. Towards therapy termination he reported his cancer worries were gone. He stated, “I just want to accept the consequences and...get on with life.”

Along with this, Tane reported behaviour change at work, being more sociable rather than withdrawing. While he did not reduce his hours, working now had a “different feeling” for him, as he did it for enjoyment rather than to escape worries, which were no longer on his mind at work. “I’ve got the energy and I can focus on one thing, what I’m actually doing, rather than having everything else there.” He said he was “feeling for the moment.”

Finally, Tane's presentation visibly changed over the sessions; he moved from appearing reserved and moderately low in mood, to relaxed and cheerful, and making jokes. It is likely this was also influenced by Tane feeling more at ease with the process, and the strengthening of the therapeutic alliance. He believed therapy had produced a "huge turnaround" for him, stating "I'm a happy go lucky sort of a guy and I'm getting it all back again."

Assessment of Therapeutic Progress

As shown in Table 23, Tane's scores on the HAQ, AAQ-II, DASS, and his NA score on the PANAS showed major post-treatment reductions (see Figure 6a-d) to moderate health anxiety, low experiential avoidance, and normal levels of general distress (depression, anxiety, stress, and NA). Reliable Change Indices calculated for progress on each measure confirmed these changes as clinically significant²⁹ (see Table 24, p. 144; the negative sign indicates a score reduction). His improvements in these areas remained significant at follow-up, despite slight increases on the HAQ, AAQ-II (to moderate experiential avoidance), and DASS. Tane's NA scores steadily declined over therapy from very high to within the average range when compared with non-clinical PANAS norms. This reduction was maintained at follow-up, with his post-treatment and follow-up scores placing him at the 12th percentile. Tane showed a level of PA throughout therapy that was comparable to non-clinical norms (i.e., scores ranged from average to above average for his gender), and fluctuated about the 40 mark. There were no significant changes in these scores post-treatment or at follow-up. His follow-up score placed him at the 81st percentile. Additionally, Tane scored 46 (out of 100) on the Liverpool Stoicism Scale (LSS), which was below the average range for males in the development sample.

Table 23
Tane's Post-Treatment and Follow-Up Results for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------------|-----|--------|---|------|---|-------|----|
| | | | | A | S | PA | NA |
| Post-treatment | 23 | 13 | 0 | 0 | 0 | 40 | 10 |
| 6-week follow-up | 25 | 30 | 2 | 4 | 0 | 38 | 10 |

²⁹ From this point on, "significant" refers to clinical significance unless otherwise stated. Reliable Change Indices greater than 1.96 are likely to reflect clinically significant change.

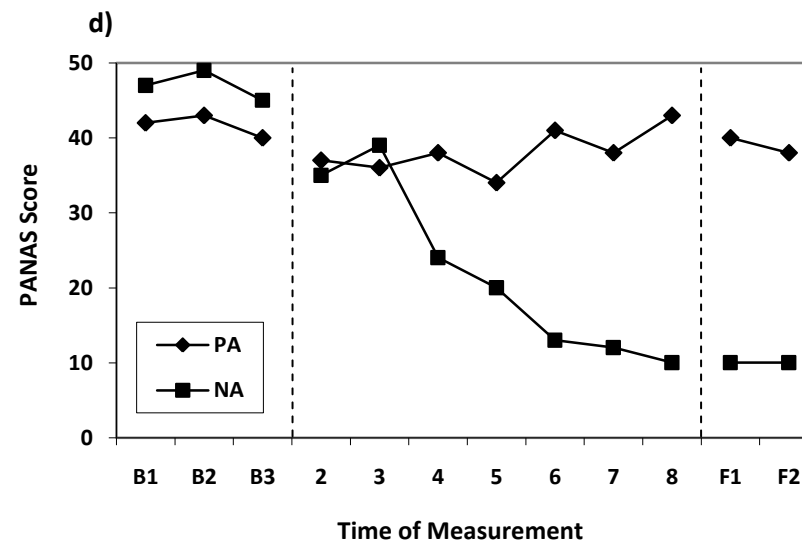
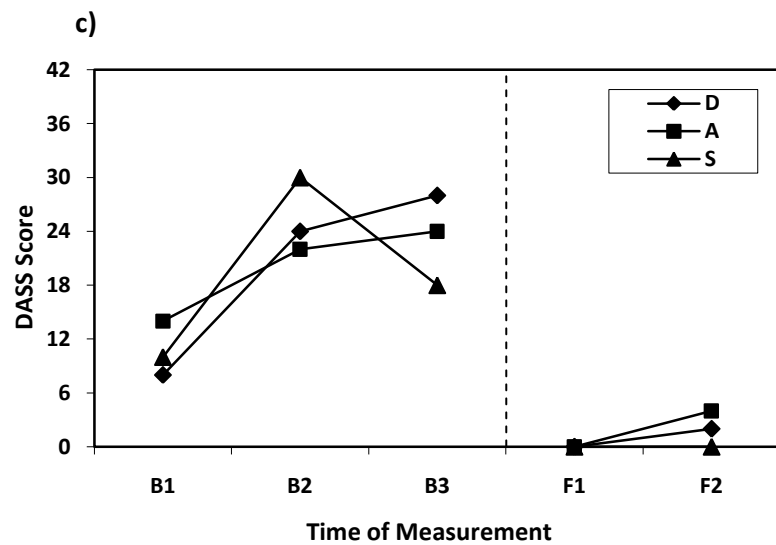
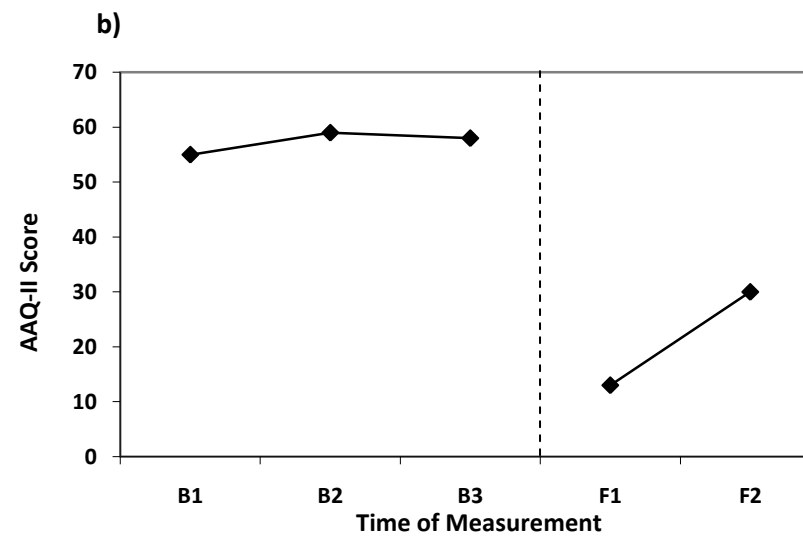
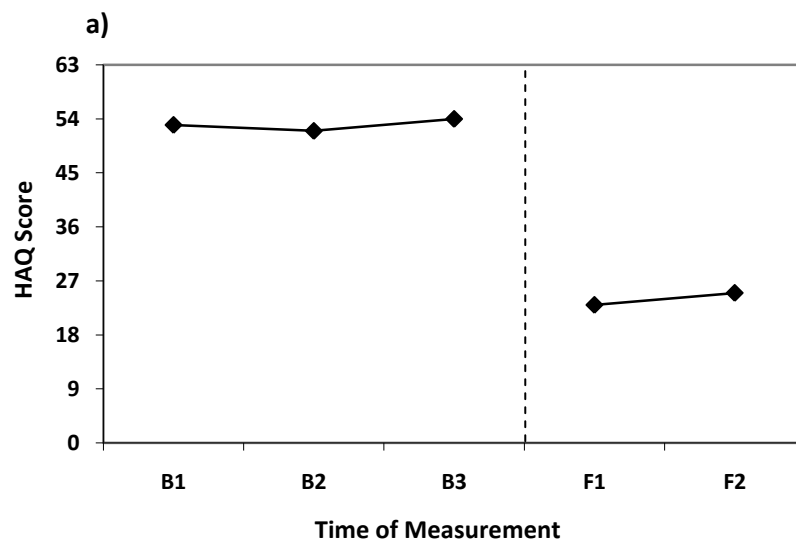


Figure 6. Tane's HAQ, AAQ-II, and DASS scores at baseline, post-treatment, and 6-week follow-up, and weekly PANAS scores.

Table 24
Tane's Reliable Change Indices for Each Measure

| Time | HAQ | AAQ-II | <i>D</i> | DASS | | PANAS | |
|------------------|--------|--------|----------|----------|----------|-----------|-----------|
| | | | | <i>A</i> | <i>S</i> | <i>PA</i> | <i>NA</i> |
| Post-treatment | -7.39* | -7.33* | -4.02* | -6.39* | -4.43* | -0.27 | -5.54* |
| 6-week follow-up | -6.90* | -4.50* | -3.61* | -5.11* | -4.43* | -0.54 | -5.54* |

* Indicates clinically significant change.

General Summary

Tane engaged well with the ACT approach, taking on board and actively applying the concepts. While he reported the language and ideas were initially difficult to understand, he “got used” to them. His levels of health anxiety, experiential avoidance, and general distress improved significantly over the course of treatment, and were maintained at least 6 weeks post-therapy. Tane enclosed a note to the researcher when he mailed back his final measures, stating “I keep reminding myself to ‘Give it space’.”

Case 2: Anaru – “Rise To The Challenge”

Case Introduction

Anaru was a 67-year-old man of Māori descent. He was married, retired, and had completed between 3 and 5 years at secondary school. He witnessed four bomb tests at Operation Grapple, and received a war pension for this service. Anaru reported the following health problems: high blood pressure, heart trouble, a chronic skin condition, and hearing impairment. He also reported middle insomnia, but did not consider this particularly problematic.

Anaru reported feeling secure in his Māori identity, and stated he was the spokesman for his whānau on their *marae* (tribal meeting place), a big responsibility. Along with this, he was chairman of the trust for his *hapū* (subtribe), and had been a marae trustee for 30 years. He reported recently becoming interested in writing out his whakapapa, and learning it to 10 generations for *whaikōrero* (formal speaking) on the marae.

Presenting Complaints

Anaru reported he used to be “always worried” about getting cancer, as a sibling had died of this. However, he stated he no longer worried about his health for himself, but for his grandchildren, “It’s all about whānau. We don’t think about ourselves. Worry is more for them than for me. It’s our *mauri*, our life force – we live for our whānau.” He expressed concerns about dying early and not being around to support or guide his grandchildren into adulthood (i.e., he wanted to be at their 21st birthdays). He did not consider these concerns anxiety, only “a bit of a worry.” Anaru also expressed concern about his grandchildren’s health, and whether they would receive compensation if they had health problems in the future (because of his Operation Grapple service). He said if they developed health problems he would link this to his radiation exposure and feel guilty. (He had heard the effects of radiation can be manifested four generations later.) He rated these health worries 5-6/10 (0 = *Not anxious about your health*, 10 = *Most anxious you have ever felt about your health*), and added that they were related to “ageing and survival.” He stated that while worry had caused him major distress in the past, it was now minimal. However, he reported that while he felt very well at the time of the research, the question “always lurking in the back of [his] mind” was, “*How long will this last?*”

Anaru appeared to cope well with his worries, which did not seem to interfere in his life. He reported he was not struggling with anything, and did not feel he needed any help, or that anything in his life needed changing. He described himself as a “challenge person” who enjoyed problem solving, believing this outlook had made him a “stronger person.” He volunteered for the research because he wanted to do anything he could to help the “case” of the nuclear veterans in terms of seeking compensation, and also in the hope that his experiences could help others.

History - Nuclear Testing Exposure

Anaru reported he and his friends in the navy had looked forward to an overseas experience, and saw Operation Grapple as an “adventure.” He believes they had no choice at the time regarding their test participation, and now feels they were used as “guinea pigs.” He described the bombs as “scary,” reporting that once detonated, they could see their bones through their hands. He said the men wore protective clothing and sat on the upper deck of the ship when the bombs were dropped. They then sailed through the drop zone. He believed the purpose of the operation was to assess the effects on the human body, but that this was “covered up.”

Anaru reported being physically healthy and active following the tests. However, when a sibling died of cancer, he became concerned this may also happen to him.

History - Mental Health Related

Anaru reported experiencing what appeared to be a Major Depressive Episode at the age of about 62 years (five years previously), lasting for about a year prior to him seeking help. He described this experience as feeling like something had “taken over [his] life and thought patterns,” and reported symptoms including feeling dizzy, nauseated, and irritable. He also reported feeling very anxious at this time. He stopped working due to loss of motivation and fear of causing accidents due to his state of mind. While he believed he would spontaneously recover, he eventually visited a GP at his wife’s encouragement. He believed his depression was related to his Operation Grapple experience, but the GP disagreed, believing this event had occurred too long ago. (He reported he went to three different doctors and they “refused to consider” that his depression resulted from his Operation Grapple service.) Anaru then described two traumatic experiences involving family members that had taken place in the five years prior to his becoming depressed. He believed the initial onset of his depression (when it began to “set in”) coincided with one of these experiences. He reported the GP told him he was depressed, and gave the explanation that Anaru believed he was “ten feet tall and bullet-proof,” and because he did not talk to anyone about his problems, they accumulated, and a traumatic experience triggered his reaction to all of them at once. He was referred to a psychiatrist and prescribed antidepressants and anxiety medication. However, he felt his mental state deteriorated further over the next 2 to 2.5 years, as he reported he would lie on the couch all day, and became suicidal (seriously considering this twice). To assist with financial difficulties while unemployed, Anaru applied for a Grapple-related war pension.

Anaru believed his healing from depression came through *whanaungatanga* - “the strength of the family.” He reported his wife invited their children and grandchildren to stay as support for him. He described noticing changes in himself while they were there, feeling “better inside.” He believed he had “come right” by the time they left six weeks later. Anaru also believed his service in the navy contributed to his recovery, as it gave him the discipline to “overcome” his difficulties. When he recovered from his illness, Anaru began discussing his inner experiences with others.

Initial Assessment Results

Despite reporting he was not particularly health anxious, initial assessment results (see Table 25) showed Anaru was experiencing moderate levels of health anxiety on the HAQ (with these concerns relating to being around for his family). His AAQ-II score indicated moderate experiential avoidance. His DASS scores revealed moderate to severe levels of general distress, including *normal* to *moderate* depression levels, *normal* to *extremely severe* anxiety levels, and *normal* to *moderate* stress levels. This pattern of scores made it difficult to judge an accurate baseline; Anaru's scores on the HAQ, AAQ-II, and DASS subscales had reduced by the third baseline point (Session 1), with his DASS scores all in the normal range. His initial PANAS scores indicated was experiencing average levels of PA and NA for his gender (placing him in the 67th and 63rd percentiles, respectively; Crawford & Henry, 2004).

Table 25
Anaru's Baseline Results for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------|-----|--------|----|------|----|-------|----|
| | | | | A | S | PA | NA |
| Baseline 1 | 32 | 45 | 16 | 22 | 20 | 40 | 18 |
| Baseline 2 | 29 | 40 | 16 | 16 | 20 | 27 | 18 |
| Baseline 3 | 20 | 31 | 0 | 6 | 10 | 39 | 12 |

Note: HAQ = Health Anxiety Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; DASS = Depression Anxiety Stress Scales; PANAS = Positive and Negative Affect Schedule; PA = Positive Affect; NA = Negative Affect.

Case Conceptualisation

Anaru presented with moderate health anxiety and experiential avoidance, severe anxiety (general), and moderate levels of depression and stress, which may have reflected temporary stressful circumstances, as all had reduced by Session 1. While his nuclear testing experience did not cause him anxiety at the time, he later became worried about his health after a sibling died a slow and painful death of cancer. While he reported health concerns caused him considerable distress earlier in his life, this was no longer the case, with Anaru exhibiting developmentally appropriate health anxiety. However, health concerns appeared to be overshadowed by past traumatic experiences concerning his family. Anaru reported a preference for doing things himself, without help, and therefore did not share his feelings about these experiences, thinking he could "handle it." However, they "bottled up." His avoidance of discussing these experiences likely contributed to the development of depression

and suicidal ideation. It is possible he used activity to avoid these internal experiences, as he reported being “over-committed” prior to becoming depressed. At his wife’s encouragement he sought help from a GP, and received education that not talking about his experiences had contributed to his difficulties. However, his mental health worsened until the presence and strength of his family enabled him to recover. He began discussing his experiences with his wife and close friends after he recovered; this experiential exposure likely prevented relapse.

Course of Treatment

While Anaru’s baseline scores indicated he had some health concerns, in person he did not consider these particularly troublesome. They appeared normal for his age and life stage (e.g., in regards to being around for his grandchildren), and he did not wish to change anything in his life. In Sessions 2 and 8, he reported experiencing knee pain from an old rugby injury, and believed this influenced his PANAS scores. While being aware of the pain, he stated he did not allow it to distract him from things he needed to focus on.

The important issue for Anaru in the sessions was his previous experience of depression (being “down in the dumps”), his beliefs around this, and how his response to it subsequently influenced his life. The majority of conversation centred on this, with Anaru often referring to it. He felt that perhaps the depression was “meant” to happen to get him “back on track” in terms of slowing down, as he was “over-committed.” He believed he overcame the comorbid anxiety by being “more focused” on what was important, and would not get himself in a situation where he felt this anxious again. Contrary to the principles taught in the ACT programme, Anaru believed he had control over his emotions and thoughts. Stating he had been called a “control freak” in the past, he described it as “very frightening” that he had lost control of his mind and body when he was depressed, as this feeling was very foreign to him. He generally felt he “should” be in control, and found it frustrating when he felt otherwise. He acknowledged, however, that depression was something he could not control.

