Personality Associations with Mood, Hoarding, Health and Well-being

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Abstract

Background:

Personality has been of interest since ancient times. Hippocrates, also known as ‘The father of Western Medicine’ was possibly the first to document the association between personality and mental and physical health by describing the ancient medical theory of Humourism. Over the last 100 years the study of personality has been evolving and there are many different perspectives. Trait perspectives have become popular but they lack any underlying theory about how personality develops. Psychobiological models offer descriptions of personality and provide testable theories on how biology influences their development. A robust psychobiological model is Cloninger’s psychobiological theory and it provided the basis for this project.

Objectives:

This project explored the associations of personality in different mental health settings using the Temperament and Character Inventory (TCI; Cloninger, Przybeck, Svrakic, & Wetzel, 1994), the personality inventory developed by Cloninger and colleagues, that is suitable for measuring both normal and abnormal personality. The TCI was used to examine the impact of depression on personality measurement and personality associations to self-reported physical and mental health, mood disorders, hoarding behaviours and well-being.

Methods:

Participants for this project were from three studies. Two randomised clinical trials designed to examine predictors of treatment response for depressed outpatients using either antidepressant medication (N=195) or psychotherapy (N=177) were used to examine the impact of depression on measures of personality. Data from the Canterbury Health, Ageing and Lifecourse (CHALICE) study (N=404), a random community sample of 50 year olds taking
part in an observational study of ageing, were used to examine personality in relation to self-reported health, lifetime mood disorders, hoarding behaviours and well-being.

**Results:**

Harm avoidance and self-directedness were strongly associated with physical and mental health, mood disorders, hoarding behaviours and well-being. Both harm avoidance and self-directedness change with mood state. After adjusting for mood state, self-directedness but not harm avoidance was associated with risk of a lifetime mood disorder. High harm avoidance and low self-directedness were strongly associated with poorer self-reported mental and physical health and increased hoarding behaviours. Hoarding disorder was strongly associated with economic hardship and impairment of mental and physical functioning. For well-being, low harm avoidance and high self-directedness were associated with better well-being and these two variables explain more of the variance in well-being than other measures such as socio-demographics. The TCI personality variables of novelty seeking and self-transcendence were associated with specific psychopathology while reward dependence, persistence and cooperativeness had no or weak associations with different aspects of health and well-being.

**Conclusions:**

TCI variables of harm avoidance and self-directedness were fundamental to health and well-being, consistent with the wider literature. The finding that self-directedness, but not harm avoidance, was a risk factor for mood disorder, could possibly be explained by self-directedness becoming increasingly important with age. Despite the overwhelming effect of harm avoidance and self-directedness, there were significant if subtle personality differences in the other TCI variables that contributed to health and well-being and personality assessment of the individual may be helpful in determining cognitive and emotional style. If the Cloninger model of personality, which separates the neurobiology of temperament and
character, is correct then self-directedness should be more amenable to change and so is a potential target for interventions to reduce psychopathology.
Preface

In 2008 I was employed as research coordinator for the CHALICE study and in 2009 as a research fellow. I enrolled as a part-time PhD candidate in 2009, examining questions related to personality, mood and well-being. Whilst the CHALICE study was recruiting I focused on data from two studies of depression previously conducted in this department.

My role in the CHALICE study encompassed all aspects of the day-to-day management of the study including: liaising with the principal investigator to prepare and finalise assessments and data collection instruments, recruiting and supervising interviewers for the study, overseeing the recruitment of participants and data collection, conducting a comprehensive (5-6 hour) assessment of participants, ensuring appropriate feedback of results was provided to participants, assisting with the preparation of research grants and ethics applications, writing and submitting papers for publication in peer reviewed scientific journals and conference proceedings. CHALICE participants were recruited and assessed at a time of considerable earthquake activity in the Canterbury region which will be described in the first results chapter (Chapter 5).

The CHALICE study was supported by grants awarded from Lottery Health, Canterbury Community Trust and University of Otago Foundation research grant. Professor Peter Joyce was the principal investigator and the other investigators were: Vicky Cameron, Steve Chambers, Richard Gearry, Hamish Jamieson, Martin Kennedy, Cameron Lacey, David Murdoch, John Pearson, Richard Porter, Mark Richards, Philip Schluter and Richard Troughton.
Acknowledgements

Thank you to all the participants who took part in the three studies described in this thesis. Without their willingness and commitment this research would not have been possible.

Thank you to my supervisors Professor Peter Joyce, Dr Esther Vierck and Dr John Pearson for their guidance, patience and wisdom.

To my partner, Dr Sandy Slow, thank you for your love, loyalty and support.

Thank you to all those who worked on the CHALICE study and on the two clinical trials of depression; to Monica Johnstone and Andrea Bartram for data management, to Dr Esther Vierck, Dr Anna Thorpe, Julia Martin, Bridget Kimber and Robyn Abbott for participant assessments and to Wendy Sincock for preparation of this thesis.

To all my family and friends here in New Zealand and the United Kingdom, thank you for your encouragement, love and humour.

I dedicate this thesis to my late mother Judith Patricia Spittlehouse (1935 – 2016).
List of Publications

I have three first author and one second author publications related to this thesis.

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<td>Mental Component Summary</td>
</tr>
<tr>
<td>MDE</td>
<td>Major Depressive Episode</td>
</tr>
<tr>
<td>MINI</td>
<td>Mini International Neuropsychiatric Interview</td>
</tr>
<tr>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>NZMHS</td>
<td>New Zealand Mental Health Survey</td>
</tr>
<tr>
<td>OCD</td>
<td>Obsessive Compulsive Disorder</td>
</tr>
<tr>
<td>PCS</td>
<td>Physical Component Summary</td>
</tr>
<tr>
<td>SCID</td>
<td>Structured Clinical Interview for DSM-III-R</td>
</tr>
<tr>
<td>SCL-90</td>
<td>Hopkins Symptom Checklist</td>
</tr>
<tr>
<td>SF-36v2</td>
<td>Short Form 36 Version 2</td>
</tr>
<tr>
<td>SI-R</td>
<td>Savings Inventory – Revised</td>
</tr>
<tr>
<td>TCI</td>
<td>Temperament and Character Inventory</td>
</tr>
<tr>
<td>TCI-R</td>
<td>Temperament and Character Inventory revised</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>TPQ</td>
<td>Tridimensional Personality Questionnaire</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>WEMWBS</td>
<td>Warwick-Edinburgh Mental Well-being Scale</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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</table>
Part 1: Introduction

Chapter 1: Introduction

1.1 Introduction

Personality has been of interest since ancient times. Indeed, Hippocrates, also known as ‘The father of Western Medicine’ was possibly the first to document the association between personality and mental and physical health by describing the ancient medical theory of Humourism (Bynum & Porter, 1993). The literature review outlines major theories of personality. The association between personality and health has been widely studied, for example, a broad search on the Google Scholar internet search engine using the words ‘personality and health’ elicited 2.4 million results.

This project aims to explore the associations of personality in different mental health settings using the Temperament and Character Inventory (TCI, Cloninger et al., 1994), a personality questionnaire that is suitable for measuring both normal and abnormal personality.

This thesis has four parts. The next section, Part 2 is a review of personality theory and more specifically, a review of Cloninger’s psychobiological theory of personality (Cloninger, 1986; Cloninger, Svrakic, & Przybeck, 1993). Part 3 is the general methods for the three studies which provide the data and results for this project.

The results from these studies are presented in Part 2 and are spread over five chapters. Most of the data in the results chapters are from a community sample of 50 year olds living in Christchurch, New Zealand (Chapters 5, 7, 8 and 9). Two studies of depression, conducted over 10 years, provide the data for the studies in Chapter 6. The association between personality and self-reported physical and mental health in the context of a period of seismic activity are reported in the first results chapter (Chapter 5). The impact of depression severity on the
measurement of personality in two clinical samples are described on in Chapter 6. The associations between personality, mood disorders and symptomology are discussed in Chapter 7. Chapter 8 presents results from a study of personality and hoarding behaviour. Personality traits in relation to well-being are reported in Chapter 9.

The rationale, background, specific methods and a discussion, including specific limitations, are provided for each results chapter. Additionally, an integrated discussion and general limitations of study design are addressed in the final chapter (Chapter 10).

1.2 Context of this Research

In this project two clinical samples of depressed outpatients provided the data described in Chapter 6 which discusses the impact of depression on measurement of personality. The samples were recruited for participation in two randomised clinical trials. One was designed to examine predictors of treatment response to two different antidepressant medications; fluoxetine and nortriptyline (Joyce et al., 2002). The other trial was designed to examine predictors of treatment response to two different therapies; interpersonal psychotherapy (IPT) and cognitive-behavioural therapy (CBT, Joyce et al., 2007; Luty et al., 2007). The samples were recruited from a wide variety of sources, including mental health out-patient clinics, general practitioners, self-referral and psychiatric emergency services. For this project the personality and depression data have been used.

The rest of the data comes from the Canterbury Health, Ageing and Lifecourse Study (CHALICE, Schluter et al., 2013). CHALICE was planned as a longitudinal study of ageing but the data used here are all from the first wave and hence cross-sectional. The CHALICE participants were 49-51 years of age and were selected at random from the electoral rolls that represent the Canterbury District Health Board area of New Zealand. Participants took part in a half day evaluation that included both physical and psychological assessment. For this project the
personality, self-reported health, mental health assessment, hoarding behaviour and well-being data have been used.
Part 2: Literature Review

Chapter 2: Personality Literature Review

2.1 Overview

Personality theories from very early perspectives to modern day research will be summarised in this chapter. Each of the six main perspectives in personality theory are described; psychodynamic, learning, cognitive, humanistic, trait and biological. Cloninger’s psychobiological approach to personality is described and reviewed in detail beginning with the initial development of his model and of his personality inventory, the Temperament and Character Inventory (TCI). Cloninger’s psychobiological model is compared with another popular model of personality, the five-factor model. Later in the chapter the distinction between temperament and character is discussed and followed by a section on personality change with age and in mood disorders. Finally, the TCI as predictor of mental disorder is reviewed.