Despite his belief in the importance of controlling emotion, he also believed the expression or “release” of emotion was important. He stated that Māori people tended to be more comfortable expressing emotion, speaking particularly of crying at funerals. However, he observed, “A lot of Māori these days (I think it must be the Western culture), it’s as though they’re inhibiting themselves from reacting naturally to a situation.” He believed Kiwi males disliked crying in front of others because it destroyed their “tough guy image.” In a similar

vein, Anaru believed he would “never” have participated in this kind of research before he “got crook (depression),” and that his wife “wouldn’t believe” his openness in sharing. His reason was that “Most of our [Māori] people won’t share our problems,” and he believed they would tend not to seek health care until the situation was serious. However, Anaru’s experiences had motivated him to talk about his difficulties, and to try to assist others who were struggling, particularly young people. Anaru considered his family, hapu, and helping others most important in life. He also indicated he valued being active and working hard. He appeared to be living in accordance with these values.

Anaru reported that experiencing depression had made him “more tolerant” and helped him to “slow down.” He believed he was more focused than he had been in the past, knew his priorities, and did not over-commit. However, he also stated he was probably still doing too much, but enjoyed this as it kept his mind “active.” He felt he kept his commitments from getting “on top” of him, generally coping better than he had prior to becoming unwell. The lesson he reported learning was to get support by sharing his problems with others.

In discussing the ACT concept of acceptance, Anaru reported that struggling with thoughts and feelings used to affect him. However, while he “used to” worry, he now believed he was just “wasting all that time worrying about something you can’t change...It’s happened, so let’s get on with life.” He appeared to have an accepting attitude towards life, stating “...I probably accept most things now.” He coped with his knee pain by doing “the best you can; there’s not much you can do. [It’s] like riding out a storm in a boat – [you’ve] gotta ride it out.” He could be aware of the pain, and feel his irritation at being immobilised, but would not allow it to “sidetrack” him from what he needed to do. While finding it frustrating that he was becoming slower at completing tasks, he was coming to accept this, along with not reaching deadlines. He felt he could now recognise what he could change, and what he could not.

On one level Anaru related to the metaphors in the ACT programme, and on another understood them in a literal sense, rather than pertaining to the struggle with private experiences. In relation to fighting or struggling against things in his life, Anaru stated that to him life was about “rising to the challenge,” and without challenges, life would be dull. He stated that dropping the rope in the *Tug of War* metaphor would mean “giving in” to him, and he did not want to give in, in life. He also saw the *Chessboard* metaphor as a challenge of one team overcoming the other, and in grasping the idea of the board being constant, stated the

constant in his life was whānau. Anaru stated he could not predict how he would react in the *Polygraph* metaphor as he had not been in this situation, but thought he would probably be able to control his anxiety.

Anaru found the mindfulness exercises “peaceful” and “relaxing.” He stated it was rare for him to sit and relax, and commented “I should do this more often,” believing it would be beneficial. He stated in the past he would have considered the exercises “rubbish” or “a waste of time.” However, he believed that because experiencing depression had made him more tolerant, he was able to understand their purpose, “[They’re] set out that way to achieve something...taking the time to...stop...clarity of thought, being aware.” He said the exercises helped him to “have a detached look at things.” He reported initially finding the language “a bit airy fairy,” and said “in the old days I would’ve probably laughed at it.” While Anaru stated he could see value and purpose in the mindfulness exercises, he did not wish to practise or incorporate them into his life. He stated early on, “I will do it now [practise between sessions], ‘cause it’ll be an exercise of whether I still think it’s a waste of time,” but as he was busy with a number of commitments, this was not a priority for him. Despite this, Anaru gave some indication of having become more mindful following his depression, being more aware of sounds such as birds singing when working outside.

While Anaru understood mindfulness as “taking time out to control” feelings, he also appeared to hold beliefs that were somewhat compatible with the rationale for ACT and mindfulness. He explained, “If you start feeling something, don’t let it take over. Before, the instinct was to fight it, but by fighting it, it actually got aggravated. If you focus it makes things easier.” He believed he could now recognise when things were “taking over.” Unfortunately, the researcher did not explore what Anaru meant by this, and how his concept of focusing compared with that of the mindfulness concept. Other comments implied he meant focus in the practical sense, on priorities.

While Anaru did not feel he had learnt anything new from the therapy approach, he said there were aspects of the educational material he had not “contemplated” before. He stated that while he initially did not see the use of mindfulness and the *Finger Trap* metaphor, his attitude to these changed. However, Anaru reported it was talking about his experiences, rather than the content of the programme, that he most appreciated, and he realised in reflecting on his life that he had experienced a number of traumatic events. He stated it was about “sort of

coming to terms with your inner feelings...which is something I haven't done all the rest of my life...It's like taking a couple of steps further backwards and...having a detached look at yourself." He believed others exposed to nuclear testing, as well as Vietnam veterans would benefit from the programme by being able to express their feelings about their experiences, which for him involved the "inescapable realisation that we were used as guinea pigs."

Assessment of Therapeutic Progress

As shown in Table 26, Anaru's scores on the HAQ and the AAQ-II had reduced following therapy (also see Figure 7a-b). These changes were significant (see Table 27, p. 153) at post-treatment and at follow-up (despite a small increase in health anxiety), with scores on both measures reducing to low levels at both time points. While his DASS scores had already reduced to normal levels at the third baseline point, comparing the mean of these points indicated significant change in all three subscales post-treatment, which was maintained at follow-up for depression and anxiety, but not stress (see Figure 7c). On the PANAS Anaru's post-treatment PA score was slightly above average, with his follow-up score back in the average range for his gender, but placing him at the 77th percentile. He showed a small post-treatment reduction in NA, which was maintained at follow-up, placing him at the 18th percentile. However, these changes were not significant. As Figure 7d shows, Anaru's PA scores were generally in the average range or just above, and his NA scores were all in the average range. Additionally, Anaru scored 56 (out of 100) on the LSS, which was in the average range for males in the development sample.

Table 26
Anaru's Post-Treatment and Follow-Up Results for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------------|-----|--------|---|------|----|-------|----|
| | | | | A | S | PA | NA |
| Post-treatment | 11 | 22 | 0 | 6 | 6 | 41 | 11 |
| 6-week follow-up | 17 | 19 | 0 | 4 | 16 | 37 | 11 |

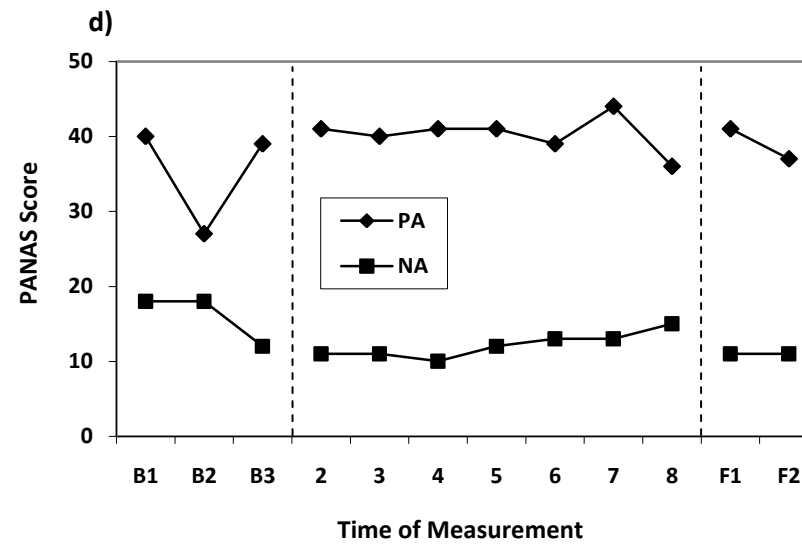
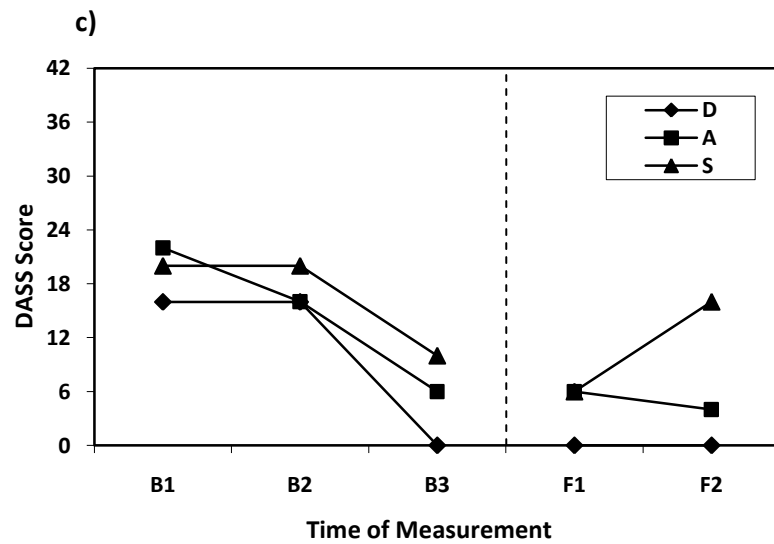
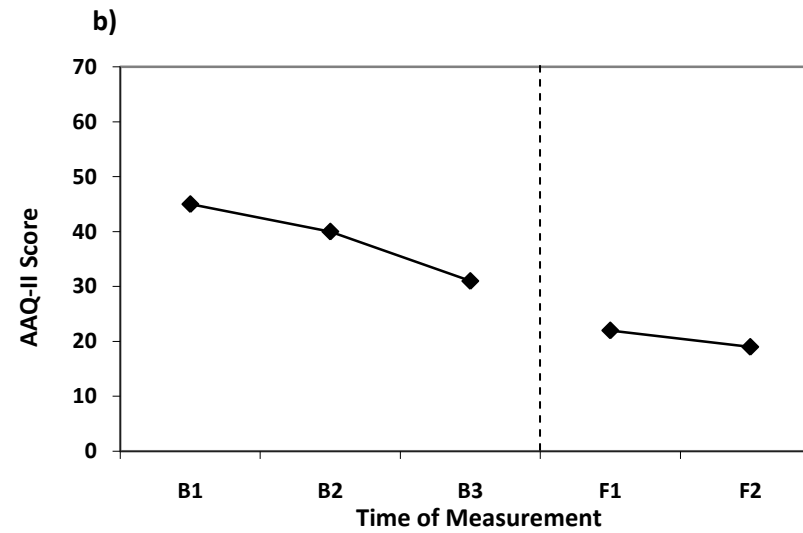
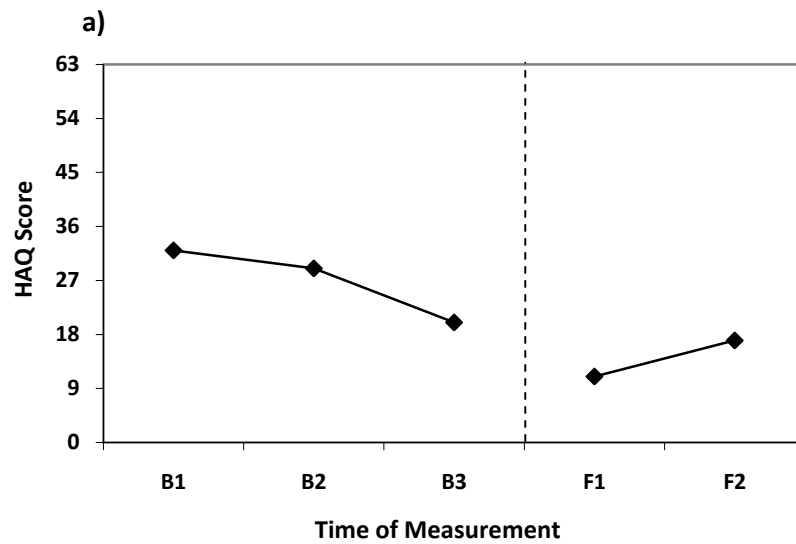


Figure 7. Anaru's HAQ, AAQ-II, and DASS scores at baseline, post-treatment, and 6-week follow-up, and weekly PANAS scores.

Table 27
Anaru's Reliable Change Indices for Each Measure

| Time | HAQ | AAQ-II | <i>D</i> | DASS | <i>S</i> | PANAS | |
|------------------|--------|--------|----------|----------|----------|-----------|-----------|
| | | | | <i>A</i> | | <i>PA</i> | <i>NA</i> |
| Post-treatment | -3.94* | -2.83* | -2.21* | -2.88* | -2.56* | -0.82 | -0.75 |
| 6-week follow-up | -2.46* | -3.33* | -2.21* | -3.51* | -0.23 | -0.27 | -0.75 |

* Indicates clinically significant change.

General Summary

Despite the therapy programme being explorative rather than clinically focused with Anaru, he still showed significant change in health anxiety and experiential avoidance, as well as general distress during this time period. However, the increase in HAQ and stress scores at follow-up may suggest these changes were unlikely to last. Despite these elevated scores, Anaru was experiencing very good levels of PA and NA, and was engaged in value-driven living.

Case 3: Fred – “Do Something About It”

Case Introduction

Fred was a 67-year-old man of Pākehā descent. He was married, retired, and held a trade certificate. He witnessed six bomb tests at Operation Grapple, and received a war pension for his health difficulties. He had been in and out of hospital over a number of years having operations to remove bladder and prostate cancer, and melanomas. In addition, he reported the following health problems: diabetes, high blood pressure, heart trouble, asthma and other respiratory problems, kidney/urinary tract problems, a chronic skin condition, and sight impairment. He also reported long-term middle insomnia.

Presenting Complaints

Fred reported he had been experiencing health problems for a number of years. He had “inoperable” melanomas on his back, and had his bladder surgically removed 6 years previously. He stated “my whole life just revolves around hospitals and doctors.” His health problems limited him in terms of domestic physical chores. He attributed all of his health problems to his nuclear testing involvement. Fred initially stated he was “not really concerned” about his health, but then said “I have days when I think about it a lot. When you get aches and pains...[you think] ‘Oh is it just ‘cause I’m 67 or is it something else?’” He rated

his health anxiety 5/10 on average (0 = *Not anxious about your health*, 10 = *Most anxious you have ever felt about your health*). He stated it was worse when sitting in the doctor's surgery. He described having more "What if?" thoughts as he got older. Fred acknowledged that at times his health caused him a lot of distress, "It can do if you let it." He rated his distress about worry 3-4/8 (0 = *Not at all distressed*, 8 = *Extremely distressed*). Fred recognised the following pattern when he was worried: "I don't talk to people...I just go quiet and work it out myself...I know I shouldn't get like it so I tell myself 'don't be so bloody stupid.'"

Despite having health worries from time to time, these did not appear to overwhelm Fred, and he felt he coped well, "I've got a pretty strong sort of nature, I think. I just won't let things beat me." He felt his health, but not his worries, caused problems in his life and held him back. He appeared to have developed adaptive ways of coping with his difficulties, stating, "I used to be a bottle up sort of person, but a few years ago [when he had his bladder surgery] I realised that if you bottle things up it just gets worse. It's better to talk to someone about it." Additionally, despite his health holding him back, it did not keep Fred from engaging in valued activities, such as fishing, making wooden utensils, and helping young men as part of a local programme "before the gangs get them." Fred volunteered for the study to help the researcher; he did not feel he needed any help, or that anything in his life needed changing. He reported having good support from his wife, friends, GP, and specialist.

History – Nuclear Testing Exposure

Fred reported being at the nuclear tests did not concern him at the time, "I was 17 and bullet-proof." He stated he could feel the heat of the blasts "like a heater," and that the closest the bombs were detonated was 20 miles away. Eight years later he "started getting a few illnesses which a joker of my age then shouldn't have had" (joint aches and pains). However, he did not consider whether radiation affected his health until about 15 years later when several friends developed cancers that could be caused by radiation, and some died in their early 40s. Fred had a scrapbook containing newspaper clippings related to Operation Grapple that he had collected over the years. He reported he went to Parliament to protest about his and his comrades' involvement in the testing and was "thrown out." He expressed frustration over the nuclear veterans' lack of compensation for their testing involvement.

Initial Assessment Results

Initial assessment results (see Table 28) showed Fred was experiencing high levels of health anxiety on the HAQ. His AAQ-II score indicated moderate experiential avoidance. Furthermore, his DASS scores revealed high levels of general distress, including *moderate* to *severe* depression levels, *extremely severe* anxiety levels, and *moderate* to *severe* stress levels. His initial PANAS scores indicated he was experiencing less PA on average compared to other males, and placed him at the 10th percentile (Crawford & Henry, 2004), indicating that 90% of males would have been experiencing greater PA than him. While he was experiencing average levels of NA compared to other males, his scores placed him at the 81st percentile.

Table 28
Fred's Baseline Results for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------|-----|--------|----|------|----|-------|----|
| | | | | A | S | PA | NA |
| Baseline 1 | 33 | 27 | 20 | 24 | 28 | 20 | 21 |
| Baseline 2 | 45 | 39 | 26 | 26 | 28 | 19 | 20 |
| Baseline 3 | 30 | 33 | 20 | 22 | 24 | 25 | 19 |

Note: HAQ = Health Anxiety Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; DASS = Depression Anxiety Stress Scales; PANAS = Positive and Negative Affect Schedule; PA = Positive Affect; NA = Negative Affect.