2.2 Personality Theory

2.2.1 Personality: word origin and definitions

There are numerous definitions of ‘personality’. The word is derived from the Latin word ‘personalis’ meaning of the person (Oxford Dictionaries, 2015). A comprehensive definition is the American Psychiatric Association (2013, pg. 772) definition of personality traits which is “… a tendency to feel, perceive, behave and think in relatively consistent ways across times and across situations in which the trait may manifest”. The current online Oxford Dictionary defines personality as “the combination of characteristics or qualities that form an individual’s distinctive character” (Oxford Dictionaries, 2015) and the American Psychological Society
definition is “personality refers to individual differences in characteristic patterns of thinking, feeling and behaving” (American Psychological Society, 2015).

### 2.2.2 Early perspectives of personality

#### 2.2.2.1 Hippocrates' four humours

Hippocrates, the ‘father of western medicine’, developed a medical theory that four bodily fluids or ‘humours’ influenced behaviour, emotion and disease. Health was achieved by the correct balance of the four humours and conversely, ill-health and pain arose when there was an excess or deficiency of one or more of the fluids. The four humours were blood, yellow bile, black bile and phlegm and they corresponded to the ancient Greek theory of four elements; air, fire, earth and water (West, 1991).

#### 2.2.2.2 Galen’s four temperaments

Galen, a Greek physician who lived approximately 600 years after Hippocrates, further advanced the theory of the four humours or ‘humourism’. In the ideal personality there was equilibrium of the four bodily fluids. If any of the humours became dominant then a different temperament would emerge. A sanguine temperament was caused by excess blood and is characterised by being optimistic and pleasure seeking. An over production of yellow bile produced a choleric personality and was said to lead to anger. In modern language a choleric person may be described as bad-tempered. Too much black bile would result in a melancholic disposition best described as a depressive personality. The phlegmatic personality, resulting from too much phlegm, was defined as being apathetic or calm and the adjective is still used today.

Humourism formed the basis of western medicine and some aspects of it persisted until the nineteenth century (Bynum & Porter, 1993). With the discovery of body processes and
hormones the theory was discredited. However, the theory had intuitive appeal for the patient, it was easily understood, highly individualistic and it emphasised holistic medical practice. Resonances of it remain today, for example, melancholic depression remains as a sub-type of clinical depression in Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5, American Psychiatric Association, 2013) and biological theories of personality assume that physical processes influence personality expression.

2.2.3 Psychodynamic perspectives of personality

Psychodynamic theories of personality dominated in the early part of the twentieth century. The concepts were defined by unconscious, mental forces and childhood conflicts among proposed structures of the mind, all of which shaped the adult personality. Despite its early dominance psychodynamic personality theories were superseded by behaviourism, the concept that psychology can be studied exclusively through behaviour without recourse to subjective mental states. Psychodynamic theories were criticised for lacking empirical evidence and for being overly reliant on human sexuality. Sigmund Freud was the pioneer of psychodynamic psychology, followed by significant contributions from Jung and Adler.

Freud’s theory presumed that behaviour resulted from the interaction and conflict between three mind or personality structures; the id, ego and superego (Corr & Matthews, 2009). The primitive, unconscious id related to pleasure and instant gratification. The ego, which operated at the conscious and pre-conscious level, satisfied the needs of the id within reason and operated on the reality principle. The last structure to develop was the superego which was both pre-conscious and conscious, facilitated social learning and was moralistic. During stages of psychosexual development in childhood the three structures interact and defence mechanisms are used to deal with conflicting impulses. Psychopathology results if a child has difficulty passing through a stage which results in them becoming ‘fixated’ and a complex,
such as the Oedipus complex (where the child experiences an erotic attachment to one parent and hostility toward the other parent) may develop.

Freud had many followers but his theory was criticised for being deterministic and for reducing individual behaviour to an attempt to control basic instincts. Alfred Adler, a colleague of Freud’s, developed his own personality psychology “individual psychology” (Adler, 1924) which emphasised holism and the importance of social aspects when explaining personality. Carl Jung, who had also collaborated with Freud for a number of years, developed a different concept of the unconscious (Vernon, 2011) and went on to describe his own theories under the name of ‘analytical psychology’. In his book “Psychological Types” (Jung, 1923) Jung was the first to coin the terms ‘extraversion’ and ‘introversion’. He distinguished between eight psychological types and described people by psychological functions of ‘perceiving’ or ‘judging’. Within the two functions individuals were further categorised into two types. For the function of perceiving there were ‘sensation’ or ‘intuition’ types and the two judging styles were ‘thinking’ and ‘feeling’. Mediating these four different types were the two ‘attitudes’ of introversion (inward looking) or extraversion (outward looking). Hence people could be described as ‘extraverted sensation’ types, ‘introverted thinking’ types or one of the other six possible variations.

Although controversial, aspects of psychodynamic theory remain relevant today. Over the past century it has evolved and has influenced a number of important psychological concepts, such as object relations (Fairbairn, 1954) and attachment theory (Ainsworth, 1979; Bowlby, 1969).

2.2.4 Learning perspectives of personality

Behaviourism, sometimes called the ‘second wave’ of psychology, is the basis of learning perspectives of personality. Work by Pavlov et al. (1928), Watson (1913) and, later in the 1930s, by Skinner (1938) and Staats and Staats (1958) began the behaviourism movement that
would make psychology and personality research more scientifically acceptable. Skinner believed that personality was an accumulation of learned responses and that it was directly observable through behaviour. Behaviour is shaped through operant conditioning where positive or negative reinforcement or punishment increase or decrease the likelihood of the behaviour being repeated. In Skinner’s “radical behaviourism” mental processes and free will are ignored, behaviour is moulded by the environment. Skinner developed these theories based on laboratory work with animals which he then extrapolated to human behaviour.

A broader behaviourist view of how personality is acquired was proposed by Staats “psychological behaviourism” (Staats & Staats, 1996). Staats agreed with Skinner that personality was developed by learning; however learnt behavioural patterns are acquired through a combination of social interaction, biology, emotions and cognition. The move from radical behaviourism to psychological behaviourism can be viewed as a paradigm shift in psychology that was more inclusive of the subjective world of cognition and emotion and paved the way for cognitive theories of personality. Behaviourism contributed to personality theory by applying learning theory to modify behaviour towards a more socially desirable outcome and has been particularly useful in education (Schunk, 1996). Nonetheless, the reductionist nature of behaviourism gave way to cognitive perspectives of personality which saw individuals as being introspective and self-directed.

### 2.2.5 Cognitive perspectives of personality

Psychology and personality psychology experienced a cognitive ‘revolution’ in the 1950s and 1960s. Cognitive personality theory emphasises the importance of internal processes of the mind for explaining behaviour and utilises an empirical approach to study behaviour and mental processes through laboratory experiments. This perspective came about as a reaction to the behaviourist emphasis on external behaviour, while excluding the role of mental processes. The development of cognitive theories of personality has challenged personality
psychology in several ways by highlighting the importance of subjective experience and the
effect that environmental circumstances have on behaviour.

The work of George Kelly and his publication “the psychology of personal constructs” (Kelly, 1955) is considered to be the first cognitive theory of personality. Kelly believed that personality could be revealed through the way in which an individual views themselves and the world, which are the ‘constructs’ in his theory. The constructs are polar opposites and some are broad and basic, such as good or bad, while other constructs are more refined and specific, such as being well-dressed or scruffy. Like scientists, people have constructs to interpret the world and they can be refined to achieve greater predictability of their life. The constructs a person has determines how they view the world and, consequently, determines behaviour, feelings and thoughts. Constructs rely on memory, are hierarchical and can be conflicting. The theory exclusively focuses on subjectivity to the exclusion of emotion, biology and objective behaviour.

Bandura’s contribution to personality psychology arose from his work with children and the now famous ‘bobo doll’ experiments (Bandura, Ross, & Ross, 1961; Bandura, Ross, & Ross, 1963). The experiments investigated if social behaviour (in this case aggression) can be acquired through observation and imitation and they did this by exposing matched pairs of children to different levels of aggressive play with a bobo doll. The results supported Bandura’s social learning theory that people learn through observation of behaviour, the consequences of the observed behaviour and imitation (modelling). Personality and human behaviour are formed by an interaction between behaviour, the environment and cognitive processes. Bandura called this ‘reciprocal determinism’ and in the 1980s he developed his theory further and renamed it social cognitive theory (Bandura, 1986). Bandura’s reciprocal determinism emphasised that personality developed over time as a result of experiences.
Mischel’s cognitive affective model of personality challenged other theories of personality psychology by proposing that behaviour is not stable across situations (Mischel, 1973). His experiments supported Bandura’s social cognitive theory, that behaviour is highly dependent on situational cues. The cognitive affective model of personality suggests that behaviour varies with the situation but in stable patterns by way of ‘if-then’ situations. These stable patterns of behaviours are called ‘personality signatures’ (Mischel & Shoda, 1995) and are influenced by ‘cognitive affective units’ such as emotions, intelligence, expectations and values of the individual.

2.2.6 Humanistic perspectives of personality

At the same time that cognitive theories of personality were becoming popular another movement of psychology was forming; humanistic psychology. The humanistic perspective is a positive branch of personality theory in which individuals are viewed as being innately driven towards personal growth and self-actualisation. The humanistic approach stresses the need for cooperation with others, love and self-esteem and theorises about how to develop a healthy, fully functional personality.

Abraham Maslow’s view of personality (Maslow, 1943; Maslow, Frager, Fadiman, McReynolds, & Cox, 1970) was that people are motivated to achieve certain needs. His hierarchy of needs (McLeod, 2007) described various stages that a person must move through to achieve optimal psychological functioning. The five stages, often depicted as a pyramid, go from fulfilling basic physiological needs at the bottom (breathing, food, water, sleep etc.) to advanced psychological needs at the top, which he called self-actualisation. The stages in between relate to safety needs (housing, employment, family and health), love (friendship, family and sexual intimacy) and needs for esteem (self-esteem, confidence and achievement). The process of moving up the hierarchy is ongoing throughout life. Maslow studied the characteristics of self-actualising people and described them as being; self-aware, open, close to others without
dependency, and that they tend to have “peak experiences” (Maslow & Pi, 1964) which are spiritually or emotionally satisfying.

Drawing from the ideas of Maslow, Carl Rogers “person-centred” personality theory (Rogers, 1959) added that for personal growth to take place individuals need be in an environment which is genuine, accepting and empathic. The main drive for humans is to become fully functioning and Rogers saw people as fundamentally good and creative. With a poor environment or self-concept people can become incongruent, where their ‘ideal self’ conflicts with their behaviour and may lead to a destructive personality. Childhood experience is important in this process.

The humanistic movement was a response to the deterministic ideas of Freudian and behaviouristic psychology. The theory is holistic, explains variation in human personality, takes account of the environment a person experiences and allows for self-determination. Conversely, critics of this approach argue that there is a lack of empirical evidence, and that the effects of social interaction and the development of an abnormal personality are not fully explained (Atkinson, 1996).

2.2.7 Trait perspectives of personality

The trait approach to personality is currently a major theoretical area of study. Trait theories assume that relatively stable characteristics cause individuals to behave in certain ways. Individual personalities are assumed to be composed of a broad number of traits and the interaction between traits is what makes each personality unique. The aims of trait theory are to identify and measure traits and to study individual differences.

One of the originators of modern trait theory was Gordon Allport. To identify traits Allport and his colleague Henry Odbert systematically went through a modern dictionary and identified 18,000 words describing personality (Allport & Odbert, 1936). This lexical approach to
identifying personality traits had been done before (Galton, 1884; Partridge, 1910) but not as comprehensively. The lexical hypothesis assumes that the most important personality characteristics will eventually become part of language and it is the basis of most of the trait theories. Allport and Odbert narrowed the list down to 4,500 and Allport’s trait theory further divided these words into three groups of traits (Allport & Odbert, 1936). Cardinal traits are rare but when they are present they dominate an individual’s life. For example, Mother Theresa may be personified by the cardinal trait of being virtuous in that her life was devoted to helping others. Central traits are general characteristics (such as happy, easy-going, sad or moody) and form the basis of personality and secondary traits (such as anxiety when speaking publically) relate to attitudes or preferences and may only appear in some situations.

Following Allport’s theory, Cattell (1943) further reduced the list of 4,500 traits to 171 by removing synonyms and uncommon traits. After rating a large sample of individuals for the remaining traits, Cattell used the new techniques of factor analysis to reduce the number of traits further. The result was 16 ‘primary’ personality traits that Cattell considered to be the source of all personality (Fehringer, 2005). Cattell also developed the Sixteen Personality Factor Questionnaire (Cattell, Eber, & Tatsuoka, 1970) which is still widely used today.

The five factors identified by Cattell roughly correspond to the traits described in the five-factor model (FFM) of personality (Goldberg, 1993). The existence of five factors was reached independently by a number of researchers (Goldberg, 1993) but there is disagreement about the exact labels for the factors. However, many use Costa and McCrae’s (1985) conceptualisation OCEAN: Openness to experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism. Each of the five traits has six facets which is a unique aspect of the broader trait. Throughout the 1980s and 1990s there was a profusion of research into the FFM and it has been found to be consistent in self-reports and observations (McCrae & Costa, 1987), across groups and in different cultures (McCrae et al., 1999).
The recent popularity of trait perspectives of personality and the FFM in particular have not been without criticisms. Some argue that trait perspectives do not explain all of personality (Piedmont, 1999) and that they have poor predictive value for behaviour across situations (McAdams, 1992). Methodologically, factor analysis has been criticised for needing a degree of interpretation by the analyst and that linear analysis is not suitable for assessing the dynamic, nonlinear nature of personality (Cloninger, 2008). Additionally, there is no theory underlying trait descriptions of personality, therefore how and why these traits come about is neglected (Eysenck, 1992).

2.2.8 Biological perspectives of personality

Biological perspectives of personality speculate that the basis of characteristics or traits can be found in biological mechanisms, especially in brain structures and neural mechanisms. From this perspective personality is, to a degree, heritable but also shaped by behavioural systems such as reward, punishment and motivation. As well as describing personality traits, biological theories also speculate on the causes of personality differences. This approach has a strong emphasis on scientific methodology but was initially criticised for an over emphasis on nature rather than nurture. Recently, efforts have been made to systematically describe and investigate the biological basis of personality through the varying models presented below. Biological approaches offer some hope of explaining how personality traits are influenced by biology and research is ongoing.

The pioneering work of Hans Eysenck led to his publication “Dimensions of personality” in 1947 (Eysenck, 1947) and “The structure of human personality” in 1953 (Eysenck, 1953). Using factor analysis, he described personality biologically in terms of two stable and independent dimensions; extraversion and neuroticism. Four personality types were derived from the dimensions which were dependent on whether individuals were high or low on either trait. Eysenck suggested that the four types were similar to Galen’s four temperaments (Eysenck &
Eysenck, 1985). In collaboration with his wife they developed the Eysenck Personality Questionnaire (EPQ, Eysenck, 1968; Eysenck & Eysenck, 1994) to assess his model of personality and they added a third dimension of psychoticism (Eysenck & Eysenck, 1968). The extraversion/introversion dimension is characterised respectively by being sociable and finding reward from outside the self as opposed to being solitary and introspective. Highly neurotic individuals are anxious (negative affectivity) and have poor emotional control compared to stable people who are calm and generally experience positive affect. Psychoticism is regarded as a tendency to aggression and selfishness in contrast to socialisation which is an inclination to be warm and altruistic. Eysenck proposed that extraversion was under the influence of cortical arousal, neuroticism was guided by the limbic system and psychoticism was determined by testosterone levels (Eysenck, 1967; Eysenck & Eysenck, 1975).

Criticisms of Eysenck’s personality dimensions led Gray, a former student of Eysenck’s, to develop his own model of personality. He disagreed with Eysenck’s emphasis on cortical arousal and classical conditioning to determine personality traits (Gray & McNaughton, 1982). Furthermore, he disagreed with the notion that extraversion and neuroticism were the main factors of personality. Instead he suggested rotating these two dimensions by 45 degrees resulting in two new factors; impulsivity (high neuroticism and extroversion) and anxiety (high neuroticism and low extraversion). Gray’s model also used factor analysis and postulated that personality was determined by reactions to rewarding and punishing experiences. He proposed ‘reinforcement sensitivity theory’ (Gray, 1970) where three brain systems respond differently to reward or punishment. The Behavioural Inhibition System (BIS) controls anxiety, the Behavioural Approach System (BAS) controls anticipation of pleasure and the Fight-Flight-Freeze System controls fear.

Cloninger’s psychobiological approach to personality initially described temperament in terms of influence of neurotransmitters on personality traits (Cloninger, 1986). He first described
three temperaments and later developed his model to include four temperaments and three
character traits (Cloninger, 1994). Originally, the temperaments were assumed to be innate
while the character aspects of personality were assumed to be acquired. However, research
has shown that all seven traits are heritable to a degree (Gillespie, Cloninger, Heath, & Martin,
2003).

2.3 Cloninger’s Psychobiological Theory of Personality

2.3.1 Development of Cloninger’s psychobiological theory

Originally Cloninger described a tridimensional model of personality (Cloninger, 1987).
Through his work as a clinician and research information from family studies he developed his
model to explain behavioural differences in different types of anxiety states. He had observed
that individuals with somatic anxiety, characterised by physical signs of tension, such as
butterflies in the stomach, muscle tension and headache, had impulsive aggressive personality
traits compared to obsessive compulsive like traits he saw in people with cognitive anxiety
which manifests as worry, negative thoughts and confusion.

There were already many personality scales that purported to measure ‘normal’ personality.
Cloninger felt that a lot of these were superfluous (Cloninger, 1987) and that the method of
factor analysis used to derive these traits was inappropriate. Factor analysis was sufficient for
identifying the factors but gave no indication of underlying structure or cause. Additionally
Cloninger wanted to describe a personality theory that could account for both normal and
abnormal personality (Cloninger et al., 1994). Traditionally personality disorders were
described categorically while description of normal personality traits was usually on
continuous dimensions.
Eysenck (Eysenck & Eysenck, 1968) had already described a three factor model of personality that accounted for normal and abnormal variations in personality. Cloninger felt Eysenck’s description of personality was insufficient because he assumed that genetic and environmental influences affect behaviour in the same way (Cloninger et al., 1994). He argued that extraversion was actually two factors that appeared as one because of common environmental effects. Work by Gray and McNaughton (1982) had convinced Cloninger that Eysenck’s description of neuroticism and extraversion inadequately described anxiety (Cloninger et al., 1994). Gray noted that anti-anxiety drugs reduced neuroticism and increased extraversion. As a consequence of Gray’s observations and through his own work Cloninger thought that a single dimension of anxiety would better describe neurotic introversion (Cloninger et al., 1994).

Cloninger called the single dimension of anxiety ‘harm avoidance’ and also included in his model two other continuous dimensions of personality; novelty seeking and reward dependence. He called these three traits ‘temperaments’. Each trait was measured by four subscales in a personality inventory developed by Cloninger called the Tridimensional Personality Questionnaire (TPQ, Cloninger, 1987). The three temperaments were seen as being genetically influenced, related to different brain systems and were preconscious responses to different types of stimuli learnt through operant conditioning. There were advantages of being high or low in the three temperaments and the traits interacted to create a dynamic personality system.

Exploration into the construct validity of Cloninger’s model, assessed by the TPQ (Cloninger, 1987), revealed that reward dependence scale was not performing well (Cloninger, Przybeck, & Svrakic, 1991; Nixon & Parsons, 1990). Persistence, which was a subscale of reward dependence, did not correlate with the other subscales in this dimension. Consequently, persistence was separated out resulting in a four factor model of temperament. The reward
dependence scale was extended to include a new fourth subscale and persistence was further developed to include four subscales (Cloninger et al., 1994). A large-scale twin study confirmed that the four dimensions were genetically homogenous and independent of each other (Heath, Cloninger, & Martin, 1994). However, the analyses indicated that four factors were not enough to fully describe personality and it was likely that six or more factors would be needed.