Case Conceptualisation

Fred presented with high levels of health anxiety, moderate experiential avoidance, and high levels of depression, anxiety, and stress. However, his self-report was inconsistent with these results. Fred reported he was not overly worried about his health, or distressed about any other concerns at the time of therapy. While his nuclear testing exposure did not concern him at the time, he had come to develop health concerns over subsequent years due to a number of health problems, beginning at a young age (25 years). He attributed these health problems, which included various cancers, to his presence at the testing. The development of severe health problems precipitated health worries regarding further illness (*"What's next?"*). Fred reported his typical way of coping with emotional problems had been to "deal with" them himself by "bottling up." While effective in the short term, this form of experiential avoidance likely increased the frequency and intensity of his health anxiety. However, following significant events in Fred's life, including undergoing bladder-removal surgery (and subsequent fears regarding his mortality), Fred made major value-driven changes. Realising bottling up

made things “worse,” he began to share his feelings and worries with others. This reduced the potential for experiential avoidance, as talking exposed him to his negative internal experiences, and may have reduced the cognitive fusion with his worries, associated beliefs, and physical sensations. Also, Fred appeared to have accepted his health problems and the limitations these placed upon him. Because he was not caught up in avoiding his internal experiences, he was able to pursue the things he valued, including strong relationships with his wife, family, and friends, recreational interests, and helping others (friends and young people through community service), which kept his anxiety from becoming disordered.

Despite his positive coping and apparent psychological flexibility, it is possible that with a tendency toward an avoidant coping style, Fred may at times have experienced more anxiety than he realised. It is possible Fred was not fully aware of how distressed he was at the beginning of therapy. Given he had been in hospital prior to completing his baseline measures, this may have triggered an increase in health anxiety, and the general distress exhibited in his scores.

Course of Treatment

As previously described, Fred did not believe health anxiety was a problem in his life, or that any aspect of the way he was living was “unworkable.” He maintained it was his health, rather than health anxiety that held him back and limited him. He showed acceptance of these limitations by not struggling with his situation, stating “hell is what we make it.” When his poor health limited him most, he would “just do the best I can.” While he acknowledged accepting his circumstances had been difficult in the past, this was no longer the case, and he talked about adapting and doing things differently. When he got cancer he came to believe “someone else is running your life then anyhow. Your life’s no longer your own.” His views regarding his health anxiety and acceptance did not change over the course of treatment. He had developed a practical, problem-solving approach to life (i.e., asking for help, taking advice, seeking medical help and opinion), and appeared to utilise social support when he needed it, firmly believing in the value of talking to others about problems. He also stayed as engaged in life as he could, with his variety of interests and social contacts.

Fred had developed certain beliefs about worry and controlling his internal experiences that seemed workable for him. He believed worrying “will get you down; it’s not going to do you any good...You’ve just got to get on with things...The more you worry about it, the worse it’ll

become.” He believed he could allow worries to come and go because he “had to.” He also believed he could control his thoughts and feelings, “We’ve got the control up here [points to head] to stop ‘em [worries]...And I think you have to, or those things’ll start running your life that you don’t want running your life, or shouldn’t be...” He stated he used to be “the biggest worrier in the world” but now, “I don’t let things worry me...It takes a lot to upset me these days.” He believed he could “pull [himself] out” of worry or negative mood states.

On one hand, Fred appeared accepting of his emotions, stating that while he may have been “afraid” of his feelings in the past, he has not been “for a long time.” He did not believe emotions caused problems for him. Conversely, he talked about “getting rid” of negative thoughts or memories by pushing them out and thinking of positive ones. While he used to “dwell on things,” he now believed it was better not to, and would do something about negative emotions rather than allowing them to be present (e.g., talk himself through the emotional state, talk to someone else, or visit the doctor if health anxious).

Fred reported enjoying the material presented in the ACT programme, particularly the metaphors, such as the *Anxiety News Radio*. His responses to these further illustrated his approach to life. In discussing the *Anxiety Tiger* metaphor, he stated “You’ve got to eat the monster. Don’t let him devour you,” and regarding the *Tug of War* metaphor said of his life, “The rope’s gone; I’ve given the rope away.” In regards to the *Volleyball Match* he stated, “...just let it be a thought once; throw the ball out of court...Think about it but don’t let it worry you.” He also used his own metaphor, recognising that worry can get us “tangled in [our] own web.”

Fred decided early on (in Session 2) that he did not want to do the mindfulness exercises. He stated these were “not [his] thing,” that he found the first exercise “restful” but could do this himself at any time. He did not believe they had anything to offer him. The researcher respected Fred’s choice and did not encourage him to complete these.

Fred reported that while much of the material he had heard in the sessions was not new to him (he felt he had learnt the principles in his own life), it helped him gain “a different outlook on things.” He stated insightfully at one point that “most of us hide from ourselves.” He enjoyed talking things through with the researcher, as he had not really had this opportunity before, “A lot of people are probably in the position like me – they’ve got no-one else to talk to

about it. It's good to talk to someone who you don't know." He believed this was what people would benefit from most in terms of this approach.

Assessment of Therapeutic Progress

As shown in Table 29, Fred's scores on the HAQ, AAQ-II, and the DASS had reduced substantially following therapy (also see Figure 8a-c), indicating his levels of health anxiety, experiential avoidance, and general distress had reduced to low levels post-treatment. These reductions were significant (see Table 30). His improvements on each of the DASS scales remained significant at follow-up, despite slight score increases. However, his reduction in experiential avoidance no longer reached significance, and as HAQ follow-up data were missing, the maintenance of Fred's gains on this measure could not be evaluated. On the PANAS his PA scores increased from below average to average for his gender, and fluctuated around the 30 mark (see Figure 8d), while his NA scores showed a general decrease over therapy to half his baseline scores. While these changes were generally maintained at follow-up (and scores were comparable to non-clinical norms for Fred's gender), they were not significant at either time point. However, he had moved to the 36th percentile for PA, and the 38th percentile for NA at follow-up. Additionally, Fred scored 48 (out of 100) on the LSS, which was just below the average range for males in the development sample.

Table 29
Fred's Post-Treatment and Follow-Up Results for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------------|-----|--------|---|------|----|-------|----|
| | | | | A | S | PA | NA |
| Post-treatment | 16 | 17 | 2 | 6 | 4 | 31 | 10 |
| 6-week follow-up | - | 22 | 6 | 8 | 10 | 29 | 13 |

Note. Dash indicates missing data.

Table 30
Fred's Reliable Change Indices for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------------|--------|--------|--------|--------|--------|-------|-------|
| | | | | A | S | PA | NA |
| Post-treatment | -4.93* | -2.67* | -4.02* | -5.75* | -5.36* | -1.36 | -1.50 |
| 6-week follow-up | - | -1.83 | -3.21* | -5.11* | -3.96* | -1.09 | -1.05 |

Note: Dash indicates missing data. * Indicates clinically significant change.

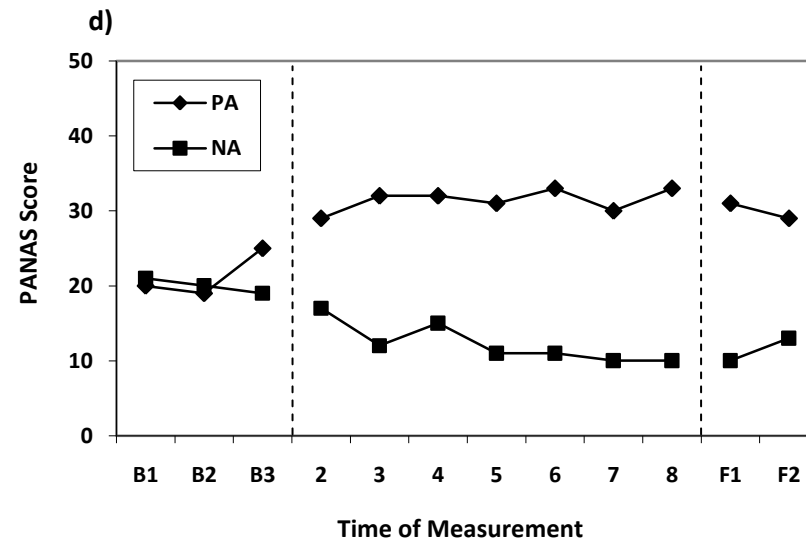
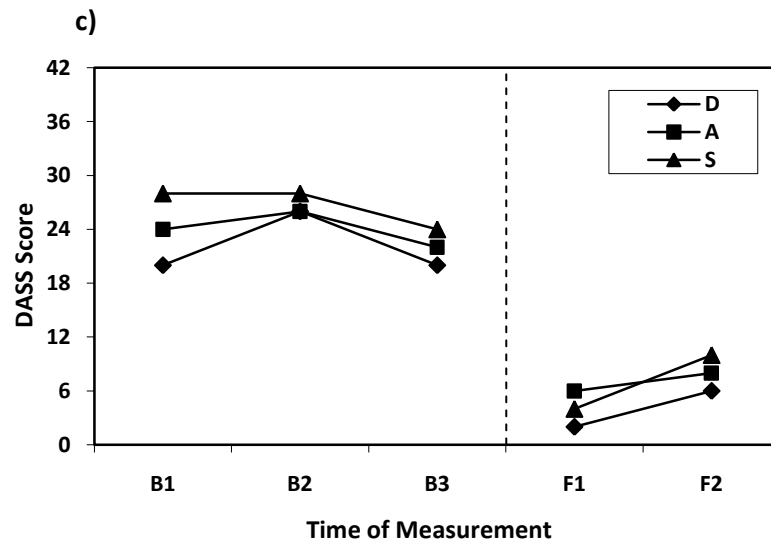
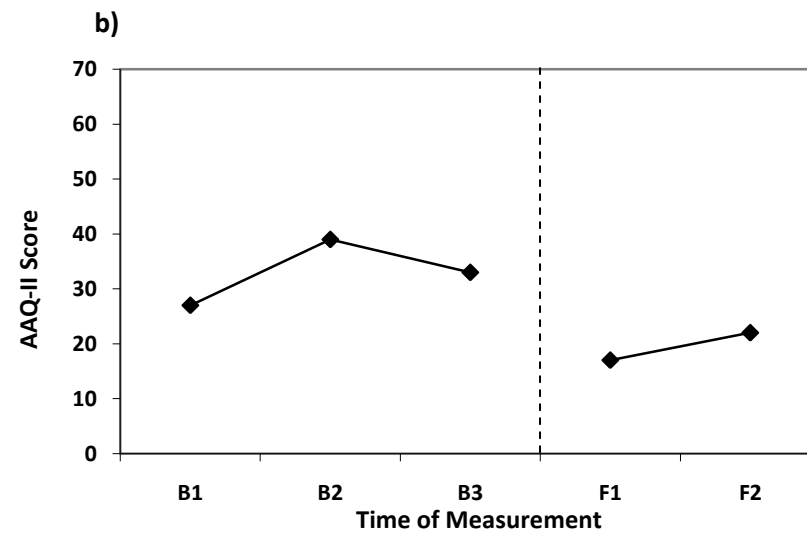
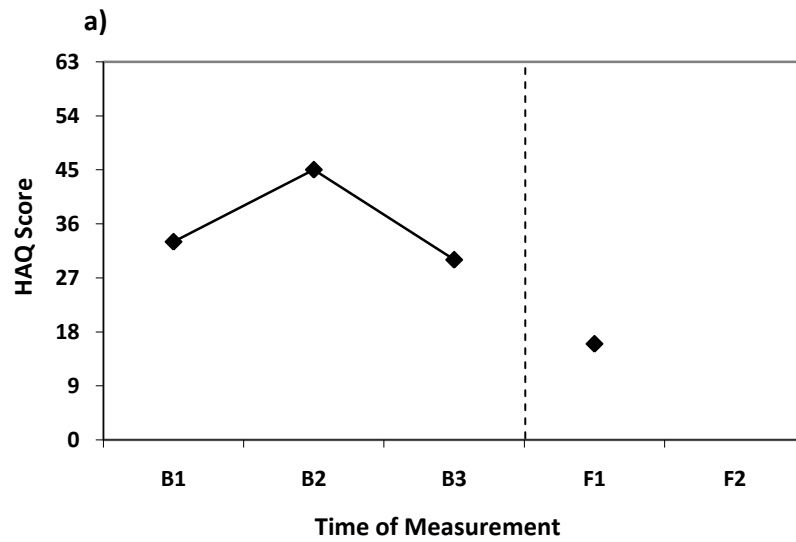


Figure 8. Fred's HAQ, AAQ-II, and DASS scores at baseline, post-treatment, and 6-week follow-up, and weekly PANAS scores.

General Summary

Overall, Fred exhibited significant improvements in health anxiety and general psychological distress, and a pattern of non-significant improvement in experiential avoidance. He also appeared to be experiencing more PA and less NA at the end of therapy. However, with missing data, slight score increases at follow-up, and a lack of significant change in some areas, it is unclear whether these changes would be maintained in the future. It is likely Fred's health problems and health-imposed limitations would contribute to ongoing fluctuation in his levels of health anxiety, general distress, and positive and negative affect, particularly as milder forms of depression are associated with functional disability in elders (Nordhus, 2008). Despite this, Fred appeared to enjoy life, have a sense of purpose, be socially connected, and well supported.

Case 4: Kingi – “I Face My Fears”

Case Introduction

Kingi was a 66-year-old man of Māori and other ethnic descent, who stated he identified more strongly with his Māori ancestry. He was married, retired, and had completed between 3 and 5 years at secondary school. He witnessed five bomb tests at Operation Grapple, and stated he was receiving a war pension for “chronic PTSD, nerve paralysis, deafness, tinnitus, leg cramps, and rectal cancer.” Kingi was diagnosed with colorectal cancer almost a year prior to the research, and had undergone surgery, radiotherapy, and chemotherapy. In addition, he reported having experienced the following health problems: high blood pressure, stomach ulcer, bowel disorder, hiatus hernia, kidney/urinary tract problems, a thyroid cyst (which was surgically removed), arthritis, and sight and hearing impairment. He worked part-time in a voluntary capacity, and was involved in a number of voluntary organisations.

Presenting Complaints

Kingi described having “constant” worry about his health, and while in the past he had attributed this to Operation Grapple, he now attributed it to ageing, stating, “You can’t keep blaming something forevermore.” While health was his greatest worry, he accepted that at his age health problems were part of life. He rated his health anxiety 8/10 on average (0 = *Not anxious about your health*, 10 = *Most anxious you have ever felt about your health*), with his major worry being the recurrence of cancer. He said anxiety caused him “concern” because he did not like experiencing it. Sleep was a major problem, and he had initial insomnia of

approximately 3 hours, for which he took two *Zopiclone* tablets nightly. He reported occasional bomb test nightmares, triggered by seeing nuclear testing in the news. Kingi obtained support with anxiety at least monthly from his GP, who he considered his “counsellor,” and whom he had known for 20 to 30 years. He had prescribed Kingi benzodiazepines to assist with anxiety prior to his cancer surgery.

Kingi reported experiencing a high level of general anxiety, stating “Anxiety sort of rules me really.” He described anxiety about various everyday concerns, as well as symptoms of social anxiety regarding public group events (including family events), public speaking, and meeting important people. He reported having concerns prior to public dinners about wearing the right clothes, fitting in with others, being able to contribute in conversation, and “measuring up to...expectations.” He had coped at events in the past by taking “refuge in alcohol” or leaving early, or would avoid going altogether. He also worried about and analysed his behaviour and others’ reactions post-event. While he recognised he “made himself believe” he would be uncomfortable or “out of place,” and enjoyed himself when he attended events despite his anxiety, these realisations did not keep him from avoiding if he could. He also described worries regarding public speaking including speech content, whether he would offend, who would be present, and feeling “terrible stress” before speaking. Additionally, he reported experiencing “self-doubts” and fears of failure, particularly in relation to his voluntary work and attending public events.

Kingi acknowledged that despite experiencing stress and anxiety, he lived life as he wanted to and liked to “have a laugh.” He stated he was emotionally stronger and coped better than he had in the past, accepting his limitations and seeing them as part of life, “I don’t sit about feeling so miserable for myself now.” Despite some concerns that “pills prop me up now and then,” he believed he had learned to manage his anxiety and did not want any help, or to change anything in his life. He said he volunteered only because the research was Grapple-related. He coped with anxiety by “facing” it, and with stress by reading books, going for walks, and gardening. He also received assistance from his wife who would help him attend functions with her whether he “liked it or not.” He appeared to be living according to his values, spending quality time with his wife, seeing his children, keeping busy and active at home and through voluntary work, and keeping up with friends. He appeared generally accepting of his life, and satisfied with the ongoing support of his wife and GP.

History – Nuclear Testing Exposure

Kingi was 17 years old at Operation Grapple, and described it as “a great experience.” He said their naval duties were to track weather conditions and keep unauthorised vessels out of the area. Following the blasts he reported feeling the explosion’s heat and wind, and seeing his bones through his hands with his back to the blast, eyes closed, and hands over his eyes. He said at times they witnessed blasts from as close as 20 miles from ground zero. Despite this, he stated he did not know much of what was involved at the time. After a naval visit to Hiroshima and Nagasaki in Japan, in which he saw babies with genetic abnormalities and heard about various radiation-related cancers, he said he began to have “doubts” about his experience at Christmas Island. He reported experiencing “stress” in the late 1950s and early 60s, in the form of initial insomnia, and dreams of nuclear explosions and irradiated Japanese people and children with deformities. However, he stated because he was in the navy where it was considered “unmanly” to discuss “problems that could not be seen,” he kept this to himself, and used alcohol to cope.

He reported his wife had several miscarriages within 10 years of his Operation Grapple service, and that some of their children were born with congenital conditions. Kingi felt his wife’s difficulties and children’s health conditions were his fault, due to his exposure. He stated he has “never wavered from this belief,” and that research by Roff (1999) led him to accept this possibility. Kingi reported his “stress” worsened following his children’s births, his alcohol use increased, and he was prescribed benzodiazepines. His first concerns for his health began alongside his wife’s miscarriages, with wives of other nuclear veterans experiencing the same problem. He said many other crew members’ children also had disabilities consistent with radiation exposure. He had believed it was “not a question of if, but when” he would get cancer, which many of his comrades had.

Kingi reported his levels of stress and anxiety led to his early retirement. He stated a consultant physician diagnosed him with “chronic PTSD” related to his Grapple service, describing symptoms of insomnia, fatigue, social withdrawal, loss of appetite, weekly vivid dreams, avoidance of nuclear testing material, and occasional flashbacks to the testing. Part of his stress also involved increasing health anxiety as he aged. Kingi attributed the “origins” of his stress to Operation Grapple, and applied for his war pension on these grounds. He stated he saw his children regularly, and each time he felt their conditions were his fault.

Additional Stressful Experiences

Kingi worked for 26 years in a job he considered very stressful, particularly as he moved up the ranks, and his position became more solitary. He said it became “too much” for him after he went through several stressful work-related experiences (which also contributed to his early retirement). As would be expected, being diagnosed with cancer and undergoing surgery and various treatments was also very stressful for Kingi, and he stated that remembering what he went through, particularly some of the “humiliating” and “degrading” medical procedures and examinations, was difficult for him.

Initial Assessment Results

Initial assessment results (see Table 31) showed Kingi was experiencing high levels of health anxiety (HAQ). His AAQ-II score indicated moderate experiential avoidance. Furthermore, his DASS scores revealed high levels of general distress, including *severe* to *extremely severe* depression and anxiety levels, and *severe* stress levels. His initial PANAS scores indicated he was experiencing average levels of PA compared to other males, and placed him at the 52nd percentile (Crawford & Henry, 2004). He was experiencing above average levels of NA compared to other males, with his score placing him at the 93rd percentile.

Table 31
Kingi's Baseline Results for Each Measure

| Time | HAQ | AAQ-II | <i>D</i> | DASS | | PANAS | |
|------------|-----|--------|----------|----------|----------|-----------|-----------|
| | | | | <i>A</i> | <i>S</i> | <i>PA</i> | <i>NA</i> |
| Baseline 1 | 33 | 40 | 22 | 24 | 26 | 33 | 24 |
| Baseline 2 | 39 | 41 | 22 | 18 | 26 | 29 | 29 |
| Baseline 3 | 38 | 42 | 28 | 26 | 28 | 35 | 27 |

Note: HAQ = Health Anxiety Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; DASS = Depression Anxiety Stress Scales; PANAS = Positive and Negative Affect Schedule; PA = Positive Affect; NA = Negative Affect.

Case Conceptualisation

Kingi presented with high levels of health anxiety, moderate experiential avoidance, and high levels of depression, anxiety, stress, and NA. Along with health anxiety he appeared to be experiencing some social and generalised anxiety. Initially, Kingi experienced uncertainty regarding the effects of his nuclear testing exposure when he witnessed the devastation of atomic bombs in Japan post-World War Two. Following this he exhibited insomnia and

nightmares. His health concerns developed following his wife's miscarriages, and were subsequently exacerbated by the births of their children, who had congenital conditions. These difficulties, along with a number of Kingi's nuclear veteran comrades developing cancer and dying also contributed to his health anxiety, leading him to fuse with the belief that he too would develop cancer. It is likely that keeping his health concerns and guilt over his children's health to himself led Kingi to avoid them through alcohol use and medication. Rather than eliminating these uncomfortable experiences, it likely made them stronger, resulting in the need for further avoidance. Fusion with the beliefs that he would get cancer, and his children's health conditions were his fault likely contributed to his high levels of anxiety and experiential avoidance.

Experiential exposure and cognitive defusion may have taken place over the years through Kingi learning to discuss his worries with his GP. It is also possible that coming to adopt the attitude of wanting to face his fears enabled him to rely less on alcohol (he seldom drank at the time of the research). His wife giving him no choice over attending events may also have assisted. Kingi stated he could allow his uncomfortable anxious feelings and distressing thoughts to be present to some extent, and act according to his values. This to him was "facing" or "confronting" his fears. This ability likely helped him cope reasonably well with high anxiety, keeping this from having a major impact on his relational and occupational functioning. Kingi acknowledged, however, that he would "push away" or "suppress" worries and guilt, which increased his distress, and he still used medication to cope with anxiety. Furthermore, at times he acted against his values by avoiding public events to avoid anxiety. This suppression and avoidance likely maintained his dislike of anxiety and desire to continue avoiding it.

Course of Treatment

While Kingi recognised he experienced high anxiety and stress, and believed he may have "got an anxiety problem somewhere along the line," he was happy with his life and did not want to change anything. He lived as he wanted to, and exercised the helpful principles and strategies he had learned over the years. He said 10 to 15 years ago he may have chosen to learn new skills or ways of coping, but he was now "too old" to change, and would find this "disruptive": "I feel that in the few years one has left...it's not going to hurt carrying on the same way as I have, providing I be careful what I do."

Kingi stated he had learned to cope with his anxiety, and described two approaches he took to this. On one hand he appeared psychologically accepting, stating, "I can face these anxieties and worries, I don't fear them," recognising that although certain events would elicit anxiety, he would "accept" this and "do it anyway." To some extent he was comfortable with them, stating, "I don't know whether I want them to go away...I've had [anxiety] so long I think I'd get lonely if it went." At the same time, he said he would not want them to be present "all the time," and he would "push them away." He stated he would take "the easy way out," using medication when his anxiety was worst. He reported he would avoid "a lot of things," stating at one point that this "concerned" him and caused him "extra stress," but at another, that he was happy to avoid and this reinforced his behaviour. Behavioural avoidance did not appear to be very unworkable for Kingi, as the relief at not going (e.g., to an event) outweighed any guilt he felt, and it had not become a major problem in his life.

Kingi believed it was necessary to accept life circumstances, stating, "I accept things when there is no other way...because I need to go on. If I don't accept something that's happened, then I'm stuck there." He had coped with cancer by he and his wife seeing various events as "peaks and troughs," in which peaks were the stressful periods (e.g., specialist visits, diagnosis, surgery, x-rays, scans, radiotherapy). To him it was about "climbing one peak at a time."

Kingi believed he could control "to some degree" what he thought and felt, including his worries, through his behaviour. If he could do something to "get rid of" or resolve worry, he would (such as acting on a particular situation). His preference was to "deal with" worry so it would subside, but he also recognised he could not fully control how he felt in certain situations, and that worry never completely went away. He believed the best way for him to live was to "control" and "manage" his anxiety as best he could.

In terms of mindfulness, Kingi reported feeling "a bit uncomfortable" during the exercise in Session 1, as though he was "in a church." He felt it did not "do much" for him, but then acknowledged he felt relaxed, usually a difficult state for him to achieve. By Session 2 he had decided not to do these exercises, stating, "I don't feel you can cure me. I'm happy the way I am." It is possible the researcher did not present a strong enough rationale for practising mindfulness, as Kingi said he would have liked to hear of other veterans who had completed and benefitted from the programme (however, this information was not available at the time). He later stated it may have been better for him if he had done these exercises.

Kingi enjoyed the metaphors, relating strongly to the *Volleyball Match*, which was “constantly” the case for him, and the *Anxiety News Radio*. However, the abstract concepts of kindness and compassion towards the self, and the self as context were new, and took him time to understand. He acknowledged he may be kind to himself without realising, but said “I feel that should come from someone else.” The idea of not judging uncomfortable feelings and thoughts, and letting them come and go was also foreign to some extent.

Kingi felt he had gained “opportunities to look at how to deal with [worries] differently.” He found the programme “educational,” and enjoyed becoming more aware of his anxieties as “self-imposed” barriers that held him back in life. However, he described finding some of the material and language too academic and “over the head.” While believing the programme would be beneficial for some of his nuclear veteran comrades, he felt they would need to “accept that they have problems.” He believed the barrier to this was, “They don’t want people to think that they’re mentally dysfunctional in any way whatsoever...The average bloke still believes that if you are seeing a psychologist there is something ‘potty’ with you.” However, he believed if they knew what the programme involved they would be appreciative of the assistance, and would gain “peace of mind,” understanding of anxiety, awareness of barriers, and confidence in a new way of coping.

Assessment of Therapeutic Progress

As shown in Table 32 and Figure 9a and 9b (p. 168), Kingi’s scores on the HAQ and AAQ-II had increased following therapy. While the increase in health anxiety was significant, the increase in experiential avoidance was not (see Table 33). On the DASS, his depression scores reduced to *moderate* post-treatment and at follow-up, while his anxiety scores reduced to *mild* post-treatment, but increased to *severe* at follow-up; his stress scores reduced to *normal* post-treatment but increased to *moderate* at follow-up (see Figure 9c). Despite the increases at follow-up, all DASS reductions 1-week post-treatment were significant. On the PANAS, Kingi’s PA scores fluctuated over the course of therapy, but all except one score (Session 7) were in the average range for his gender (see Figure 9d). While his score had reduced slightly by the end of treatment, this was not significant, and at follow-up he was still at the 36th percentile. Kingi’s NA scores ranged from *above average* to *average*, and while they reduced over the sessions, this reduction was not significant, nor was it maintained at either post-treatment point. Kingi’s follow-up score placed him at the 95th percentile (slightly worse than his mean

baseline score). Additionally, Kingi scored 57 (out of 100) on the LSS, which was in the average range for males in the development sample.

Table 32

Kingi's Post-Treatment and Follow-Up Results for Each Measure

| Time | HAQ | AAQ-II | <i>D</i> | DASS | | PANAS | |
|------------------|-----|--------|----------|----------|----------|-----------|-----------|
| | | | | <i>A</i> | <i>S</i> | <i>PA</i> | <i>NA</i> |
| Post-treatment | 45 | 49 | 14 | 8 | 14 | 26 | 23 |
| 6-week follow-up | 48 | 52 | 20 | 18 | 24 | 29 | 29 |

Table 33

Kingi's Reliable Change Indices for Each Measure

| Time | HAQ | AAQ-II | <i>D</i> | DASS | | PANAS | |
|------------------|-------|--------|----------|----------|----------|-----------|-----------|
| | | | | <i>A</i> | <i>S</i> | <i>PA</i> | <i>NA</i> |
| Post-treatment | 1.97* | 1.33 | -2.01* | -4.79* | -3.03* | -0.82 | -0.60 |
| 6-week follow-up | 2.71* | 1.83 | -0.80 | -1.60 | -0.70 | -0.41 | 0.30 |

*indicates clinically significant change.

General Summary

Overall, Kingi did not engage in therapy or show major improvements on the measures. His levels of health anxiety and experiential avoidance increased, and while his levels of general distress had improved post-therapy, they had increased again at follow-up. Despite this, Kingi reported he had learned to cope with anxiety and stress over the years, and experienced average PA alongside his high NA. He “enjoyed” and was content with his life.

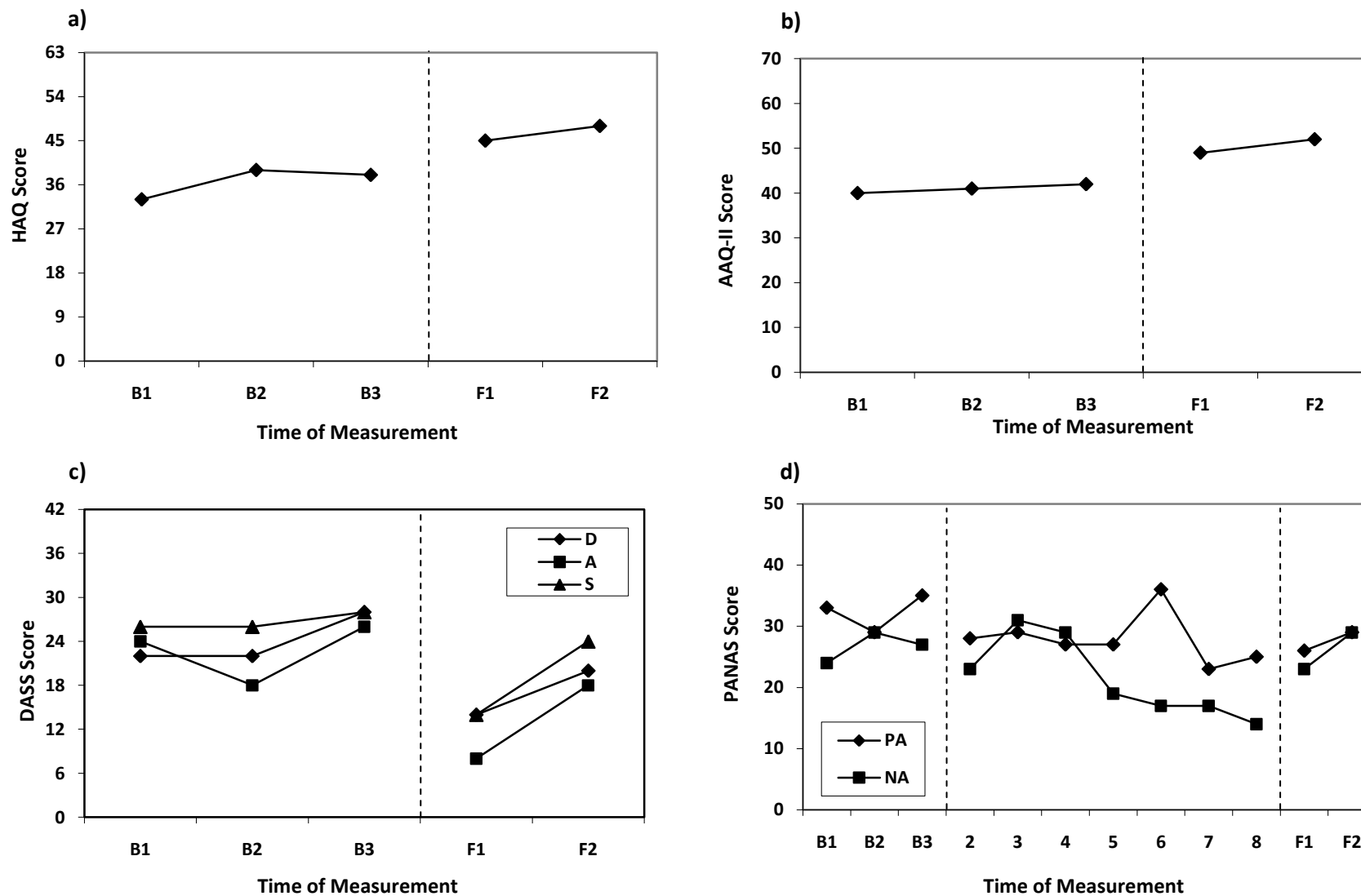


Figure 9. Kingi's HAQ, AAQ-II, and DASS scores at baseline, post-treatment, and 6-week follow-up, and weekly PANAS scores.

Case 5: Ray – “Don’t Dwell On It”***Case Introduction***

Ray was a 72-year-old man of Pākehā descent who was married, and reported witnessing all nine bomb tests at Operation Grapple. He had completed less than 3 years at secondary school, and held a trade certificate, but was retired at the time of the research. The only health problem he reported was diabetes.

Presenting Complaints

Ray did not report any difficulties, stating that health concerns were “not really a worry” for him. He acknowledged that he thought about his health “every now and then,” particularly when he received a newsletter from the NZNTVA chairman, and would feel “apprehensive” about when it would be “[his] turn” to get cancer. He reported that a number of the other nuclear veterans currently had cancer, or had died of it. He rated health anxiety 0-1/10 on average (0 = *Not anxious about your health*, 10 = *Most anxious you have ever felt about your health*). He reported there was a difference between “worrying about something and thinking about it,” and stated he tended not to let himself “dwell on” things. He recognised that occasionally having health concerns was a “natural” part of life.

In general, Ray did not appear to have any major problems, was content with his life and routine, and did not feel that anything needed changing. He was enjoying his retirement, and had frequent social contact, playing snooker with friends at the local RSA a few times a week. He chose to participate in the research to help the nuclear veterans, rather than for any specific personal gain.

History – Nuclear Testing Exposure

Ray reported that at the time of the testing, he and his comrades knew “nothing about it.” He reflected that the officer on deck at the time of the blasts did not know what to expect either, and repeatedly told the men to “Brace themselves,” thinking the shock wave would be bigger than it actually was. Ray described it as an “awe-inspiring” experience that was not frightening for him, “I don’t think any of us were scared.” He reported they had various duties on board the ship including using Geiger counters to measure radiation, hosing the deck down after the blasts, and releasing weather balloons to check that conditions were right for testing. He added that after the blasts they steamed through the radiation, caught fish to eat, and swam

just off Christmas Island. He said the health problems for some of the other veterans began in about the mid-70s when some died of cancer. He believed people had not really thought much about the exposure until then. To Ray, the experience itself was “over and done with” and while he expressed frustration over their lack of compensation, he did not believe they would receive recognition for their service. He did not appear to be preoccupied with the experience or his health in relation to it.

Initial Assessment Results

Initial assessment results (see Table 34) showed that Ray was exhibiting low levels of health anxiety and experiential avoidance, and normal levels of general distress. His initial PANAS scores indicated he was experiencing average levels of PA and NA for his gender. His mean baseline PA score placed him at the 57th percentile, and his NA score at the 38th percentile (Crawford & Henry, 2004). Baseline scores were varied for the AAQ-II, anxiety and stress scales of the DASS, and both scales of the PANAS, making it difficult to accurately ascertain what Ray would generally score on these measures.