Shortly after Cloninger separated out persistence from reward dependence, he added the character traits to his evolving model. Cloninger’s original temperament model was capable of differentiating sub-types of personality disorder but could not detect whether or not an individual had a personality disorder or how mature the person was (Cloninger, 2008; Cloninger et al., 1993). Through correlation studies using other personality factors, Cloninger identified aspects of personality not accounted for by his model (Cloninger et al., 1993). Specifically, the model did not measure adjustment problems in children. Factor analysis on the personality traits of children found that a factor labelled ‘unpopularity’ was not correlated with novelty, seeking, harm avoidance or reward dependence. The ‘unpopularity’ factor strongly correlated with peer conflict, being unpopular and bullying or being bullied. Other studies on personality characteristics in adults revealed that the TPQ did not account for traits measured by other personality inventories. These traits were social cooperation, compassion, aggression, hostility, self-esteem and absorption (Cloninger et al., 1993). Accordingly Cloninger and colleagues (Cloninger et al., 1993) extended the model to include self-directedness, cooperativeness and self-transcendence. Cloninger called these dimensions ‘characters’ and they were purported to measure self-acceptance, acceptance of other people and acceptance of nature respectively. The authors also created a new personality inventory called the Temperament and Character Inventory (TCI, see Appendices H, I and P for the three versions used in this project) to assess all seven dimensions of personality described in the model. The extended model and the TCI was tested in adults and questions were discarded if they had
extreme response frequencies or had only weak correlations with other items within the factor. This resulted in 13 scales; five scales each for self-directedness and cooperativeness and three scales for self-transcendence (Cloninger et al., 1993). Later the TCI was reviewed to create the revised TCI (TCI-R) with 240 items and an abridged version, the short TCI-R which has 140 items (Cloninger, 1999). Measurement of Cloninger’s psychobiological theory is discussed in detail below.

2.3.2 The seven domains of Cloninger’s psychobiological theory of personality

A detailed description of each of the seven temperament and character dimensions as measured by Cloninger’s Temperament and Character Inventory-Revised (TCI-R) are below (Cloninger et al., 1994). First are the four ‘temperament’ domains followed by the three ‘characters’.

2.3.2.1 Novelty seeking

Novelty seeking is described as being a manifestation of a behavioural activation system assumed to be linked to dopamine (Cloninger, 1994; Cloninger et al., 1993). Behavioural activation is related to exploration of novel environments, pursuit of rewards and avoidance of monotony and punishment. As such, individuals high in novelty seeking are described as excitable, curious, enthusiastic, ardent, easily bored, impulsive, and disorderly. People low in novelty seeking may be uninquiring, unenthusiastic, unemotional, reflective, tolerant of monotony, systematic, and orderly. The advantage of high novelty seeking is that individuals are quick to engage in new or unfamiliar environments leading to exploration and potentially to rewards. However, high novelty seeking may also result in being quick tempered, disengaging when frustrated leading to instability and lacking in attention to detail. Like all the temperament domains measured by the TCI, novelty seeking has four subscales. The traits of scoring high or low on each subscale are shown in Table 2.1.
Table 2.1

Descriptors of individuals who score high and low on novelty seeking

<table>
<thead>
<tr>
<th>Subscale</th>
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<tr>
<td>Novelty seeking</td>
<td>NS1 Exploratory</td>
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<td></td>
<td>NS2 Impulsive</td>
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<td></td>
<td>NS3 Extravagant</td>
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<td></td>
<td>NS4 Disorderly</td>
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</tbody>
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2.3.2.2 Harm avoidance

Harm avoidance is an expression of a behavioural inhibition system and was anticipated to be governed by serotonergic activity (Cloninger, 1994; Cloninger et al., 1993). Behavioural inhibition is a bias to respond intensively and fearfully to new or aversive stimuli resulting in suppressed behaviour and avoidance. People with high harm avoidance are described as cautious, fearful, timid, doubtful, insecure, passive and pessimistic. On the contrary, people low in harm avoidance may be carefree, relaxed, daring, composed, and optimistic. High harm avoidance has the advantage of making people more cautious in dangerous situations whereas low harm avoidance may result in confidence in the face of danger and general optimism with low levels of distress. The traits of scoring high or low on each of the four harm avoidance TCI subscales are shown in Table 2.2.

Table 2.2

Descriptors of individuals who score high and low on harm avoidance

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Descriptors of Extreme Variants</th>
</tr>
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<tbody>
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<td>High</td>
</tr>
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<td>Harm Avoidance</td>
<td>HA1 Pessimistic</td>
</tr>
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<td></td>
<td>HA2 Fearful</td>
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<tr>
<td></td>
<td>HA3 Shy</td>
</tr>
<tr>
<td></td>
<td>HA4 Fatigable</td>
</tr>
</tbody>
</table>
2.3.2.3 Reward dependence

Reward dependence is a reflection of a behavioural dependence system (Cloninger, 1994; Cloninger et al., 1993) and was proposed to be influenced by the neurotransmitter noradrenalin. Reward dependence is a measure of social attachment and explains reaction to social rewards. High reward dependence is expressed by behaviours such as being tender-hearted, loving and warm, sensitive, dedicated, dependent, and sociable. People with high reward dependence pursue social contact and are open in their communication. Low reward dependence is shown by being practical, tough minded, cold, and socially insensitive. People low on reward dependence are content to be alone and have difficulties finding commonalities with other people. Individuals high in reward dependence have the advantage of being sensitive to social cues which enables warm relationships with other people. However, this may also mean that the individual is easily led by others and lacks objectivity of thought. Those with low reward dependence are relatively free from sentiment and wishful thinking leading to practical and objective outlooks but they may lack the ability to build beneficial social relationships. The behaviours of people scoring high or low on each of the four TCI reward dependence subscales are shown in Table 2.3.

Table 2.3

Descriptors of individuals who score high and low on reward dependence

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Descriptors of Extreme Variants</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward Dependence</td>
<td>RD1</td>
<td>Sentimental</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>RD2</td>
<td>Sociable</td>
<td>Aloof</td>
</tr>
<tr>
<td></td>
<td>RD3</td>
<td>Warm</td>
<td>Detached</td>
</tr>
<tr>
<td></td>
<td>RD4</td>
<td>Sympathetic</td>
<td>Independent</td>
</tr>
</tbody>
</table>
2.3.2.4 Persistence

Persistence was originally part of reward dependence. It was shown to be independent of the other three temperament scales resulting in it being separated out to create a fourth temperament trait in Cloninger’s model (Cloninger et al., 1991; Cloninger et al., 1993). Cloninger (Cloninger et al., 1993) described high persistence as “perseverance despite frustration and fatigue” (p. 978). Those with high scores in this TCI trait are industrious, hard-working and reliable. They may perceive frustration and fatigue as a personal challenge and will make major sacrifices to be a success. However, they are likely to be ambitious overachievers who are perfectionists with workaholic tendencies. In contrast, low scorers are described as being inactive, unreliable and unstable. They are slow in starting work and tend to give up easily when faced with frustration or criticism but they are usually satisfied with their accomplishments even if that means underachieving. Table 2.4 shows the tendencies of extreme scorers.

Table 2.4

Descriptors of individuals who score high and low on persistence

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Descriptors of Extreme Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Persistence</td>
<td>PS1</td>
</tr>
<tr>
<td></td>
<td>PS2</td>
</tr>
<tr>
<td></td>
<td>PS3</td>
</tr>
<tr>
<td></td>
<td>PS4</td>
</tr>
</tbody>
</table>

2.3.2.5 Self-directedness

Self-directedness is the first of the character dimensions. Unlike the temperament dimensions there is no advantage of being low in either this or any of the other character domains. A higher score reflects greater maturity. According to Cloninger (2015c) the most important
feature of high self-directedness is the ability to behave in accordance with personal goals based on an accurate assessment of the facts. High scorers are mature, strong, self-sufficient, responsible, reliable, goal oriented, constructive, and well-integrated. They have good self-esteem and are self-reliant. Highly self-directed people are able to adapt their behaviour to their personal goals but may be viewed as rebellious when under the authority of others. Low self-directedness indicates an immature, weak, blaming, ineffective and irresponsible personality. Clinicians may describe them as having a personality disorder. They may be incapable of setting and achieving goals because they lack core organisational principles. Self-directedness is measured in the TCI with five subscales and the traits of extreme scores are shown in Table 2.5.

Table 2.5

Descriptors of individuals who score high and low on self-directedness

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Descriptors of Extreme Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Self-directedness SD1</td>
<td>Responsible</td>
</tr>
<tr>
<td>SD2</td>
<td>Purposeful</td>
</tr>
<tr>
<td>SD3</td>
<td>Resourceful</td>
</tr>
<tr>
<td>SD4</td>
<td>Self-accepting</td>
</tr>
<tr>
<td>SD5</td>
<td>Congruent second nature</td>
</tr>
</tbody>
</table>

2.3.2.6 Cooperativeness

Cooperativeness measures the degree to which an individual sees themselves as part of society. A high cooperativeness score is advantageous for teamwork and for building satisfying and balanced relationships. Those who score high may be described as compassionate, supportive, fair and principled. They understand the needs and preferences of others as well as their own. Conversely, low scorers are intolerant, critical, unhelpful, self-absorbed and opportunistic. They tend to be inconsiderate of others’ feelings and a self-directed leader may
be described as tyrannical if they are uncooperative. Low cooperativeness is characteristic of people who prefer to be solitary. Similar to self-directedness a low cooperativeness score is associated with all types of personality disorder and low scores on both scales is a general factor in all personality disorders. Cooperativeness is also measured in the TCI with five subscales and the traits of extreme scores are shown in Table 2.6.

Table 2.6

Descriptors of individuals who score high and low on cooperativeness

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Descriptors of Extreme Variants</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperativeness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO1</td>
<td>Social acceptance</td>
<td>Social intolerance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>Empathic</td>
<td>Insensitive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO3</td>
<td>Helpful</td>
<td>Hostile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO4</td>
<td>Compassionate</td>
<td>Revengeful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO5</td>
<td>Principled</td>
<td>Opportunistic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.3.2.7 Self-transcendence

The self-transcendence scale in the Temperament and Character Inventory is the first time that a specific measure of spirituality has been included in a personality inventory. Arguably it is more prone to cultural influences than the other two character traits. Cloninger’s concept of self-transcendence is supposed to measure the extent to which an individual sees themselves as an integral part of the universe. High scorers may be described by others as humble and modest and they are defined by being unpretentious, content, creative, selfless and spiritual. People who have a low score may be seen as proud, unimaginative, materialistic and unfulfilled. An individual who has a high score in self-transcendence has the advantage of being able to adapt to suffering, ill-health and death which is of benefit in advancing age. In the TCI-R self-transcendence has three subscales but in some TCI versions self-transcendence has five subscales. The traits of extreme scores are shown in Table 2.7.
Table 2.7

Descriptors of individuals who score high and low on self-transcendence

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Descriptors of Extreme Variants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>Self-transcendence</td>
<td>ST1 Self-forgetful</td>
</tr>
<tr>
<td></td>
<td>ST2 Transpersonal</td>
</tr>
<tr>
<td></td>
<td>ST3 Spiritual</td>
</tr>
</tbody>
</table>

2.3.3 Measurement of Cloninger’s psychobiological theory

The Tridimensional Personality Questionnaire (TPQ, Cloninger et al., 1991), a self-report inventory, was devised to measure the three temperament traits outlined in Cloninger’s original model. It had 100 items, 12 subscales and responses were in a true or false format. The TPQ reliably measured novelty seeking, harm avoidance and reward dependence but the persistence facet, which was originally part of reward dependence, was less reliably measured by one short scale.