Table 34
Ray's Baseline Results for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------|-----|--------|---|------|---|-------|----|
| | | | | A | S | PA | NA |
| Baseline 1 | 2 | 11 | 0 | 6 | 6 | 35 | 19 |
| Baseline 2 | 3 | 10 | 0 | 2 | 4 | 35 | 11 |
| Baseline 3 | 1 | 15 | 0 | 0 | 0 | 28 | 10 |

Note: HAQ = Health Anxiety Questionnaire; AAQ-II = Acceptance and Action Questionnaire-II; DASS = Depression Anxiety Stress Scales; PANAS = Positive and Negative Affect Schedule; PA = Positive Affect; NA = Negative Affect.

Case Conceptualisation

Ray presented with normal levels of health anxiety, experiential avoidance, general distress, PA, and NA, appearing to be in good mental health. While he had experienced some difficult times in his life, including the loss of a close family member, he appeared to have found effective ways of coping with these experiences. He believed it was important to talk about things rather than bottle them up, as “the more you talk about it, [the more] you come to accept it...the easier it becomes...It’s no good bottling it up inside you, that’s when your health fails.” This habit of talking about painful experiences may have continually exposed Ray to

difficult thoughts and feelings over the years, such that he did not fear them but accepted them as a part of life, “Everybody has feelings...and they shouldn’t worry about them...It’s normal.” He also appeared to be accepting of these difficult events, seeing them as “just one of those things that happens.” Because Ray was not engaged in attempts to avoid his internal experiences, he could pursue what he valued in life, including time with his wife, keeping in touch with family, friendships, and recreational activities. All of these factors kept any health concerns at a normal level. It is also possible that health was not such a concern for Ray because he had not developed ongoing or significant health problems in his life.

Course of Treatment

Ray maintained throughout the course of treatment that he had “no worries really,” and had a stable, consistent presentation. He described several ways of coping that had enabled him to get through the difficult times in his life. The key idea he kept returning to was the need to “not dwell on” things, such as worries and sad memories. In relation to the death of a family member he stated, “[You] can’t keep dwelling on things like that, you end up moping...you’d make yourself sick.” He said he and his wife would talk about this person often. When asked whether he accepted circumstances, he stated, “You have to don’t you? You can’t let them eat at you.” He said he had come to accept the loss within “a couple of weeks,” and believed that, “Things happen to you; you’re not the only one. They happen to other people as well.” He believed that keeping to a routine, which he had learned in the navy and gave “stability,” was very helpful for coping. He reported he used to smoke to cope with things, but did not anymore.

In terms of experiential acceptance, Ray reported he was willing to experience emotions and memories, “I don’t suppress them...They come and go naturally,” and believed that suppressing them would make them “take on a stronger hold.” He talked about both recognising the importance of allowing private experiences to be present, and that they come and go, and on the other hand doing things to “take your mind off it,” such as distracting oneself through tasks and “keeping busy.” He believed that we can “definitely” control our thoughts and feelings, “It’s good to mourn. Put a time frame on it but don’t go too long with it. Then you start getting into trouble.” Additionally, Ray recognised the importance of talking about issues in preventing the build-up of emotion, “I know people who do bottle things up, and really they’re in a hang of a mess. Mentally they’re all screwed up.” He gave the example of a man he knew who had lost his wife a number of years ago: “You never see him...He

doesn't go anywhere. I just think he shut himself away after his wife died." He alluded to pent up emotion that needed to be "released," and stated "It'll go away quicker if you don't bottle it up." While he did not report having worries, Ray recognised that people can become "consumed" with worries that "take over their life."

Ray had a mixed reaction to the mindfulness exercises during the ACT programme. He initially reported having a "weird feeling" while doing these exercises, and finding them "a bit strange," but stated he came to accept them after a while, and expressed the intention of occasionally taking the time to sit and focus on external sounds. He described the exercises as "relaxing" and "peaceful," and believed they may have some benefit in terms of helping people, particularly older adults who he felt rushed around, to relax and slow down from their busy lives. He also stated, "If you get into the habit of doing this exercise, I'm sure you'd find you accept things easier and not dwell on them too much." Despite acknowledging the benefits that mindfulness may bring for others, Ray did not feel this would add anything to his life. He said at one point he could not think of when he would need to use the exercises or why.

The metaphors in the ACT programme did not really seem relevant to Ray as he was not struggling with health anxiety, and there was no private experience that he found troublesome. He tended to understand the metaphors in a literal sense, and spoke of practical solutions to the struggles outlined in these abstract pictures. He found the idea of the *Epitaph* exercise difficult, and decided not to complete it because he felt that, "You're not supposed to say nice things about yourself."

Ray stated that he found the programme interesting, and the one thing it did for him was to "highlight things" he had not previously thought much about, such as taking the time to "sit quietly" and rest (mindfulness). This was the only idea he felt he would take away from it.

Assessment of Therapeutic Progress

As shown in Table 35 and Figure 10a to 10c (p. 174), Ray's scores on the HAQ, AAQ-II, and the DASS from baseline to follow-up were similar, with the slightest decrease in health anxiety. No clinically significant changes were observed (see Table 36). On the PANAS, while Ray's PA scores during the treatment sessions and post-treatment appeared variable with a range of 12 points (see Figure 10d), they were all within the average range for his gender. His NA scores

were also in the average range. While his follow-up PA score was in the average range, it placed him at the 72nd percentile. His post-treatment and follow-up NA scores placed him at the 12th percentile. Additionally, Ray scored 65 (out of 100) on the LSS, which was in the average range for males in the development sample.

Table 35

Ray's Post-Treatment and Follow-Up Results for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------------|-----|--------|---|------|---|-------|----|
| | | | | A | S | PA | NA |
| Post-treatment | 0 | 13 | 0 | 2 | 4 | 31 | 10 |
| 6-week follow-up | 0 | 15 | 0 | 0 | 4 | 36 | 10 |

Table 36

Ray's Reliable Change Indices for Each Measure

| Time | HAQ | AAQ-II | D | DASS | | PANAS | |
|------------------|-------|--------|---|-------|------|-------|-------|
| | | | | A | S | PA | NA |
| Post-treatment | -0.49 | -0.17 | 0 | -0.32 | 0.23 | -0.27 | -0.45 |
| 6-week follow-up | -0.49 | -0.5 | 0 | -0.96 | 0.23 | 0.41 | -0.45 |

*indicates clinically significant change.

General Summary

Overall, Ray appeared well-adjusted and in good mental health, experiencing low levels of health anxiety and distress, and better levels of PA and NA on average than other men. Despite his statements about the usefulness of keeping busy and distracting oneself from painful inner experiences, he showed low levels of experiential avoidance.

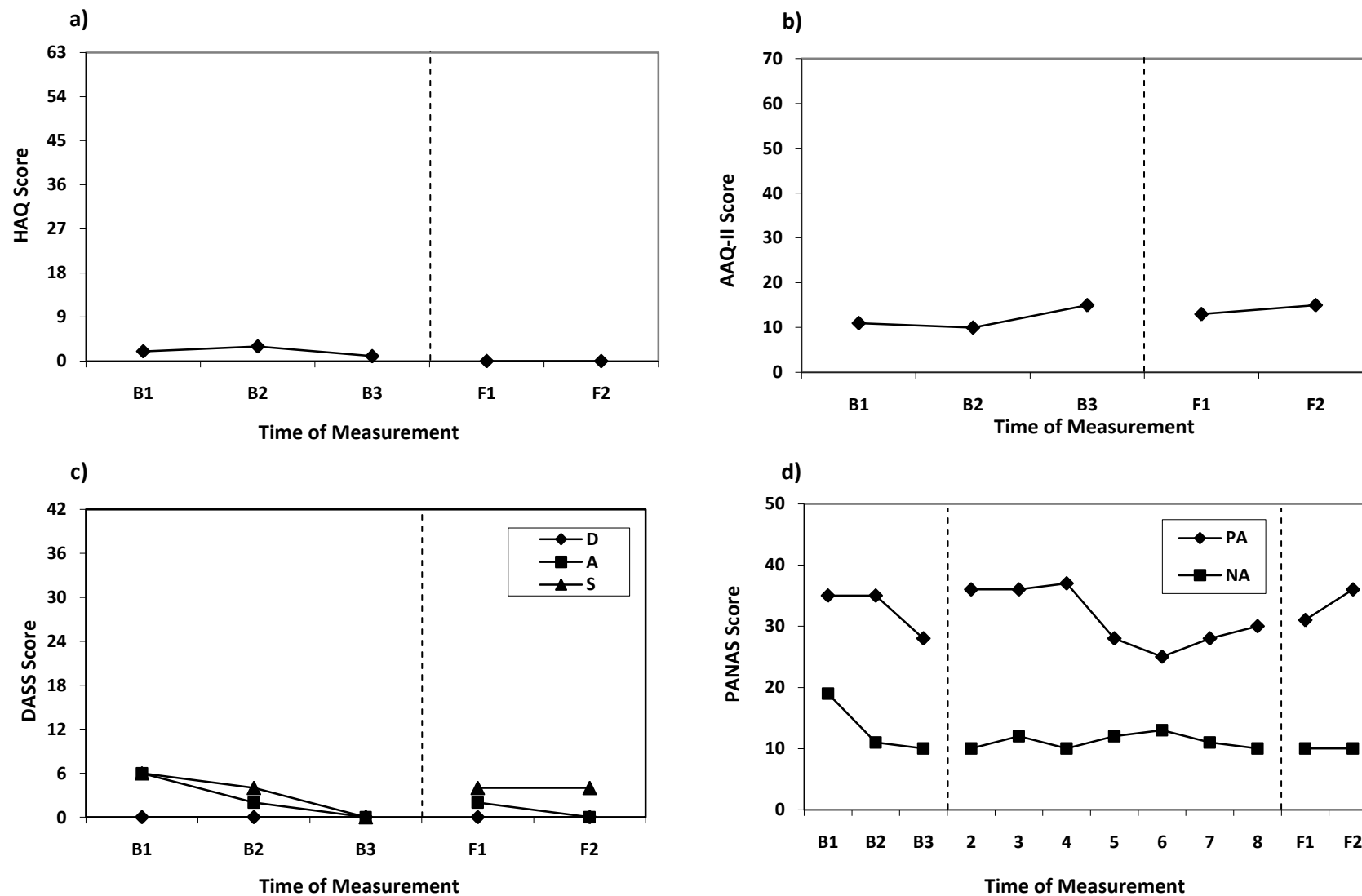


Figure 10. Ray's HAQ, AAQ-II, and DASS scores at baseline, post-treatment, and 6-week follow-up, and weekly PANAS scores.

CHAPTER TWELVE: STUDY II DISCUSSION AND THEORETICAL INTERPRETATION

Summary of Results

Study II investigated the effectiveness of ACT with older adults with nuclear exposure-related health anxiety. Of the 5 participants, only 1 engaged fully in therapy (Tane). He exhibited high baseline levels of health anxiety, experiential avoidance, and general psychological distress. (Despite this, he showed above average levels of PA.) Tane showed significant improvements in all of these areas post-treatment. These changes were maintained, and remained significant at follow-up.

Anaru exhibited moderate baseline levels of health anxiety, experiential avoidance, and general distress. Despite not engaging in therapy, he showed significant improvements in health anxiety and experiential avoidance post-treatment and at follow-up. His mean levels of general distress at baseline had also significantly reduced following treatment. However, his health anxiety and stress scores had increased at follow-up. While he showed a minor increase in PA and decrease in NA post-treatment, these scores were not significant, and had returned to the average range at follow-up.

Fred exhibited high baseline levels of health anxiety and general distress, and moderate experiential avoidance. Despite not engaging in therapy, he showed significant improvements in health anxiety, experiential avoidance, and general distress post-treatment. Reduced distress remained significant at follow-up, while reduced experiential avoidance did not, and health anxiety follow-up data were missing. While PA had increased and NA decreased from average levels post-treatment, these changes were not significant.

Kingi exhibited high baseline levels of health anxiety, general distress, and NA, and moderate experiential avoidance. He did not engage in therapy, and while he showed *increased* health anxiety and experiential avoidance post-treatment (with only the first increase being significant), he showed significant improvements in distress post-treatment. However, these reductions did not reduce to the *normal* range, and were not maintained at follow-up. He continued to show high levels of NA post-therapy and at follow-up (despite a non-significant reduction by the end of therapy), and average levels of PA.

Ray exhibited low baseline levels of health anxiety, experiential avoidance, and general distress, along with average PA and NA. He did not engage in therapy, and his scores showed very little change post-treatment.

Overall, results were mixed. While the majority of participants showed significant improvements in experiential avoidance, health anxiety, and general distress, these outcomes likely resulted from individual factors, with only one participant really engaging in treatment.

Support for Hypotheses

Initial Level of Health Anxiety

As a preliminary hypothesis, it was expected that each nuclear veteran would be experiencing at least moderate health anxiety on the HAQ at baseline. Of the 5 participants, 3 showed high levels of health anxiety (1 very high), 1 moderate, and 1 low. Thus, Hypothesis I was mostly supported. (However, one would not expect *all* of the nuclear veterans to be health anxious, and the researcher was unable to select only the most highly anxious men.) This pattern of experiencing at least moderate health anxiety is consistent with the literature on those exposed to nuclear radiation through warfare, accidents, and testing. While not explicitly measured in these populations, health anxiety or preoccupation was frequently observed to be a key characteristic of this exposure. Murphy et al. (1990) and Garcia (1994) found health concerns to be a prominent feature amongst the US nuclear veterans they interviewed. Similarly, a number of researchers (Baum et al., 1983; Collins, 1992; Collins & Bandeira de Carvalho, 1993; Green et al., 1994; Lifton, 1967; Remmenick, 2002; van den Bout et al., 1995) have noted health worries or concerns in nuclear warfare and nuclear accident populations.

However, an important difficulty in interpreting these results is ascertaining whether reported levels of health anxiety could be attributed to Operation Grapple exposure, or are simply normal for older adults. With no older adult norms for the HAQ, this is very hard to determine. Some researchers report a higher prevalence of health anxiety in older adults (Blazer et al., 2004; Lindsay & Marudkur, 2001), which would be expected from a developmental standpoint as health naturally declines, and mortality is more imminent (Bravo & Silverman, 2001; Hunt et al., 2003). Similarly, Knight and Satre (1999) suggest that because the correlation between the physical and psychological dimensions increases for elders, therapy can involve teasing out these effects. Health anxiety in older adults is by its nature complex.

Thus, just because these nuclear veterans exhibited mostly high health anxiety, does not mean this is not normal for older adults in general, or it is necessarily pathological. For Fred and Kingi, who had both had cancer, ongoing health problems and fear of cancer recurrence likely contributed more to their health anxiety than their radiation exposure.

Despite this argument, the initial presentation of the 4 health anxious veterans in this study is consistent with Vyner's (1988) theory of the Radiation Response Syndrome (RRS), in which nuclear veterans self-diagnose themselves as harmed by radiation and live out this belief system through health preoccupation and identity conflicts. Vyner recognised that in particular, it was those who developed physical illnesses subsequent to exposure, some with symptoms their doctors could not diagnose and/or treat, who were most likely to develop RRS. This may explain why Ray, who had not developed health problems post-exposure, was experiencing low health anxiety. This syndrome was observed in Tane, who firmly believed the radiation had injured him (although he had undiagnosed symptoms), and was clearly preoccupied with its effects on his health. He was so conflicted between the identities of being healthy or unwell that he once "publicised" to a group of people that he had cancer, even without a diagnosis. Kingi believed his development of cancer resulted from nuclear exposure, and while currently in remission, lived with the conflict that at any time he could take on the identity of being unwell again if the cancer were to return. He also lived with the belief that his radiation injury had caused his wife's miscarriages and the genetic problems of his children. Consequently, he took on the identity of being a "guilty man" whenever he saw his children. Fred also linked his cancer to his nuclear exposure, and over years of health difficulties had grappled with the identity of being unwell, and restricted in life by poor physical health. Finally, Anaru, while mostly in good health, feared that at some point this may not "last" and he may develop cancer. At times he felt apprehensive about the possible change of identity to a "sick man" unable to be there for his grandchildren. He also alluded to his possible identity shift to a guilty man if his grandchildren later developed illnesses that could be linked with his radiation exposure. While Tane had given up valued behaviour in the service of avoiding his anxiety, the other three, despite their health anxiety and the identity conflicts they faced, did not appear preoccupied with the health effects of radiation to the extent that they ceased engaging in some areas of valued living.

Similar to the features of the preoccupation dynamic (Vyner, 1988), it seemed each of these 4 veterans was attempting to make sense of his exposure experience through the self-diagnostic

belief and fears for the future. At some point in their lives (when applying for war pensions related to Grapple service), all 4 had tried to prove the radiation had caused illnesses they had. In this sense, they had tried to convince Veterans' Affairs (and likely others around them) that these issues were real, and 1 had even gone to protest at Parliament. It was clear that over the years they had thought often about their exposure, and the subsequent effects on their health and that of their families. Moreover, all were members of the NZNTVA, a vehicle for sharing any related concerns, providing them with frequent updates on news pertinent to nuclear veterans, encouraging ongoing reflection on these issues. While only Tane appeared consumed by preoccupation, at least 3 of these veterans (perhaps excepting Anaru, whose health anxiety was moderate) appeared to be experiencing preoccupation to some extent, with health anxiety as part of this. Consequently, the challenges involved in coming to terms with the testing experience and ongoing health concerns were a definite breeding ground for the use of experiential avoidance.

Reduced Experiential Avoidance

In terms of therapeutic effects, it was primarily expected that ACT would be effective in significantly reducing experiential avoidance (EA) in all participants, and that this reduction would be maintained at follow-up. Three participants showed significant EA reductions post-treatment, despite only Tane wanting assistance and engaging fully in treatment. (One exhibited increased EA post-treatment, and 1 low EA at baseline with no change post-treatment.) Two of these 3 showed maintenance of reduced EA at follow-up. The positive results are consistent with the ACT treatment literature of various anxiety disorders, in which reduced EA was observed in participants post-treatment. In Forman et al.'s (2007) study, 101 university student outpatients showed significant improvements in EA post-treatment in both ACT and Cognitive Therapy conditions. Similarly, Zettle (2003) found that 24 mature-aged university students showed significant EA reductions post-treatment and at follow-up in both ACT and Systematic Desensitisation conditions. Twohig (2008) observed significant EA changes in 17 individuals receiving ACT (versus Progressive Relaxation Training) post-treatment and at follow-up. Similar results were found by Dalrymple and Herbert (2007), Ossman et al. (2006), Twohig et al. (2006), Batten and Hayes (2005), and Orsillo and Batten (2005).

In addition, earlier studies tended to measure willingness as there was no published measure of EA prior to 2004. Block and Wulfert (2000) observed that willingness to participate in public speaking increased following an ACT intervention, with two of three participants showing a

further increase at follow-up. Likewise, Block (2002) later reported that participants receiving a similar intervention showed increased willingness to experience anxiety, and were more willing to experience uncomfortable public speaking situations than group CBT participants. Reduced EA (or increased willingness) is a common and consistent result of ACT treatment. The literature would suggest ACT effectively targets its key pathological process.

In the present study, the fact that EA reduced in 2 participants who did not really engage in the ACT approach, and who considered experiential control workable, was an interesting finding. It is possible that while Anaru did not report benefitting from the mindfulness exercises other than finding them “relaxing,” they made him more conscious of his internal experiences, and the regular in-session practise of being present may have transferred to some extent to his life in general. At one point he described being more aware of external sounds while working outside (e.g, birds singing). He also described the ACT programme as being about “coming to terms with inner feelings,” and commented on his openness in sharing his emotions with the researcher. It is possible the process of simply talking through (or describing) past experiences and his reactions exposed him to painful memories and feelings, and because he was in a safe, supportive environment, he did not need to avoid these. Indeed, as Horvath (2000) and Rogers (1992) explain, this type of environment is what the therapeutic relationship aims to foster. Thus, he may have defused somewhat from these experiences, coming to regard them as less threatening. Anaru described his experience of the programme as “having a detached look” at himself; perhaps to some extent he had developed his observer self. Additionally, it was interesting that Fred’s EA reduced significantly, given he did not do the mindfulness exercises, as these are specifically designed to promote experiential acceptance. He stated he appreciated the opportunity to talk to someone about his experiences, especially a stranger. This may suggest that discussing his internal experiences with an objective person allowed him to process them in a different way, perhaps changing his relationship to them.

Despite positive results for 3 participants in the current study, Kingi showed increased EA post-treatment. (With Ray already low in EA at baseline, it was unsurprising no changes were observed following treatment.) It is possible that discussing health concerns caused these to increase for Kingi (as observed in his results), which he found distressing, leading him to apply even more vigorous avoidance efforts.

Reduced Health Anxiety

Although anxiety reduction is not an explicit target of ACT, participants' health anxiety levels were expected to have reduced post-therapy. While significant reductions in health anxiety were observed in 3 participants post-treatment, with changes remaining significant at follow-up for 2 of them (data were missing for the other participant), this hypothesis cannot be said to be partially supported. With only 1 participant engaging in therapy, these improvements cannot definitively be attributed to ACT. A post-treatment reduction in health-related anxiety has been found in the ACT literature. Páez et al. (2007), and Montesinos et al. (2001) observed reduced anxiety, and Montesinos and Luciano (2005) observed significant reductions in relapse fear intensity and interference, as well as hypochondria and "anxious worrying," in patients diagnosed with breast cancer. A number of ACT researchers have also found post-treatment reductions in the primary type of anxiety measured (Block, 2002; Block & Wulfert, 2000; Dalrymple & Herbert, 2007; Hayes, 1987; Ossman et al., 2006; Twohig, 2008; Twohig et al., 2006; Zettle, 2003).

ACT's reduction of primary anxiety while not overtly targeting this makes sense when examining the underlying processes contributing to increased anxiety. As researchers (Eifert & Heffner, 2003; Feldner et al., 2003; Karekla et al., 2004; Levitt et al., 2004; Marcks & Woods, 2005; Wegner et al., 1991; Wells, 1997) have noted, efforts to suppress unwanted thoughts and emotional responses cause a paradoxical increase in these internal experiences. It would be expected that with increased willingness to experience uncomfortable anxious thoughts and feelings, efforts to suppress and avoid these would subsequently cease. Consequently, the rebound effect (Wegner et al., 1991) in which further anxiety is produced would disappear, resulting in reduced anxiety levels. Furthermore, as shown in NZ older adults, EA moderates the relationship between self-reported health concerns and anxiety (Andrew & Dulin, 2007). Thus, if this moderating factor has reduced, we might expect this relationship to weaken, with anxiety less likely to be produced at lower levels of EA. With 3 health-anxious participants reporting health concerns and showing reduced EA post-treatment, we might expect their anxiety to also have reduced.

This argument could also explain why health anxiety reduced in 2 participants (Anaru and Fred) who did not consider this problematic for them and therefore did not deliberately or consciously practise mindfulness as a new coping strategy (or engage in therapy generally). If simply discussing health concerns was enough to expose them to uncomfortable internal

experiences (as argued above), the expected consequence of decreased EA would be a reduction in health anxiety. Alternatively, there is a large body of research supporting the efficacy of psychotherapy in general (see Lambert & Ogles, 2004), as well as a recent NZ study on the utility of “Talking Therapies” (Peters, 2007), indicating that psychotherapy as an intervention is in general, effective. Additionally, therapist attention alone is known to have a therapeutic effect (Kendall et al., 2004). It is possible that discussing issues in a therapeutic environment helped Anaru and Fred process difficult life experiences, with the indirect result being a reduction in their health concerns.

Again, while there were positive results for health anxiety in 3 participants, 1 (Kingi) showed a significant increase in health anxiety post-treatment. (Again, with Ray initially presenting as low in health anxiety, this was not considered likely to change during treatment.) As explained regarding Kingi’s increased EA, it is possible that discussing his health concerns increased their frequency.

Reduced Psychological Distress

It was also expected that ACT would be effective in reducing comorbid psychological distress in the form of depression, non-specific anxiety, stress, and NA. In support of this hypothesis, 4 participants showed significant decreases in depression, anxiety, and stress post-treatment (Ray showed no change from normal baseline levels). For 3 participants these changes remained significant at follow-up, except for Anaru’s stress score. For NA, Tane showed a significant decrease post-treatment that was maintained (and remained significant) at follow-up. Three additional participants showed non-significant decreases in NA over therapy, with 2 showing maintenance at follow-up, and the other increasing in NA 1-week post-treatment. (Ray’s scores remained average.) Reduction in comorbid distress was found in some of the handful of ACT studies that investigated this alongside the primary type of anxiety. In studying OCD, Twohig et al. (2006) found reduced comorbid anxiety and depression in participants, which was maintained at 3-month follow-up. Carrascoso Lopez (2000) observed reduced trait anxiety in a man diagnosed with panic disorder with agoraphobia. Batten and Hayes (2005) reported reductions in general psychological distress, psychopathology, and depressive symptomatology from clinical to non-clinical levels in a woman with PTSD. The woman also reported reduced comorbid substance abuse.

These indications that ACT has the potential to reduce comorbid distress and symptomatology could be explained similarly to decreases in primary anxiety. In encouraging willingness to feel health anxious internal experiences, this accepting stance may generalise to other private events such as depressive thoughts and feelings, more general anxiety, and urges to use substances. In producing a more general attitude of experiential acceptance, other private experiences need no longer be avoided and consequently, unnecessarily compounded. Thus, reduced comorbid distress may be another by-product of reduced EA.

In 3 participants, the significant reductions in general distress (DASS scores) noted post-treatment were mostly maintained at follow-up. However, Anaru's stress score had risen and was no longer significant at follow-up. It is possible that discussing concerns and past trauma may have led to a reduction in depressive and anxious symptoms, but as he had not implemented any new coping skills, he was quickly re-affected by the stresses of everyday life. Also, Kingi's reduced DASS scores had increased at follow-up, so the reductions were no longer significant. While not significant for 3 of these 4 participants, NA scores showed the same pattern as the DASS, with 2 men maintaining reductions, and Kingi's score again increasing, this time from post-treatment to follow-up. The fact that Kingi's score reductions were not maintained post-treatment suggests his progress was more to do with therapist contact than the implementation of a new coping strategy (i.e., acceptance).

While some of these results are positive, particularly in Tane's case, and the hypotheses were partially supported, there were some unexpected findings. The following section outlines some issues that may explain these findings.

Theoretical Interpretation

One of the main difficulties encountered in this study was the incongruity between participants' scores on the measures (particularly the HAQ), and their self-reported anxiety and distress in person, and consequently why they had chosen to participate in a study offering therapy for health concerns related to their nuclear exposure. Two participants reported health anxiety was not a problem for them, despite showing moderate to high scores on the HAQ and DASS. Additionally, they did not believe anything in their lives was unworkable or needed changing. Another participant, while recognising he experienced high levels of anxiety and distress, was not motivated for change. Several possible reasons are

presented for their subsequent research participation and non-engagement in therapy, including motivation, experiential control, level of emotional awareness, transference, and resignation versus general acceptance.

Motivation

Four participants (those who did not wish to make life changes) reported they volunteered in order to help others, or because the research was Operation Grapple-related. Two also mentioned helping the case of the nuclear veterans. Perhaps the 2 participants who did not acknowledge any major difficulties (Anaru and Fred) truly did not require psychological assistance. These men did not appear to present with clinical problems, but seemed to be coping well. In this instance, then, their higher scores could either mean that their baseline period was not representative of their typical presentation, or that while they generally experienced moderate or higher levels of health anxiety and distress, this had not become a problem for them, and their coping strategies were effective and workable. If this was the case, it is quite likely their participation had an altruistic basis.

It is possible that older adults in New Zealand are particularly supportive of research, as Andrew and Dulin (2007) attained a very unusual 83% response rate in their NZ study. Research has shown that altruism predicts positive affect in older age, and thus is important for the maintenance of positive mental health states at this stage of life (Dulin, 2000). Volunteering, or pro-social behaviour, is also associated with increased well-being and life satisfaction in older age (Caprara & Steca, 2005; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003). Additionally, adults in the later stages of life may gain purpose through serving and giving back to the community, and may therefore be willing to participate to help younger generations and advance knowledge, or to assist a cause they believe in.

If it was altruism that motivated participation in this study, rather than motivation for change, it is not surprising that participants did not engage. A lack of motivation in the sense that there was no great need for them to engage in an effort-full life-changing process is perhaps the most likely explanation. Essentially, their motivation for change was at a pre-contemplative stage (Prochaska & DiClemente, 1992) and therefore they likely did not put any real effort into the therapy. Indeed, Hayes (1987) provides valuable insight on this in his early experiences of ACT, "Clients who are not in considerable pain or otherwise ready for a major

change will not give the therapist the room necessary for such a fundamental challenge to our normal perspective on things” (p. 377).

Experiential Control

One explanation is that those participants who did not feel they needed help were exhibiting stoicism. While the men in the present study appeared partially accepting of their internal experiences, they also held strong stoic beliefs regarding emotional and cognitive control, which seemed to make it difficult for them to fully connect with the ACT principles. To them, control was a valued and useful coping strategy. Beliefs about eliminating emotion were exemplified by the fact that most participants could not name benefits of anxiety, making comments such as “when it stops.” Stoicism appears to be highly valued in Western countries, and has parallels with modern psychotherapies including Rational-Emotive Behaviour Therapy and CBT (Montgomery, 1993; Still & Dryden, 1999). Its prevalence in Western and perhaps non-Western countries may explain CBT’s successful adaptation to and acceptance by a number of cultures (see Hays & Iwamasa, 2006). Consequently, this may explain why ACT concepts that contradict stoic beliefs can be difficult for clients to comprehend; they are understandably foreign to individuals who take pride in internal regulation, and consider this workable. Some nuclear veterans did not seem to ever really grasp these concepts as they came from a very different perspective. Hayes (1987) acknowledges the ACT perspective is a definite paradigm shift from our usual way of thinking. This difficulty adopting a new mindset may explain why Braekkan (2007) did not observe significant changes in EA, believability of thoughts, or any form of symptomatology in applying ACT with combat veterans.

While 1 participant exhibited high EA and 3 moderate EA, without AAQ-II norms, particularly for older adults, it is hard to judge the significance of these scores. (Unfortunately, the use of a different AAQ version precluded comparison with the results of Andrew & Dulin, 2007.) Additionally, without norms it is also difficult to ascertain whether participants’ Liverpool Stoicism Scores were high in terms of the general population of New Zealanders (and the development sample was only aged 20 to 50 years). Compared to the UK sample, 3 participants scored in the average range for men (as well as the Australian men’s average range; Judd et al., 2006), and the 2 who showed the most clinical improvement over the course of therapy scored below average (Tane and Fred). While participants’ stoicism levels were not above average for their gender, it is possible stoic attitudes influenced emotional disclosure and full engagement with the ACT concepts.

Stoicism is generally recognised as a personality trait of the stereotypical male (e.g., Cheng, 1999), particularly the 'Aussie male' (Elliot-Schmidt & Strong, 1997), and most likely also the "Kiwi bloke." Research appears to confirm this gender difference, with a number of studies observing significantly³⁰ higher levels of stoicism in British and Australian men compared to women (Judd et al., 2006; Judd et al., 2008; Murray et al., 2008; Wagstaff & Rowledge, 1995). Additionally, greater stoicism in males was associated with them being less likely to have sought help for mental health-related problems in the past (Judd et al., 2006), and generally having negative attitudes towards help-seeking (Murray et al., 2008). NZ research has shown women were more likely to make a mental health visit than men (Oakley Browne et al., 2006). Unsurprisingly, given these findings, men tend to hold more personal stigma about mental illness and be less receptive to their inner feelings and emotions (Judd et al., 2008). Judd et al. (2008) suggest these factors may make it difficult for men to recognise and accept emotional difficulties, or cause them to minimise these (Murray et al., 2008). Additionally, Judd et al. (2006) state stoicism may "make it difficult for health providers to detect problems when an individual actually does present seeking help" (p. 775). This may relate to the stoic idea that if one is unable to completely eliminate a certain emotion, he or she should hide it and perhaps fake another in order to give a different impression (Sherman, 2005). Consequently, those high in stoicism may be adept at hiding their true emotional health. Also, Nordhus (2008) states that older adults may under-report and minimise anxiety symptoms.

Emotional Awareness

A concept important to consider when discussing emotional control is emotional awareness, the ability to recognise different types of emotion in oneself and in others (Lane, Quinlan, Schwartz, Walker, & Zeitlin, 1990). This factor may account for participants' (Anaru and Fred) beliefs that they were not terribly health anxious or distressed, while their scores suggested otherwise. Several studies have confirmed the general perception that women are more emotionally aware than men (Feldman Barrett, Lane, Sechrest, & Schwartz, 2000; Ciarrochi, Caputi, & Mayer, 2003; Ciarrochi, Hynes, & Crittenden, 2005). However, men have been found to match women in emotional awareness, particularly if motivated to attend to their emotional responses, but this tends to take them longer (Ciarrochi et al., 2005). Ciarrochi et al. (2005) suggested this may be due to socialisation in which women are taught from a young age to attune to their emotions and those of others (Murray, 1999), whereas this is encouraged

³⁰ From this point on, "significant" refers to statistical significance.

less in men (Murray, 1999). As a result, women may simply have more ready access to their emotional knowledge than men.

Lane, Sechrest, and Riedel (1998) found low emotional awareness to have a small but significant association with older age (65 to 80 years), male sex, and lower education level, all characteristics of those in the present study. While emotional awareness was not measured in the present study, the researcher began considering whether this was an issue during the therapy process when participants did not seem to engage with ACT. In response to being asked to name all the emotions they could think of or emotions they frequently experienced, participants showed varying levels of emotional awareness, with some appearing highly aware, able to differentiate emotions they felt, and others less aware, speaking of “feelings” for a person, feeling “emotional,” or physiological cues (such as feeling “cold”; Lane et al., 1990). Given the argument that the present participants may be more likely to control emotion as a result of their military experience, one may wonder if this continued suppression can lead to reduced emotional awareness. It is likely that a culture which continually encourages men to be stoic could both contribute to and perpetuate reduced emotional awareness. It is possible that male older adults with a history of military service are more likely to be stoic, and to have less awareness of and more difficulty expressing their emotions.

Following from this is the question, *“In controlling emotion as part of stoicism, are people able to differentiate their emotional responses, or do they simply recognise they are becoming ‘emotional’ in general, and therefore suppress any kind of emotional arousal?”* Related to emotional awareness (but not investigated in the present study) is the concept of *alexithymia* – difficulty identifying and expressing feelings, and difficulty differentiating feelings from physical sensations (Sifneos, 1973). Alexithymia has been found to correlate positively with stoicism ($r = 0.33$; Judd et al., 2008). Studies have produced conflicting results regarding gender, with no gender differences observed, as well as higher alexithymia scores observed in men (Lane et al., 1998; Judd et al., 2008). Judd et al. (2008) have suggested it may not be the case that men are less able to describe their feelings, just that they are less comfortable openly expressing them. This suggests that whether male or female, it is possible that those higher in stoicism may have the potential to be less emotionally aware. Conflicting findings have also been found in older adults, with higher levels of alexithymia observed than in younger adults, as well as no differences between age groups (Gunzelmann, Kupfer, & Brahler, 2002; Henry, Phillips, Maylor, Hosie, Milne, & Meyer, 2006; Lane et al., 1998). Despite these

inconsistencies, it is likely that for clients of any age or gender, who are higher in alexithymia or lower in emotional awareness, ACT as an approach requiring awareness of thoughts and feelings could be difficult to engage with. It may be useful, therefore, to provide emotional education as a preliminary treatment phase before beginning ACT with these clients.