When Cloninger revised his model of personality to incorporate the three characters, and to separate persistence from reward dependence, he developed a new self-report inventory called the Temperament and Character Inventory (TCI, Cloninger et al., 1994). There are several versions of the TCI including three major versions (Cloninger, 2015b). Version 8 and version 9 of the TCI were very similar to each other and retained a true or false response format. They had 226 items in common, with version 8 also having a perceptual aberration/dissociation scale (Cloninger, 2015a). Version nine had 240 items created by removing most of the perceptual aberration/dissociation scale and adding in some previously excluded items of the TPQ. This allowed earlier studies which had used the TPQ to be compared with the TCI. The latest version of the TCI is the revised TCI (TCI-R, Cloninger, 1999). This inventory has 240 items, five of which are validity items, and 29 subscales. Responses are
recorded on a 5 point Likert scale; definitely false, mostly or probably false, neither true nor false or about equally true or false, mostly or probably true and definitely true. The revised TCI was derived from an expanded 295 item version called the TCI-295 (Cloninger, 2015a). A shorter version of the TCI-R which has the first 140 items, is also available and is recommended for use when participant time is limited. The short form is as reliable as the TCI-R (Farmer & Goldberg, 2008b) but is less precise when working with the TCI subscales which may be needed for clinical work (Cloninger, 2008). Apart from the adult version, which is suitable for 15 years of age and older, there is also a junior version for self and informer report as well as an informant reporting pre-school version (Cloninger, 2015b).

2.3.3.1 Psychometric properties of the TCI-R and the short TCI-R

A psychometric study of a preliminary version of the TCI-R, which had 295 items, and the short TCI-R was conducted by Farmer and Goldberg (2008b). They reported good internal consistency for both versions of the TCI-R with Cronbach’s alpha values ranging from .84 to .92. The only exception was novelty seeking which had a lower alpha value of .78 and this result is reflected in the mean item intercorrelations which were .14 for the TCI-R and .15 for the short version. Subsequently, Cloninger reported internal consistency ranging from .84 to .92 for the 240 item version of the TCI-R (Cloninger, 2008). In the Farmer and Goldberg study (2008) the domain scales of both versions were highly correlated (.93-.98) demonstrating that they are assessing the same constructs. However, the authors note that the intercorrelations reveal overlap among the domains, particularly between harm avoidance and self-directedness, and self-directedness and cooperativeness. Test-retest reliability has been reported for the TCI-R at two weeks (Hansenne, Delhez, & Cloninger, 2005) with interclass correlations between .81 and .94. Long-term the test-retest reliability for the TCI over four years was .71 (self-directedness and cooperativeness) to .81 (harm avoidance) and similar
results were reported for six and 10 years (Josefsson et al., 2013). The exception was persistence which had a correlation .63 over four years.

### 2.3.4 Comparison to the five-factor model (FFM)

The five-factor model of personality (Costa & McCrae, 1985; Goldberg, 1993) is perhaps the most widely used model in personality psychology. In psychiatry Cloninger’s psychobiological theory is widely used and it is important to understand the relationship between the two models. The models come from different theoretical background; the five-factor model is lexically based while Cloninger’s model is theory driven from a biological perspective, but there is considerable overlap. A few studies (Capanna et al., 2012; De Fruyt, Van de Wiele, & Van Heeringen, 2000; Jaksic et al., 2015; Macdonald & Holland, 2002) have investigated the similarities and differences in divergent samples and using different questionnaires to assess the five-factor model. The correlations between the TCI-R and the FFM assessed by the Big Five Questionnaire (Caprara, Barbaranelli, Borgogni, & Perugini, 1993) are shown in Table 2.8.

In the Big Five Questionnaire neuroticism is reversed and labelled emotional stability. Most of the five domains of the five-factor model map onto the TCI-R (De Fruyt et al., 2000; Macdonald & Holland, 2002). The exception is self-transcendence where the results are less clear (Capanna et al., 2012; Jaksic et al., 2015). The strongest positive correlations are between harm avoidance and neuroticism, cooperativeness and reward dependence with agreeableness and between persistence and conscientiousness and extraversion. Self-directedness has a strong inverse correlation with neuroticism as do harm avoidance and extraversion. Other correlations of note are positive correlations for novelty seeking with extraversion and self-directedness with conscientiousness (De Fruyt et al., 2000; Jaksic et al., 2015). One point of difference between the two models is that self-transcendence is not consistently associated with any five-factor model domain (Capanna et al., 2012; Jaksic et al.,
2015) except in one study where there was a moderate correlation between self-transcendence and openness (De Fruyt et al., 2000).

The differing results for self-transcendence association with the five-factor model may reflect differences in the samples selected or the questionnaires used to assess the five-factor model. For example De Fruyt et al. (2000) studied a sample of psychiatric in-patients whereas the other studies used a general population sample (Capanna et al., 2012) or a sample of psychiatric out-patients (Jaksic et al., 2015). It may also be the case that the five-factor model does not capture all the aspects of personality including transpersonal experience (Cloninger, 2000a). There is some evidence for this as other lexical personality researchers have suggested a six-factor model of personality called HEXACO (Ashton & Lee, 2007): Honesty-Humility (H), Emotionality (E), Extraversion (X), Agreeableness (A), Conscientiousness (C), and Openness to Experience (O). Ashton and Lee (2007) arrived at six factors after lexical studies using personality descriptors from a number of languages, rather than just English. They argue that a six-factor solution covers important personality factors not accounted for in the FFM (Ashton & Lee, 2007; Ashton, Lee, & de Vries, 2014). The extraversion, conscientiousness and openness to experience facets of the HEXACO model correspond to the same FFM facets. However, the other three (honesty-humility, emotionality and agreeableness) do not but they do incorporate aspects of FFM agreeableness and neuroticism. The honesty-humility scale is not strongly or moderately associated with any scale of the FFM (Ashton et al., 2014). The scale may correspond to some aspects of TCI self-transcendence, such as being as humble, modest and unpretentious but it does not cover transpersonal aspects of personality. Rather, the honesty-humility scale seems to be a measure of altruism and possibly corresponds to the ‘dark triad’ of personality features called psychopathy, narcissism and Machiavellianism (Balakrishnan, Plouffe, & Saklofske, 2017). Despite that the honesty-humility scale doesn’t map on exactly to TCI self-transcendence scale, it does suggest that there are weaknesses and omissions within the FFM and one of those omissions may be aspects of self-transcendence.
Table 2.8

Correlations between Cloninger’s seven factor TCI-R and biological theory of personality and the five-factor model

<table>
<thead>
<tr>
<th>TCI-R</th>
<th>Five-Factor Model Facets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E</td>
</tr>
<tr>
<td>NS</td>
<td>.32**</td>
</tr>
<tr>
<td>HA</td>
<td>-.60**</td>
</tr>
<tr>
<td>RD</td>
<td>.20**</td>
</tr>
<tr>
<td>PS</td>
<td>.58**</td>
</tr>
<tr>
<td>SD</td>
<td>.24**</td>
</tr>
<tr>
<td>CO</td>
<td>-.02</td>
</tr>
<tr>
<td>ST</td>
<td>.12**</td>
</tr>
</tbody>
</table>

Correlations ≥ .40 are shown in bold. *p < .01, ** p < .001, two-tailed.
E=Extraversion, C=Conscientiousness, ES=Emotional stability, A=Agreeableness, O=Openness to experience.
NS=Novelty seeking, HA=Harm avoidance, RD=Reward dependence, PS=Persistence, SD=Self-directedness, CO=Cooperativeness, ST=Self-transcendence.
Adapted from Capanna et al., (2012) Temperament and character inventory revised (TCI-R) and big five questionnaire (BFG)

2.3.5 The distinction between ‘temperament’ and ‘character’

One of the basic tenets of Cloninger’s theory is that personality has two aspects; temperament and character. He has described the two aspects as emotion versus volition, instinct versus will or habit versus cognition (Cloninger, 1994). Temperament can be defined as emotional drives while character refers to an individual’s rational goals, beliefs and values.

The theory behind the TCI-R has evolved from the theory that underpinned the earlier versions of the TCI. Cloninger describes the theory in his book “Feeling Good” (Cloninger, 2004) and in a paper responding to Farmer and Goldberg’s (2008b) factor analysis of the TCI-R. Cloninger sees personality as expressed and regulated by three different learning and memory systems that are separable, overlapping and interconnected. Temperament is guided by procedural memory (remembering how to do things) and learning which enables people to learn habits and skills. The procedural system is automatic and unconscious. Character is directed by propositional learning and memory which is voluntary, conscious and a product of the
interaction between an individual and their environment. The third learning and memory system is the auto-neotic system that is the ‘spiritual’ aspect that guides learning of intuitions and personal narratives. This self-aware part of learning is exclusive to human beings, while procedural learning can be seen in primitive mammals and propositional learning is present in primates (Cloninger, Abou-Saleh, Mrazek, & Möller, 2011). The systems mature in sequence and all are functioning by early childhood. During the lifespan the systems interact with one another uniquely within each person to give the basis for individual personality traits and differences in susceptibility to mental illness. Defective development in one of these systems may lead to; phobias and addictions (procedural system), psychoses (semantic system) or personality disorders and dissociation (auto-neotic system).