Transference

With the researcher possibly being of a similar age to participants' children or grandchildren, this may have affected their willingness to share their difficulties, due to issues of age and role (Knight, 2004). In particular, the men may have found the idea of sharing thoughts and emotions, and indeed "problems" or areas of perceived "weakness" with a young woman uncomfortable. While most of the men seemed very comfortable and open regarding their experiences and reactions (perhaps excepting Ray), it is possible that transference issues influenced their level of personal disclosure. Additionally, due to cultural role issues regarding elders, Māori participants as older men may have had reservations about sharing openly with a young Pākehā female (S. Bennett, personal communication, 14 November, 2006). Age may also have been a factor in participants' apparent reluctance to provide any negative feedback on the programme.

Developmental Factors - Resignation versus General Acceptance

A further explanation for the older adults in the present study resisting making life changes is an attitude of resignation. Older adults may be resigned to the fact that at their age and stage of life certain things are inevitable, such as experiencing anxiety and depression (Fernandez, Levy, Lachar, & Small, 1995) or pain (Yates, Dewar, & Fentiman, 1995), or that it is not worth implementing change because they do not have many years left to live. Consequently they may be resigned to their present situation, even if their coping strategies are unworkable in some way. Walters, Iliffe, and Orrell (2001) found that among other reasons, older adults may not seek help or may decline it due to resignation.

Alternatively, this attitude could be considered acceptance, which may increase as a developmental characteristic of later life. According to Erikson's developmental stages, older adults are attempting to master the stage of Ego Integrity versus Despair (Erikson, 1950/1995), in which they try to integrate all of their life experiences in a meaningful way, and come to accept them. It may be that those older adults who successfully resolve this dilemma come to a place of acceptance and contentment (and thus, integrity), and therefore consider life

change at their age unnecessary. In line with this, acceptance has been found to correlate with well-being in older adults (Ranzijn & Luszcz, 1999). It is possible this was the case for some of the present participants, who certainly appeared accepting of their internal experiences and life events to some extent.

Conclusion

The present sample is too small to enable any strong interpretive conclusions to be drawn. There were no definite patterns, and it is possible that the results observed may simply be due to individual differences. However, some potential theories have been proposed as to why the older adults in the present study may have found it difficult to engage with the ACT approach.

CHAPTER THIRTEEN: THE FIT OF TRADITIONAL ACT WITH NZ OLDER MALES

Applying the Contextual, Cohort-Based, Maturity, Specific-Challenge Model

This chapter focuses on evaluating the fit of ACT with NZ older males (based on observations from the present study), and presenting potentially useful ACT adaptations for this population. Knight's (2004) contextual, cohort-based, maturity, specific-challenge (CCMSC) model of gerontology is drawn on as the basis for some of participants' observed difficulties engaging with ACT, and for the proposed adaptations. This model suggests changes to psychotherapy approaches when working with older adults are likely to be necessary due to their experience of particular social contexts, cohort membership, and the specific challenges they face, rather than developmental factors related to ageing (maturation). Additionally, it recognises changes may be needed as most therapeutic approaches tend to have been developed on younger adults, and may consist of "concepts and techniques [that] may be more specific to young adult cognitive and emotional development" (Knight & Satre, 1999, p. 200).

In interpreting the present results, confirming the premise of the CCMSC model (Knight, 2004) cohort effects appeared more prevalent than ageing effects. Older adults are not a homogeneous group; individual differences are just as present as in younger adults (Cook, Gallagher-Thompson, & Hepple, 2005). As such, the CCMSC model suggests that personality differences often attributed to ageing can be more accurately attributed to cohort effects. It is likely that earlier cohorts (and therefore the particular cohort studied) hold certain characteristics, such as being less highly educated, less psychologically minded (Clarkin & Levy, 2004), and less educated about psychotherapy than we might expect later generations to be (Knight & Satre, 1999). Consequently, they would likely exhibit a different response to ACT than would be expected from later generations.

Thus, in adapting ACT for participants in the present study, changes based on both cohort and ageing effects, particularly in line with the cognitive changes that tend to accompany ageing, are needed. Specific issues in tailoring ACT for use with NZ older males may include simplifying language, using familiar concepts to transition to new ones, providing transparent meaning of therapeutic concepts, and the use of cohort-relevant metaphors. (It is possible these proposed modifications may also be useful for other older adults of this cohort.)

Simplifying Language

The slowing of cognitive processes in which speed is involved is the most prevalent age-associated change (Salthouse, 1985). Additionally, working memory tends to decline, and this can affect language comprehension (Light, 1990). Thus, the need for clear, simple language (without jargon) is important in therapeutic work with older adults (Knight, 2004; Knight & Satre, 1999), and Knight (2004) states this change would be similar to that made for clients of lower socioeconomic status. Several of the present participants said they found some of the ACT language difficult to understand, which perhaps made it more difficult for them to engage with the concepts. Tane stated he grew accustomed to the “technical jargon,” and understood it better by the end of the programme, but initially thought it was “all foreign,” and difficult to follow. Another participant reported finding the language of some of the mindfulness exercises “a bit airy fairy.” In general, it was the researcher’s experience that most of the men still showed some difficulty comprehending the ACT language by the end of the intervention. However, it is also possible the researcher’s inexperience in presenting this material, particularly to older adults, contributed to these problems.

Additionally, participants’ level of education, often recognised as lower in earlier cohorts (Knight, 2004), may have contributed to their difficulty with the ACT language. The men in this sample had mostly minimal education levels, with 1 completing less than 3 years of secondary school, and trade certificates being the highest qualification. Clients from less educated cohorts are more likely to find abstract concepts and complex language difficult, and may be expected to be less psychologically minded (Knight, 2004). The ACT literature on anxiety disorders tends to include samples of more highly educated (university) participants. Despite this argument, Hayes (1987) claims while ACT may first appear appropriate for only “very intellectual” clients, he has used the approach successfully with “uneducated people with borderline IQs,” as well as children (with language appropriately altered). Hayes et al. (2006) report that ACT appears to be working for a range of populations, with demographic factors not seeming to affect outcome. Also, Tane, who had the lowest level of education, understood well the basic concepts of this approach. However, this factor may emphasise the need for simpler language in working with earlier cohorts.

To cope with this language issue, the researcher ended up simplifying and summarising much of the educational material and metaphors (rather than keeping to the full descriptions provided in Eifert & Forsyth, 2005), as well as changing some of the wording in the mindfulness

exercises. Two of the 3 participants who were willing to practise mindfulness in session reported preferring the *Watching Thoughts Drift By* (like leaves on a stream) exercise, as it had a visual component, making it more “practical” and easier to engage with. This may suggest mindfulness exercises with simpler phrasing, and involving visualisation could be more useful with older males, and that presentation of ACT material needs to be focused and concise.

Using Familiar Concepts

In addition to language considerations, learning and memory changes associated with older age may also have influenced participants’ response to the ACT material. Learning is more difficult later in life, perhaps partly due to deterioration of working memory, making it more laborious to transfer new concepts to long-term memory (Light, 1990). These factors may also make it harder for older adults to take on new concepts, particularly those which are complex (Knight, 2004), such as the ACT concepts of control as the problem and the self as context. This may be another reason why participants took time to grasp these ideas (and may not have ever fully comprehended them). This may suggest a need to use familiar concepts to bridge the gap to new learning in later life.

For older males of more stoic cohorts, it may be useful to present the concept of acceptance or non-control as being needed when stoicism (or over-control of emotion) becomes a problem, and is no longer workable. Therapists could explain that while control can at times be useful, there comes a point where too much control becomes unworkable, and stops us from living according to our values (e.g., relating well to family, pursuing interests, maintaining friendships, living purposefully). The ACT approach could be presented more along the theme of “reducing control of your emotions so you can take control of your life,” and in this sense would not be taught from a completely “no control” standpoint. The ACT perspective would focus more around a balance between changing or controlling the things we can, and accepting those we cannot control, or that would cause us more suffering if controlled. This approach may be more helpful for those from similar cohorts to the present participants, who may find the idea of experiential acceptance somewhat foreign and irrelevant because they consider control workable. (It may also be useful for adult Kiwi males in general, as well as those in the military.)

Making Meaning Transparent

Fluid intelligence, or the efficiency of cognitive *processing* (versus crystallised intelligence, the accumulated knowledge or *products* of processing), is the ability to think flexibly or solve novel problems. There is a decline in this abstract reasoning ability with age (Salthouse, 1998). The fact that inferring relations of an abstract nature (or inferential reasoning; Knight, 2004) is more difficult for older adults suggests they may not grasp the implicit meaning of metaphors. This may explain why the present participants at times appeared to take them literally. All participants seemed to take literally the Epitaph exercise in particular, and were visibly uncomfortable about completing it, seeing it more as a reminder of their mortality rather than a metaphorical exercise. They were also uncomfortable “blowing their own trumpet.” The only participant who completed this exercise wrote, “I was too busy to stop for death so he kindly stopped for me,” despite the explanation given that the purpose of the message was to express values, and the researcher knew “busyness” was not his only, or primary, value.

The decline in fluid intelligence also implies it may be necessary to use more concrete examples, as in work with less educated clients (Knight, 2004), and to “lead the older client to conclusions” (Knight & Satre, 1999, p. 191), instead of expecting them to “think through the implications of abstract interpretations” (Knight, 2004, p. 32). In the present study, the researcher explained the metaphors to participants to be certain they understood the messages, as they frequently seemed to see things from a different perspective. This perspective was usually expressed in concrete, practical, problem-solving terms, such as with 1 participant stating that for him, “dropping the rope” in the *Tug of War* exercise would mean giving in, in life, and not facing the challenge (rather than being free from the struggle with thoughts and emotions). Another participant saw the *Child-in-a-Hole* metaphor (and the concept of “digging”) as representing general life problems, rather than relating it to internal experiences. This may suggest ACT therapists need to be explicit about the meaning of metaphors, even though this is not usually the intended purpose for their use (Eifert & Forsyth, 2005). Otherwise, they may find the use of metaphor as a key ACT strategy loses potency with their older (male) clients. With the ACT concepts at times seeming too abstract for the present participants, the writer described issues in a more practical sense, and asked them “What advice would you give someone in this situation?” This drew on their expertise from life experience (Knight, 2004), particularly in terms of understanding people, an adaptation that Knight (2004) suggests as a way of building on strengths the older adult already possesses.

By nature, ACT concepts and metaphors in their present form tend to be fairly abstract, and given the cognitive changes associated with ageing, this is important to keep in mind when working with older clients. The following section presents possible metaphorical adaptations to assist with age-related and cohort-related issues.

Using Cohort-Relevant Metaphors

Knight (2004) reports that older adults will likely find “personally relevant” (p. 9) material easier to learn, therefore it may be more helpful to use cohort-specific examples in therapy. Similarly, Smith (1996) reports older adults are more likely to retain information when it is meaningful and relevant to them. With participants in the present study seeming either to not understand the implicit meanings of the metaphors, or to take them literally, the potential utility of cohort-relevant metaphors was highlighted. While the ACT metaphors were developed to be widely relatable, and Hayes et al. (1999) suggest variations, metaphors specifically tailored to the present cohort may substantially influence comprehension and treatment engagement.

One modification the researcher used to make the material more relevant to this sample was changing the *Chessboard* metaphor to the “Rugby Field,” as the men did not really play chess. This metaphor seemed more appealing to NZ males, for whom sport, and rugby in particular, has long been a major part of their culture (King, 2003). Thus, the explanation becomes of one team battling the other, and the participant taking the side of the neutral field, that simply allows the game to be played out. Even so, 1 participant still appeared to take this literally; after hearing this metaphor he spoke about how he had always been involved in sport, and believed this was psychologically protective for people.

While the present participants reported liking the *Finger Trap* and *Tug of War* metaphors, it could also be useful to enlist other images alongside these to aid understanding of the new concept of “ending the struggle.” Another metaphor the researcher used, given the men’s navy experience, was that of being “anchored in the storm.” This was used to assist with understanding the concept of observing emotions and thoughts, even if they seemed intense and scary, without being “tossed about” by them, as by wind and waves (i.e., letting them be there without buying into them).

A further metaphor that could be useful with this cohort, and may particularly appeal to males, is using the cooling system of a car engine to explain how over-control becomes a problem. Coolant liquid (water and antifreeze) flows through the radiator, where heat is transferred into the air, keeping the temperature from getting too high. As the coolant gets hot, it expands, causing the pressure to increase. When the pressure builds up, a release valve (or pressure cap) in the top of the radiator tank opens and allows coolant to flow into an overflow tank, relieving the excess pressure (Nice, 2000). If this release valve did not regularly allow the overflow of liquid, the pressure would build up, causing costly damage to the engine. Similarly, a certain amount of internal regulation may assist us to keep from catastrophising or having inappropriate emotional outbursts. However, if we regulate too much for too long, without having regular “flow-through” of internal experiences - being present with all we are thinking and feeling (our “safety valve” to release pressure) - the pressure of internal control can build up, causing emotional damage, and keeping us from “running” effectively (i.e., living according to our values). In presenting this metaphor, the importance of regularly opening the safety valve should be emphasised, along with the explanation that this is what mindfulness practise helps us become skilled at doing. This concept of over-controlling causing the build-up of internal pressure could be adapted with other metaphors, including a pressure cooker, and a shaken bottle of beer - the idea some participants mentioned of “bottling up.”

Conclusion

In this section, adaptations have been suggested that may help effectively tailor ACT interventions for use with older NZ male clients. The adaptations take into account both maturation and cohort effects. To some, these adaptations may appear to “dilute” ACT, and the question may be asked, *“Why would ACT be selected over CBT, which has already proven successful with older adults?”* It may be helpful here to review that experiential avoidance is a known moderator between self-reported health concerns and anxiety and depression in NZ older adults (Andrew & Dulin, 2007). Similarly, psychological acceptance is associated with a higher subjective quality of life, notably in the areas of health and emotional well-being, in older adults from Australia (likely to be similar to NZ elders, as our Australasian neighbours). Reducing experiential avoidance in this age group, therefore, seems a therapeutic priority, and one CBT does not explicitly target.

Knight and Satre (1999) note that due to life experience, older adults may have more complex emotional responses. They state that, “Rather than substituting another cognition, it may be

more strategic to have the client focus on the positive emotion along with the negative” (p. 192). This recommendation to be present with multiple emotions obviously lends itself well to an ACT approach. Thus, ACT, if tailored well, may be a good therapeutic fit with the emotionality of older adulthood.

In suggesting these adaptations, the researcher does not wish to imply that ACT will be the appropriate therapeutic choice for all older adults in need of psychotherapy. It is simply proposed that these modifications may make it even more effective with those for whom therapists already believe it would be useful.

CHAPTER FOURTEEN: STUDY II LIMITATIONS, IMPLICATIONS, FUTURE DIRECTIONS, & OVERALL CONCLUSIONS

Limitations

As with all research, there were a number of limitations in Study II. These included several design faults and procedural issues. Reflecting on these flaws provides important information for how similar research can be improved in the future, and consequently, contribute to making the ACT therapeutic literature more robust.

Design Faults

One of the major design faults was the lack of a true multiple-baseline-across-individuals design. Due to time constraints and the process of obtaining consent to participate, participants could only have the same baseline length rather than increasing lengths. Three baseline readings, while meeting the minimum requirement for clinical research (Barlow & Hersen, 1984) were not really sufficient to judge participants' general levels of health anxiety, experiential avoidance, and general psychological distress. Varying baseline lengths would have helped to rule out the influence of non-specific factors on therapeutic progress, such as the passage of time, therapist attention, repeated assessment, and expectancy for change (Chambless & Hollon, 1998; Kendall et al., 2004). Any positive results in Study II cannot definitely be attributed to the ACT intervention.

Another design fault was the lack of general initial assessment of participants. The decision not to complete a full assessment was made due to time constraints, and the intended specific focus on nuclear exposure-related health anxiety. However, the researcher lacked information that would have been helpful, such as the number and type of traumatic experiences participants had had in their lives, which may have contributed to or confounded their scores on the measures. However, all participants reported various significant life events, so it is possible this information was indirectly elicited. Specific information regarding unexplainable or undiagnosable bodily symptoms, health-related history including historical and recent diagnoses to determine heredity, participants' life history including type of family environment and coping strategies modelled (such as experiential avoidance), mental health history, current and past prescribed medications, frequency of GP visits (current and historical), and more detailed war pension information would have been very useful. Also, further cultural

information from Māori participants would have been helpful (e.g., their world-view of mental health issues and therapy, whether they would seek traditional Māori healing, and more detailed information regarding their cultural involvement). Some of this information was also missing due to the researcher's inexperience in clinical assessment and interviewing.

Also relating to assessment, in hindsight it would have been useful if Te Whare Tapa Whā was used as a framework for the assessment of Māori participants, examining how health anxiety impacted on these four domains, as well as on cultural involvement. While some participants volunteered this information as part of the process, a specific assessment would have been helpful. The additional use of a cultural assessment tool may have been more applicable and acceptable to Māori participants, and have provided further important cultural information.

Measures of cognitive defusion and values were not utilised in this study as participants were already required to complete several measures. While qualitative information suggested one participant had defused from his worries and made valued behaviour change, it would have been useful to measure these aspects more formally. Additionally, it would have been useful to assess participants' motivation for change, perhaps using a measure of stages of change (based on Prochaska & DiClemente's 1992 model).

The time periods used in this study are also questionable. Eight treatment sessions may not have been enough. While there is research evidence to suggest a smaller number of sessions can still produce significant change (Given, 2002; Sanderson, 2002), and that substantial change often occurs early in therapy rather than later (Lambert & Ogles, 2004), whether 8 sessions provided enough time for the consolidation of new concepts and skills in this study remains unclear. A meta-analysis of older adult therapy outcome studies found better outcomes were achieved in studies with more than nine sessions (Pinquart & Sorensen, 2001). Additionally, the short follow-up period was unfavourable. Again, time pressures precluded the use of a longer period between treatment termination and follow-up assessment. Unfortunately, 6 weeks does not seem sufficiently long to judge whether treatment gains have been maintained, and there is justification in questioning whether the present intervention had a lasting effect in Tane's case.

The present study in some ways lacked objective evidence for treating health anxiety in this population of nuclear veterans. While the literature presented health concerns as generally

plaguing nuclear exposure populations, the researcher was relying on anecdotal evidence for this also being the experience of NZ's nuclear veterans. In hindsight, it would have been very useful to conduct an interim investigation in which all Exposed and Control participants in Study I initially completed the HAQ (possibly over the telephone), to ascertain whether nuclear veterans were experiencing significantly greater health anxiety than Controls. This would have provided a stronger research basis for treating health anxiety in the nuclear veterans, and would have subsequently led into Study II. Comparing health anxiety between the two groups while controlling for historical and current health problems would also have been useful.

Another design fault was the sole use of self-report measures. Participants' responses on the measures were at times questionable, as the researcher observed participants had completed questions incorrectly due to misunderstanding or not reading the question thoroughly (when going through measures with them later in therapy). For example, one AAQ-II item was often answered inaccurately, due to its wording (item 10, "My thoughts and feelings do not get in the way of how I want to live my life"; participants often missed the "do not"). They also appeared to understand the meaning of various questions differently to the researcher, and answered them according to their own interpretation. Therefore, their responses and scores may have been inaccurate. In hindsight, it would have been better to telephone participants and have them complete the first set of baseline measures by phone (with the hard copy in front of them), so the researcher could go through each questionnaire with them and establish a correct understanding of items at the outset. Age-associated memory problems (Hoyer & Verhaeghen, 2006) could also have influenced scores on some measures (e.g., trying to remember the "past week").

Another problem with self-report measures is the potential for bias. With the political and legal issues associated with Operation Grapple exposure, it is possible the veterans wished to portray themselves as highly concerned about their health and highly distressed in order to prove their injury to the government, or because this may work in their favour. Alternatively, it is possible the men consciously or unconsciously fabricated their scores out of social desirability, or a desire to please the experimenter by providing favourable results. This issue is made more problematic by the fact that no objective data were collected regarding participants' health anxiety or general distress (e.g., therapist ratings). While there is no way of knowing whether this was the case, and some participants did express a desire to help the

nuclear veterans' case and the researcher, no overt signs of secondary gain or "therapist-pleasing" were detected over the course of the programme.

In measuring psychological distress it may have been more useful, with this particular sample being older adults, to have used the Geriatric Depression Scale (Sheik & Yesavage, 1986) and the Geriatric Anxiety Inventory (Byrne, Pachana, Siddle, & Koloski, 2005; Pachana, Byrne, Siddle, Koloski, Harley, & Arnold, 2007), rather than the DASS, as these were developed specifically for older adults, and the GDS has been widely used in research. Also, the DASS has no older adult norms. Alternatively, the revised version of the SCL-90 may have been a better measure of general psychological distress, and would have given information regarding a number of specific domains. It is widely used in research and clinical practise, with both clinical and non-clinical norms, and has been used to measure distress in other nuclear exposure populations (Baum et al., 1983; Green et al., 1994; Prince-Embury, 1992). For the purposes of this study, however, the DASS was useful as a brief screen of depressive, anxious, and non-specific stress symptomatology.

The very small sample is a major limitation of this study. Financial and time constraints meant the researcher could only include nuclear veterans from a particular area of NZ. With only 5 male participants, generalisability of the results cannot be justified, and their assessment scores and response to therapy cannot be considered strongly representative of NZ older adults. With a larger sample, more valid and reliable conclusions could have been reached regarding the effectiveness of ACT for health anxiety in older adults, the prevalence of experiential avoidance in NZ older adults (and this cohort in particular), their general response to ACT as a largely unstudied therapy approach with this population, as well as average levels of health anxiety in NZ older adults.

Other design criticisms of the present study involve not including checks of treatment adherence or therapist competence (treatment integrity), assessing treatment credibility, or obtaining information regarding further treatment or another form of intervention (such as increased GP visits) during the follow-up period. Qualitative information suggested Tane (who engaged and significantly improved) found it acceptable – he stated he had been "skiting" at work about getting better, and told a friend, "I've had these worries for years and years and years. All of a sudden, since I've started this project...I've been marvellous." However, only Tane's response to ACT as a therapeutic approach could really be evaluated.

Procedural Issues

The main procedural issue in the present study was the lack of random selection of participants. Due to the small number who volunteered, all were needed to make up numbers. As random selection did not take place, the researcher may have obtained participants with particular characteristics, such as those who were more open to therapy and issues of a psychological nature (more psychologically minded), and consequently may have been more likely to show improvement.

Additionally, it is unclear to what extent participants' use of various medications influenced their presentation and scores on the measures. Various drugs can cause a range of psychological symptoms, which older adults are especially vulnerable to due to ageing changes in neural sensitivity and drug absorption, and potential interaction effects from the "poly-pharmacy" of medications they often consume (Nordhus, 2008; Sadock & Sadock, 2003). A major oversight on the researcher's part was not collecting detailed information regarding the name, dosage, and frequency with which this medication was taken (due to clinical inexperience). Participants reported taking physical health medication, and 2 were prescribed psychotropic medication (Tane, Selective Serotonin Reuptake Inhibitors [SSRIs], and Kingi, benzodiazepines). As well as reducing anxiety, Prozac (*Fluoxetine*) and other SSRIs can sometimes produce anxiety and restlessness, and anxiolytics (benzodiazepines) and hypnotics (such as Zopiclone) can sometimes induce anxiety and mood disorders (Sadock & Sadock, 2003). Furthermore, some respiratory medications (e.g., bronchodilators) can produce anxiety symptoms, and some blood pressure medications (anti-hypertensives) can produce depressive symptoms (Whitbourne, 2000). Some medical conditions such as cardiovascular diseases, pulmonary and respiratory disease, neurological disorders (e.g., dementia), thyroid disease, renal disease, and arthritis can also produce anxiety and depressive symptoms (Sadock & Sadock, 2003). These effects are potentially a major confounding factor for the results of this study, as if present, they could have influenced the levels of anxiety (and depression) observed in the men's presentation and scores, and perhaps their approach to treatment.

Implications and Future Directions***Toxic Exposure Populations***

The results of Study II, while very modest, provide initial support for the use of ACT with clients experiencing long-term health-related anxiety subsequent to toxic chemical exposure. ACT

was proposed to be particularly useful with this population as it acknowledges the very real fears of those exposed to such agents, assists them to live with these fears rather than trying to change them or otherwise eliminate them, and encourages movement toward valued action in their lives.

Thus, this study has implications for the treatment of health anxiety in numerous other populations exposed to nuclear products or toxic chemicals. Armed forces personnel and civilians exposed to nuclear testing in the US, the former Soviet Union, Australia, and the Pacific Islands (among others), may continue to live with health anxiety for themselves and for their children. The same may be said of the next generations of Hiroshima and Nagasaki survivors (Lifton, 1967); those exposed to various nuclear accidents and industrial leakage, such as the Chernobyl and Three Mile Island accidents (Baum et al., 1983; Havenaar et al., 1999), veterans of chemical warfare (e.g., Gulf War veterans; Noyes et al., 2004); and Vietnam veterans exposed to Agent Orange (Michalek, Barrett, Morris, & Jackson, 2003; Robinowitz et al., 1989). There have likely also been a number of less newsworthy exposure situations whose effects are no less troubling for those involved, such as smaller nuclear accidents, and occupational chemical and electrical injuries - exposure to organic solvents, organophosphate pesticides, lead, other industrial chemicals, and electric shock (Miller, 1993). Consequently, ACT could be implicated as an effective therapy approach in any situation where health anxiety could have some realistic physical basis.

An ACT intervention for victims of toxic exposure (e.g., in group form) may be particularly useful directly after knowledge of the exposure has come to light. While there is often no way of proving whether physical damage has occurred, the nuclear exposure research indicates exposees experience high levels of initial distress, and sustained stress and anxiety for many years post-event, even into late life, influencing perceived physical and mental health. The present researcher had a sense she had got to participants “too late,” when they were resigned to their situation. Some suggested they were highly health anxious 10 to 15 years ago, and would have appreciated help then. An immediate post-exposure intervention may help to curtail some of the long-term psychological effects of toxic exposure, and may also lead to financial savings in health care through the reduction of GP visits and unnecessary medical procedures.

Useful Processes

While the present study did not investigate ACT's superiority to another form of treatment, a number of facets are worth noting. First, for Tane, who showed the most significant improvement over therapy, there was little to no resistance to the notion that his avoidance behaviours were counterproductive, and that perhaps a better way forward for him was to be more willing to experience the internal distress generated by the possibility that he had been damaged by nuclear radiation exposure. It is possible that a therapy that focused on restructuring or challenging his thoughts would have become bogged down in deliberation about whether or not the nuclear exposure had been damaging, even given his clean bill of health. He would have a large amount of evidence that the exposure had damaged his comrades, and that possibly in the future he too would manifest physical problems. Key factors in the success of this case were the focus on willingness and "making space" for the distressing thoughts and feelings, simply observing the internal workings of the mind, and increasing valued behaviour. It is likely that these skills, irrespective of the specific type of therapy utilised, can be helpful for individuals with a toxic exposure history.

Older Adults

The present results provide tentative support for the use of ACT with older adults. While the effects of ageing were not a specific focus with Tane, his clinical situation was similar to what is often experienced in therapy with the elderly. Elderly adults are often particularly distressed about late-life losses and health related problems that are chronic in nature and frequently related to exposure to toxins such as tobacco and heavy consumption of alcohol (Dulin & Pachana, 2005). ACT provides a way to help an older individual accommodate to their difficult situation in which "change" is limited, and to focus on late-life values and goals. Obviously, further ACT research specifically focusing on older adults is needed to support this notion, but the success with Tane's case issues forth a promising therapeutic possibility. Butler and Ciarrochi (2007) state ACT seems "ideally suited for this population" (p. 614), as it could help older adults accept age-related losses while remaining engaged in value-directed action. With the appropriate adaptations, informed by the CCMSC model (Knight, 2004) and particularly taking cohort effects into account, ACT has the potential to be another effective therapeutic option for this population, and the only approach specifically targeting experiential avoidance. Developing effective treatment approaches for older adults is especially important given NZ's ageing population (Statistics New Zealand, 2006b).

Culture

With ACT being a relatively new therapy, cultural modifications of the therapeutic approach are yet to be published. While a specific Māori cultural model was not developed, the treatment provided in Tane's case was still effective. Despite this, it is possible that ACT might have an even greater impact with the inclusion of appropriate modifications, such as incorporating culturally relevant protocol and metaphors, and the use of Māori language. Durie (1999) and Hirini (1997) have both expressed the need for culturally competent interventions, with Durie asserting that a secure cultural identity is necessary for good mental health. Additionally, Prasadaraio (2007) asserts that these approaches may encourage use of mental health services among kaumātua (Māori elders). Future research might examine the modification of ACT for use with Māori clients, similar to that which is being undertaken in adapting CBT for use with Māori (Bennett et al., 2008). It is considered that a researcher of Māori descent would be best positioned to lead such a study.

Māori mental health in NZ continues to be a pertinent issue, given the findings of *Te Rau Hinengaro*, the latest NZ Mental Health Survey (Oakley Browne et al., 2006), in which the prevalence of mental disorder in any time period (i.e., 1-month, 12-month, and lifetime) was highest for Māori compared to Pacific people and "Other" ethnic groups. The lifetime prevalence of anxiety disorders was 31.3%, mood disorders 24.3% (with 15.7% for major depressive disorder), and substance use disorders 26.5%. Māori also showed a higher 12-month prevalence of anxiety disorders accounted for by age, education, and household income. In general, Māori were at a greater lifetime risk of developing an anxiety, mood, substance use, or eating disorder. They were also twice as likely as non-Māori to consider or attempt suicide in a 12-month period.

ACT may be a very promising approach for use with Māori, given its basis on workability rather than "Western rationality" (see Hirini, 1997). One NZ Māori clinical psychologist believes that an "important advantage of ACT over CBT with minority cultural groups, is that its theoretical basis could be considered less culturally intrusive" (S. Bennett, personal communication, January 6, 2009). The prevalence of mental disorders amongst NZ Māori, and the potential therapeutic value of the ACT approach for this population provide a strong rationale for further research into the use of ACT with Māori. Like the NZ population in general, the Māori population is also ageing (Statistics New Zealand, 2006a). It is hoped this study will, at the least, inform further research that will assist in developing well-matched approaches for

Māori, and therefore assist more effectively with improving Māori mental health in NZ. This rationale also has relevance to other indigenous or minority cultural groups, particularly those in Britain and North America (see Somervell, Manson, & Shore, 1995, and Cochrane, 1995). Finally, ACT may be more suited to non-western cultures in general, who tend to have a more holistic conception of mental health (Marsella & White, 1982).

Specific Client Variables

The present results also have implications for using ACT with clients who may be stoic, less emotionally aware, and less educated. Aptitude by treatment interaction research (Cronbach, 1975) could be undertaken to investigate how these specific client variables, that may be present in earlier cohorts, interact with the ACT approach. Subsequent research could also examine the effect of providing initial emotional education (and thus increasing emotional awareness) on outcome. The Levels of Emotional Awareness Scale (Lane et al., 1990) could be used to assess emotional awareness before beginning a programme of ACT, to determine if this education phase is needed.

The Importance of Tailoring ACT Interventions

The present results and discussion indicate that ACT cannot necessarily be applied to any population without some modification enabling a better “client-treatment match” (Clarkin & Levy, 2004). It would seem more useful to fit therapy to the characteristics and needs of individuals (i.e., certain non-diagnostic client variables), rather than trying to fit individuals to a particular approach. Indeed, Hayes (1987) acknowledged early on that “not all clients will respond” to the ACT approach (p. 377). He found that some simply could not relate to or understand the meaning of the ACT metaphors. They appeared to have a rigid cognitive style, and would take everything literally. He could not pinpoint their distinguishing characteristics, but believed they were not demographically-based.

While it is reasonable that one therapeutic approach cannot necessarily be applied to all individuals (Smith & Grawe, 2005), tailoring the ACT approach for the populations mentioned here, including older adults and various cultures, would likely go a long way in increasing its effectiveness. Indeed, researchers are finding it necessary to tailor ACT in certain ways for certain populations to increase its acceptability and produce better results (e.g., for those with PTSD and substance use disorders; Dulin & Yeomans, 2008). Future research should focus, therefore, on applying ACT with these specific populations, and developing appropriate

modifications. Tailoring the approach to the specific cohort or cultural world-view using relevant metaphor for these groups, may be particularly important in encouraging motivation to engage in therapy, and assisting with clients' ability to understand and relate to what may likely be foreign concepts.

Conclusion

In conclusion, the characteristics of the present sample – male, ageing, less educated naval veterans of earlier cohort membership – were a test for ACT, particularly given that much of past research on ACT for anxiety has used well-educated female samples. The present results indicate that ACT may show potential in treating nuclear (or toxic) exposure-related health anxiety in older adults. However, further research on a larger scale, that is more specifically targeted using appropriate adaptations, is clearly needed to demonstrate ACT's effectiveness with toxic exposure populations, older adults, and clients of specific cultures. This will also help to clarify which specific client variables, if any, contribute to ACT outcomes.

General Conclusions

The psychological fallout of exposure to nuclear testing is now becoming more widely recognised by governments and society at large, as a result of tireless campaigning by those exposed. Unfortunately, while war continues to be a possibility, nuclear weapons - the most powerful of all - will continue to be built and tested. Not only are these devastating in warfare, they can have life-altering and chronic repercussions for those involved in their development. While the effects of years of health concern in both nuclear veterans and their families cannot necessarily be undone, recognising the psychological as well as physical effects of testing nuclear weapons, may, it is hoped, help discourage further use.

Additionally, the psychological stress, particularly in the form of health anxiety associated with toxic exposure, is a significant issue in our present world. Toxic exposure is difficult to avoid in some occupations, and often leaves exposees to navigate uncertain waters and face questions that may never be answered. Living with the chronic consequences of these forms of exposure, particularly health anxiety, can be debilitating and narrow an individual's focus to such an extent that preoccupation with these effects overshadows living a valued and full life. While an understudied area, it is important clinical psychologists and other health professionals understand the characteristics of this unique clinical presentation, and are aware

of therapeutic approaches that are most validating and beneficial for individuals in this situation. ACT's foundation on contextualism and experiential acceptance rather than rationalism and control provides a solid basis from which to assist these individuals, and provides a promising treatment alternative to current approaches, not just for toxic exposure populations, but possibly also for older adults and those of indigenous cultures.

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