Potential conflicts among the emotional aspects of temperament can be regulated by higher cognitive processes of character which are; executive function or foresight (self-directedness), legislative function or judgment (cooperativeness) and judicial function or insight (self-transcendence) (Cloninger, 2004, 2008). For maturity and well-being Cloninger suggests that all three character domains have to be developed and that this can be achieved by increasing self-aware consciousness (Cloninger, 2006b). Self-aware consciousness has four stages spanning from a stage of no self-awareness (the individual is aware of likes and dislikes but is immature and seeks immediate gratification) to stage three of contemplation (which is defined by coherence and gives access to the unconscious, non-dualistic psyche). Most adults spend a lot of time in stage one, which is described as ordinary cognition (purposeful but ego centric and prone to negative emotions). Ordinary cognition functions well under good circumstances but is problematic under stress. Stage two is described as meta-cognition and defined by maturity and being able to take on the perspective of others. Cloninger has developed specific techniques (Cloninger, 2006a) to develop self-aware consciousness and foster well-being that aim to increase the character domains of self-directedness, cooperativeness and self-transcendence thereby reducing psychopathology.
According to Cloninger all of the TCI domains interact in dynamic and non-linear ways. For example, regarding personality disorders the temperament dimensions are able to distinguish between sub-types and the character dimensions of self-directedness and cooperativeness are used to determine if a personality disorder is present or not. Furthermore, people with the same temperament configuration may behave differently because their character profiles are not the same. Each temperament configuration may give rise to a different character configuration and vice versa. Cloninger (1994) gives the example that those high in novelty seeking and low in harm avoidance may have an impulsive personality disorder if self-directedness and cooperativeness are also low. Conversely, if self-directedness and cooperativeness are high that person is likely to be mature and could be inquisitive, daring or materialistic. The interaction between temperament and character is shown in Figure 2.1.

![Figure 2.1. The interaction between temperament and character](image)

Originally Cloninger theorised that temperament would be moderately heritable and stable throughout life as it tended to develop early in childhood. Conversely, character would be less heritable, influenced by social learning and move towards greater maturity during the lifespan. Subsequent research has shown that both temperament and character are moderately
heritable at approximately 40% to 50% (Ando et al., 2004; Gillespie et al., 2003; Yang et al., 2015). Each of the TCI-R dimensions has a unique genetic variance that is not explained by the other TCI-R scales. Genetic variance ranges from 27% for cooperativeness to 32% for novelty seeking (Gillespie et al., 2003). Despite similar heritability, temperament and character may have different developmental paths because character is more strongly influenced by environmental effects than temperament, with the exception of harm avoidance (Yang et al., 2015).

Table 2.9

Correlations between temperament and character domains

<table>
<thead>
<tr>
<th></th>
<th>NS</th>
<th>HA</th>
<th>RD</th>
<th>PS</th>
<th>SD</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty seeking (NS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harm avoidance (HA)</td>
<td>-.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward dependence (RD)</td>
<td>.08</td>
<td>-.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistence (PS)</td>
<td>-.14</td>
<td>-.27</td>
<td>.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-directedness (SD)</td>
<td>-.26</td>
<td>-.47*</td>
<td>.21</td>
<td>.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperativeness (CO)</td>
<td>-.10</td>
<td>-.28</td>
<td>.54*</td>
<td>.18</td>
<td>.57*</td>
<td></td>
</tr>
<tr>
<td>Self-transcendence (ST)</td>
<td>.20</td>
<td>-.08</td>
<td>.28</td>
<td>.11</td>
<td>-.10</td>
<td>.15</td>
</tr>
</tbody>
</table>

Bold indicates correlations > .25 and * indicates correlations > .40
Adapted from Cloninger et al. A psychobiological model of temperament and character (1993)

There is overlap between some of the TCI domains and the correlations between the domains are shown in Table 2.9. Correlations between the four temperaments are negligible, the highest of which is a weak, negative correlation between harm avoidance and persistence. The strongest correlations are moderate and occur between harm avoidance and self-directedness, reward dependence and cooperativeness, and self-directedness and cooperativeness. Some factor analysts have suggested that harm avoidance could be
combined with self-directedness and reward dependence combined with cooperativeness to make a five factor model (Herbst, Zonderman, McCrae, & Costa Jr, 2000). However, harm avoidance and self-directedness do not measure the same constructs despite being highly correlated. An individual with high harm avoidance will be anxious and fearful which will hinder the development of autonomy and purposefulness measured by self-directedness. Likewise, a highly reward dependent individual will have a high need for the company of other people but won’t necessarily be empathic and helpful to others which is measured by high scores on cooperativeness.

2.3.6 Criticism of the distinction between ‘temperament’ and ‘character’

Cloninger has been criticised for making the distinction between temperament and character and the research has yielded conflicting results (Farmer & Goldberg, 2008a, 2008b). The distinction is not supported by a recent factor analysis study (Farmer & Goldberg, 2008a, 2008b) but they did find six or seven factors rather than five. Other factor analysts have supported a seven factor model (Brandstrom et al., 1998; Hansenne et al., 2005; Richter, Eisemann, & Richter, 2000b). Cloninger has frequently argued that factor analysis is deficient for explaining his model of personality because of its non-linear aspects (Cloninger, 2004, 2008). Cloninger explained that personality cannot be described by average effects of the differences between people and that factor analysis can’t possibly provide a model for constantly fluctuating internal processes that the TCI-R is supposed to measure (Cloninger, 2008). However, Farmer and Goldberg tested for non-linear associations between temperament and character and found no evidence of them (Farmer & Goldberg, 2008a). The inconsistent factor structure of Cloninger’s TCI is a limitation of the inventory.

Cloninger has also suggested that temperament and character are distinct neurobiologically (Cloninger, 2008). However, when he added persistence, self-directedness, cooperativeness and self-transcendence to the model he did not include specific predictions of their
neurobiology which makes testing the theory rather difficult (Farmer & Goldberg, 2008a). In his original tridimensional theory of personality Cloninger proposed that the three temperament traits of novelty seeking, harm avoidance and reward dependence were associated with specific neurotransmitter systems, dopamine, serotonin and norepinephrine respectively (Cloninger, 1986, 1987). The evidence for these associations has been mixed. Links between harm avoidance and serotonin have been found (Hansenne et al., 1997; Peirson et al., 1999) but Peirson et al., (1999) also found that serotonin was associated with self-directedness. Associations between novelty seeking and dopamine have been reported by some (Cloninger, Adolfsson, & Svrakic, 1996; Keltikangas-Järvinen et al., 2003) but not others (Gebhardt et al., 2000; Vandenbergh, Zonderman, Wang, Uhl, & Costa Jr, 1997). One study found an association between novelty seeking and norepinephrine not dopamine (Gerra et al., 1999). Reward dependence has been found to be associated with the neuropeptide oxytocin (Bell, Nicholson, Mulder, Luty, & Joyce, 2006) but not with norepinephrine (Paris, 2005). Additionally, studies of medications that act on specific neurotransmitters that are purportedly associated with extremes of the three temperament domains (e.g. serotonergic drugs would be the best treatment for problems resulting from high harm avoidance) have been varying (Joyce, Mulder, & Cloninger, 1994; Nelsen & Dunner, 1995; Nelson & Cloninger, 1997). Therefore the evidence in support of the original associations between neurotransmitter systems and specific temperament traits is weak and, for the revised model there is little evidence of differences in neurobiology.

2.3.7 The effect of age on TCI personality measures

Conventional wisdom in personality research advocated that personality was fixed either in childhood, adolescence or in early adulthood. Over the last two decades longitudinal studies have reported that changes in personality measured by the five-factor model do occur and can happen after age 30 (Srivastava, John, Gosling, & Potter, 2003) although these changes may be
small. Change in personality may reflect increasing psychological maturity and well-being (Boyce, Wood, & Powdthavee, 2013).

The effect of age on Cloninger’s seven factor psychobiological theory is different for the temperament and character dimensions. Cross-sectional studies examining mean-level change report inconsistent results for temperament with the exception that novelty seeking decreases with age (Al-Halabi et al., 2010; Mendelowicz et al., 2000; Trouillet & Gana, 2008). For character, Cloninger reports that self-directedness and cooperativeness have strong correlations with age, increasing until age 40 and then levelling out, but for self-transcendence the results were less clear (Cloninger et al., 1993). Self-transcendence is less consistent and possibly peaks at 20-30 years of age, dips in middle age and then rises again in older adults (Josefsson et al., 2013; Kirk, Eaves, & Martin, 1999; Yu, Chamorro-Premuzic, & Honjo, 2008). Other cross-sectional studies report conflicting results for the character scales (Al-Halabi et al., 2010; Mendelowicz et al., 2000; Trouillet & Gana, 2008).

Perhaps the best evidence for the effect of age on the TCI comes from a recently published long term longitudinal study (Josefsson et al., 2013). In this large population based study participants, aged from 20 to 45, were followed up over 10 years. For temperament they found mean level changes with a moderate effect size for novelty seeking which trended down with age. Weak effect sizes were seen for persistence (positive trend) and reward dependence (negative trend). Harm avoidance didn’t change with age. For character, large effect sizes were seen for self-directedness, which trended up with age, and for self-transcendence, which decreased with age. Cooperativeness also increased with age and had a moderate to large effect size. In Josefsson et al. (2013) the largest changes in personality over four years were predicted by high novelty seeking, high persistence and high self-transcendence. The authors explain this as a move to greater maturity in individuals with high scores on these traits; those with high novelty seeking mature to more stability and less impulsiveness, high persistence
drives personality change through sustained effort and high self-transcendence or personal growth leads to greater personality change.

2.3.8 TCI personality measures as risk factors for mental disorder

The TCI and its predecessor the TPQ are valuable predictors of psychopathology. When Cloninger developed the TPQ he endeavoured to produce a personality theory that could account for both normal and pathological variants. His work on family, twin and adoption studies led him to realise that different combinations of novelty seeking, harm avoidance and reward dependence could distinguish between different personality disorders as well as adaptive behaviours (Cloninger, 1987). Additionally, Cloninger’s personality theory could predict which children would develop anti-social behaviour problems (externalising behaviour problems), pro-social behaviours or social withdrawal (internalising behaviour problems) (Sigvardsson, Bohman, & Cloninger, 1987). For example, high novelty seeking and low harm avoidance were predictive of antisocial behaviour, whereas the opposite configuration resulted in social withdrawal. Later, persistence was separated out from reward dependence and the three character dimensions were added. Cloninger added the character dimensions when he realised that the current model couldn’t distinguish between those with and without personality disorders or whether an individual was mature or not (Cloninger, 2004).

Harm avoidance and self-directedness appear to have great predictive utility but they are not specific and close attention to the other TCI domains and the subscales may reveal greater specificity. A recent meta-analysis of TCI temperament in axis I psychiatric disorders (Miettunen & Raevuori, 2012) found that, compared to controls, higher harm avoidance was seen in all diagnostic groups except alcohol use disorders and had very large effect sizes for major depression and anxiety disorders. In pairwise comparisons more subtle differences between cases and controls were revealed in novelty seeking (low for social phobia and high for bulimia nervosa), reward dependence (low in schizophrenia and high in social phobia) and
persistence (low in social phobia and high in anorexia nervosa). For personality disorders both temperament and character have been shown to distinguish different disorders and subtypes and low self-directedness has been reported as a feature of most personality disorders (Cloninger, 1987, 2000b; Cloninger, Bayon, & Svrakic, 1998; Svrakic, Whitehead, Przybeck, & Cloninger, 1993).

Studies of depression show that high harm avoidance and low self-directedness can predict major depression over one year (Cloninger, Svrakic, & Przybeck, 2006), four years (Farmer & Seeley, 2009) and in family studies (Farmer et al., 2003). More recently a study of mood disorders (Harley, Wells, Frampton, & Joyce, 2011) reported that, after correction for mood state, harm avoidance was higher in the mood disorders group than in unaffected relatives. Furthermore, self-transcendence was higher in the bipolar I group than the other groups and the authors suggest that genes that affect self-transcendence may be a vulnerability factor for bipolar I. Earlier studies using the TPQ have reported greater novelty seeking (Janowsky, Morter, Hong, & Howe, 1999) and lower persistence (Osher, Lefkifker, & Kotler, 1999) in bipolar disorder. Engstrom and colleagues have carried out a body of work with TCI personality and bipolar disorder (Engström, Brändström, Sigvardsson, Cloninger, & Nylander, 2003, 2004a, 2004b). They reported that, compared to controls, bipolar disorder was associated with higher harm avoidance and lower reward dependence, self-directedness and cooperativeness.

2.3.9 TCI personality measures, treatment response and disorder outcome

TCI traits have also been found to be prognostic of response to antidepressants and psychotherapy. Joyce, Mulder and Cloninger (1994) assessed temperament only with the TPQ and found that these traits predicted response to clomipramine or desipramine over six weeks. Those with temperament profiles of low novelty seeking, harm avoidance and reward dependence predicted a positive response to treatment while negative treatment response
was predicted by the profile of high novelty seeking and low harm avoidance and reward dependence. The only difference between these two profiles was the change in novelty seeking. Likewise other studies using the TPQ found that the combination of high reward dependence and high harm avoidance predicted response to nefazodone, although high reward dependence made more of a contribution (Nelson & Cloninger, 1997; Nelson & Cloninger, 1995). Character traits of high cooperativeness and self-directedness were found to predict response to maprotiline at eight and 16 weeks (Sato et al., 1999) but the temperament traits did not. Having low scores in the character traits may indicate a comorbid personality disorder (Mulder, Joyce, Sullivan, Bulik, & Carter, 1999) which in turn may influence response to treatments for depression (Joyce et al., 2003). TCI predictors of response to psychotherapy are different depending on the therapy used. Those with high harm avoidance may benefit more from cognitive behavioural therapy compared to interpersonal therapy (Joyce et al., 2007). One study that compared TCI personality with the prognosis of depression treated with pharmacotherapy or psychotherapy reported findings at odds with most of the research (Kronstrom et al., 2011). Kronstrom et al. (2011) found that high scores on self-directedness, reward dependence and cooperativeness predicted worsening depression scores when treated with fluoxetine but not in the group treated with psychotherapy.

A study exploring relapse and recovery in depression found that those who relapse are likely to have high harm avoidance and low self-directedness (Mulder, Frampton, Luty, & Joyce, 2009). In a recent 15 year longitudinal study using a general population sample (Rosenström et al., 2014) the authors reported that lower self-directedness predicted the number of future dysphoric episodes with high harm avoidance and low cooperativeness also implicated in higher dysphoria rates. However, in the same study they used a clinical sample with diagnosed mood disorders that they followed for five years. TCI personality was a poor predictor of the duration of depression but low persistence predicted accumulative depression episodes in a sub-sample of bipolar patients. In an earlier study of bipolar disorder that used the TPQ
(Strakowski, Stoll, Tohen, Faedda, & Goodwin, 1993) high novelty seeking predicted impaired recovery over six months in a sample who were experiencing their first episode of mania.

2.4 Conclusions

The study of personality has been evolving over the centuries but perhaps especially so in the last 100 years. The different perspectives presented in this chapter have often arisen as a consequence of the inadequacies of the theories that were previously proposed. More recently trait perspectives using the lexical approach have become popular but they lack any underlying theory about how personality develops and the causal neurobiology. Psychobiological models offer descriptions of personality and provide testable theories on how biology influences their development. Although Cloninger’s model has limitations, such as inconsistency in its factor structure and weak evidence of the neurobiology underpinning the theory, it is a valuable predictor of psychopathology and appears to outperform other personality models in this respect (Grucza & Goldberg, 2007). Therefore, Cloninger’s psychobiological theory will provide the basis for this project.

2.5 Thesis Overview

This project examined personality and its association with health, mood, hoarding and well-being in clinical samples of depressed patients and in participants enrolled in the CHALICE study, a randomly selected community sample of 50 year olds. To explore the impact of depression on personality measurement, including the subscales of the TCI, the data came from the two clinical samples. The clinical samples provided the data to assess the subscales of TCI personality because full-length versions of the TCI were used in these studies (which allowed reliable evaluation of the subscales) and because the impact of mood on personality was able to be measured both before and after treatment for depression had taken place. Further exploration of mood disorders in relation to personality were undertaken with data
from the CHALICE study, however, subscale evaluation was not carried out with this sample because the study used the short TCI to reduce the burden on participants. CHALICE was a longitudinal study with a focus on health and well-being and these two variables (self-reported health and well-being) associations with personality are also reported on in this project.

Before the CHALICE study began recruiting community group consultation was carried out, and this consultation identified hoarding behaviours as a topic of interest. Additionally, during the course of the CHALICE study, hoarding disorder was a new addition to the DSM-5. Therefore, associations between hoarding behaviours and personality were also included in this project.

The first part of Chapter 5 in this thesis describes a series of earthquakes, which began shortly after CHALICE recruitment commenced, and their impact on the self-reported health of the CHALICE participants. Although the impact of earthquakes was not planned as a CHALICE outcome, I felt it needed to be discussed early on in the thesis because of the considerable effects it had on the Christchurch population and the CHALICE participants specifically. The final chapter of the thesis (Chapter 10) brings together the findings from all the results chapters into an integrated discussion of personality, health and well-being.

The broad aims of the thesis are:

- To assess whether harm avoidance and self-directedness are the only TCI traits associated with health and well-being across different mental health settings.
- To evaluate what the other five TCI variables contribute to health and well-being.

There are also specific aims for each of the results chapters which are as follows:

- Chapter 5 described the impact of the Christchurch earthquake sequences, which began soon after the CHALICE study started recruiting in 2010; and explored associations of physical and mental health with personality.
• Chapter 6 used data from two clinical trials to examine the impact of depression severity on the seven domains of TCI personality and its subscales.

• Chapter 7 further examined the association of mood and TCI personality using CHALICE study data. Personality traits associated with lifetime mood disorders; depression and bipolar disorder were described. Personality traits as risk factors for or a consequence of mood were examined.

• Chapter 8 described the key personality traits associated with hoarding behaviours.

• In Chapter 9 personality traits that predict well-being scores were reported on as well as a description of which combination of character traits were associated with higher well-being scores.
Part 3: Methodology

Chapter 3: Overview of the Methodology in Two Clinical Depression Trials

3.1 Overview and Introduction

The methodology for two randomised clinical trials designed to examine predictors of treatment response for depressed outpatients using either antidepressant medication (antidepressant trial) or psychotherapy (psychotherapy trial) are described in this chapter. The results for these studies are in Part 4, Chapter 6.

The antidepressant trial was designed to examine predictors of response to a selective serotonin reuptake inhibitor, fluoxetine and a tricyclic antidepressant, nortriptyline. Additionally, the trial aimed to study the course of depressive illness over five years for participants treated in a systematic manner. The psychotherapy trial aimed to examine predictors of response to interpersonal psychotherapy (IPT) and cognitive-behavioural therapy (CBT) for depression. Follow up included 16 weeks of weekly therapy and maintenance therapy for six months and naturalistic follow-up for up to five years after that.

3.2 Methods

3.2.1 Ethical approval

Both studies received approval from the local Canterbury (New Zealand) ethics committee (see Appendix E). Participants were informed about the study by an information sheet (see Appendix F) and provided written informed consent (see Appendix G).
3.2.2 Inclusion criteria

The inclusion criterion for the antidepressant trial was:

- A current principal diagnosis of major depressive episode, with a clinical indication to treat with an antidepressant.

The inclusion criterion for the psychotherapy trial was:

- A current principal diagnosis of major depressive episode.

Other inclusion criteria for both trials:

- Aged 18 years or over.
- Minimum of 2 weeks drug free or 5 drug half-lives of any centrally acting drugs (including St. John’s Wort). This excludes oral contraceptives or occasional hypnotic/benzodiazepine use.

3.2.3 Exclusion criteria

The exclusion criteria for the antidepressant trial were:

- Recent (within the last 12 months) and adequate trial of nortriptyline or fluoxetine.
- Unwillingness to take either drug.

The exclusion criteria for the psychotherapy trial were:

- Recent (within the last 12 months) and adequate trial of CBT or IPT.
- Currently in any other counselling or therapy.
- Severe or psychotic depression.

Other exclusion criteria for both trials were:

- A history of mania (Bipolar I).
- Schizophrenia.
• Organic depression.
• Current moderate or severe alcohol or drug dependence, as a primary diagnosis.
• Current severe anti-social personality disorder.
• Major physical illness.
• Breast-feeding.
• Inability to give informed consent.

## 3.2.4 Recruitment

Participants were recruited from a wide variety of sources, including mental health out-patient clinics, general practitioners, self-referral and psychiatric emergency services. No patients were recruited by advertising. Recruitment for the antidepressant trial took place between May 1993 and July 1998, and for the psychotherapy trial between August 1998 and February 2003. Figure 3.1 shows an overview of both study designs.
Figure 3.1. Overview of depression studies design

Telephone screening interview

Initial assessment to establish eligibility

Eligible

Consented to the study

Detailed baseline assessment:
- Structured Clinical Interview for DSM-III-R
- Clinician rated severity of depression
- Hopkins Symptom Checklist (SCL-90)
- Personality assessment (TCI)

Antidepressant trial:
Randomised to fluoxetine or nortriptyline

Commence antidepressants and meet with treating clinician at least weekly for 6 weeks

6 weeks evaluation of response to medication:
- If responsive then continue with medication for 6 months
- If not responsive then switch to the other medication

Psychotherapy trial:
Randomised to cognitive-behaviour therapy or interpersonal therapy

Weekly therapy sessions for 16 weeks

Monthly maintenance therapy sessions for 6 months

6 months post treatment assessment:
- Clinician rated severity of depression
- Hopkins Symptom Checklist (SCL-90)
- Personality assessment (TCI)

6-9 months post treatment assessment:
- Clinician rated severity of depression
- Hopkins Symptom Checklist (SCL-90)
- Personality assessment (TCI)
3.3 Procedure

Initially participants underwent a telephone screen interview with a research nurse to confirm depressive symptoms and to check inclusion and exclusion criteria. They were then asked to attend an assessment given by a psychiatrist or a psychologist and eligible participants were invited to take part in the relevant study. Written, informed consent was obtained and the participant was booked in for a comprehensive baseline assessment.

3.3.1 Assessment and baseline measures

Eligible participants attended a detailed clinical and neurobiological assessment. The clinical assessment was conducted by a psychiatrist or clinical psychologist using the Structured Clinical Interview for DSM-III-R (SCID, Spitzer, Williams, Gibbon, & First, 1992a, 1992b). Ratings of depression severity were made with the Montgomery-Asberg Depression Rating Scales (MADRS, Montgomery & Asberg, 1979). Patients completed a series of self-report questionnaires, including the Hopkins Symptom Checklist (SCL-90, Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) and the Temperament and Character Inventory (TCI, Cloninger et al., 1994; Cloninger et al., 1993). In the fluoxetine/nortriptyline study a 238 item version of the TCI was used (see Appendix H for the inventory, instructions to participants and scoring key) and the IPT/CBT study a 293 item version was used (see Appendix I).

3.3.2 Treatment randomisation and treatment

3.3.2.1 Randomisation

In both trials patients were randomised to the interventions in a 1:1 ratio based on a computerised randomisation sequence of permuted blocks of size 20.
**Fluoxetine/Nortriptyline**

After these baseline assessments, patients in the antidepressant trial were randomised to treatment with either fluoxetine or nortriptyline. They were seen for 20 to 40 minutes at least weekly for six weeks, depending on patient need.

**Interpersonal Psychotherapy/Cognitive Behaviour Therapy**

In the psychotherapy trial patients were randomised to IPT or CBT. Patients received weekly IPT or CBT sessions for three months, with a minimum of eight sessions.

### 3.3.3 Initial intervention or treatment

**Fluoxetine/Nortriptyline**

For patients randomised to fluoxetine the initial dosage was 20 mg daily for three weeks, although, in exceptional cases, this could be reduced to 10 mg to decrease side effects. At three weeks the clinician was free to adjust dosage up to a maximum of 80 mg. At six weeks, the mean dosage was 28 mg, the most common dosage was 20 mg, and the range was 10 to 80 mg.

For patients randomised to nortriptyline the initial dosing schedule was 25 mg for one night, 50 mg for the next night, and then 75 mg for subsequent nights. Clinicians could adjust the dose based on blood levels of nortriptyline, side effects and clinical response. At six weeks, the mean dosage was 93.5 mg and dosages ranged from 50 to 175 mg.

**Interpersonal Psychotherapy/Cognitive Behaviour Therapy**

Participants were booked to see their therapist on an approximately weekly basis, for 50 minute sessions for a period of up to 16 weeks. The protocol was flexible to allow for those with severe symptoms or suicidal ideation to receive twice weekly sessions and for those who
showed marked improvement to have less than weekly sessions. The minimum number of sessions was eight and the maximum was 19. The mean interval between baseline and follow-up assessments was 14 weeks. In CBT (Beck, Rush, Shaw, & Emery, 1979) the therapist used techniques related to the cognitive model of depression to assist the patient in identifying and substituting negative cognitions about themselves, the world and the future. The therapy sessions, which were tailored to the patient, initially focused on education about depression and the cognitive model while later the emphasis was on cognitive change. In the final sessions there was a focus on relapse prevention. In IPT (Klerman, Weissman, Rounsaville, & Chevron, 1984) the patient and therapist worked collaboratively to identify social and personal issues that were associated with and maintained their depressive symptoms. Therapy was tailored to individual needs with early sessions focussing on important past and present relationships and identification of general areas of relationship difficulty (grief, disputes, transitions or deficits). Later, sessions were used to help the patient develop approaches to deal with the problem area and the final sessions were about terminating weekly therapy. Further details of CBT and IPT are described in an earlier paper (Luty et al., 2007).

Those receiving therapy who had deterioration in depressive or suicidal symptoms that interfered with the therapy; or those with severe symptoms who showed no improvement over four to six weeks could be reviewed. The decision to review was made during supervision and group discussions of the trial clinicians. The review was carried out by a study psychiatrist and patients were offered adjunctive antidepressant treatment. Those who had adjunctive antidepressant treatment were excluded from this analyses.
3.3.4 Subsequent treatment

Fluoxetine/Nortriptyline

At six weeks or later, the treating psychiatrist made a clinical decision as to whether the antidepressant to which the patient had been initially randomised was sufficiently clinically effective. If the antidepressant had been effective, patients continued with the drug, with a recommendation they continue the drug for a minimum of a further six months. If the drug to which they had been initially randomised was not effective, the usual protocol was to switch to the other of the two initial antidepressants. If the second antidepressant was also not effective the usual protocol was to combine fluoxetine and nortriptyline. The next step was lithium augmentation of nortriptyline.

Interpersonal Psychotherapy/Cognitive Behaviour Therapy

Following the weekly sessions, patients then received three to eight monthly maintenance sessions over a further period of six months.

3.3.5 Treatment outcome and repeat measures

Fluoxetine/Nortriptyline

At six months 175 patients completed the assessment. Eighty percent of patients originally randomised to fluoxetine were still taking the initial drug and approximately one third of patients randomised to nortriptyline were still taking the initial drug. Approximately 10% of patients were taking fluoxetine or nortriptyline as their second antidepressant. Another 10% were on other antidepressant drugs or drug combinations and about 10% of all the initially depressed patients were not taking any antidepressant drug by six months. The flow of participants is shown in Figure 3.2. After six months patients completed the TCI, the SCL-90 and were rated again on the MADRS by their treating clinician.
Interpersonal Psychotherapy/Cognitive Behaviour Therapy

At about nine months 117 patients completed the maintenance sessions and did the nine month assessment. Approximately two thirds of patients originally randomised to IPT and CBT completed the maintenance sessions. Between the baseline and nine month assessment approximately one fifth of patients commenced antidepressants. The flow of participants is shown in Figure 3.3. At the conclusion of the monthly maintenance sessions patients completed the TCI, the SCL-90 and were rated on the MADRS by an independent research nurse.
Figure 3.2. Patient flow for the anti-depressant trial

Screened by telephone for eligibility n=202

Excluded for not meeting inclusion criteria: n=7

Randomised n=195.
Received allocated intervention:
Fluoxetine n=100
Nortriptyline n=95

Dropped out n=7
Left area n=2

Assessed at 6 weeks n=186:

Dropped out n=3
Left area n=7
Withdrew from study n=1

Assessed at 6 months n=175:
Fluoxetine n=80
Nortriptyline n=35
Fluoxetine and nortriptyline n=19
No medication n=24
Multiple or other medications n=17
Figure 3.3  Patient flow for the psychotherapy trial

Screened by telephone for eligibility  
n=282

Excluded: n=105  
13 did not attend assessment interview  
46 did not meet inclusion criteria  
35 declined therapy in a research study  
11 preferred antidepressant treatment

Randomised  
n=177

Commenced interpersonal psychotherapy  
n=91

4 commenced antidepressants  
4 lost to follow-up/withdrawal

Completed adequate trial  
n=83

10 commenced antidepressants  
2 lost to follow-up/withdrawn  
1 left area  
1 switched therapy to CBT

Commenced maintenance  
n=69

5 commenced antidepressants  
4 lost to follow-up/withdrawn

Completed maintenance  
n=60

Commenced Cognitive-behaviour therapy  
n=86

7 lost to follow-up/withdrawn  
3 commenced antidepressants

Completed adequate trial  
n=76

6 commenced antidepressants  
2 lost to follow-up/withdrawn  
2 left area

Commenced maintenance  
n=66

5 commenced antidepressants  
3 lost to follow-up/withdrawn  
1 left area

Completed maintenance  
n=57

5 commenced antidepressants  
4 lost to follow-up/withdrawn  
1 left area

6 commenced antidepressants  
2 lost to follow-up/withdrawn  
2 left area

3.3.6 Measures

3.3.6.1 Diagnostic measures

The Structured Clinical Interview for DSM-III-R (SCID-I)

All patients were assessed with the full diagnostic interview which assess current (past month) and lifetime DSM-III-R axis I disorders (American Psychiatric Association, 1987). Of the disorders assessed the one that was relevant to this project was major depressive episode.

3.3.6.2 Clinical rating scale

Montgomery Asberg Depression Rating Scale (MADRS)

This 10 item clinician rating scale assesses the severity of depression and was designed to be sensitive to changes in mood. Scores range from 0 to 60 with a higher score indicating more severe depression (Montgomery & Asberg, 1979). Satisfactory inter-rater reliability and internal consistency has been reported (Davidson, Turnbull, Strickland, Miller, & Graves, 1986; Montgomery & Asberg, 1979).

3.3.6.3 Self-report questionnaire

The Hopkins Symptom Checklist (SCL-90)

This is a 90 item questionnaire to evaluate a broad range of psychological problems from which nine subscales are derived. In this thesis only the depression subscale is reported on. Each question is scored on a Likert scale ranging from 0 (not at all) to 4 (extremely). The final score for the subscales are calculated by adding all the scores and then dividing by the number of items so all final scores range from 0 to 4. A higher score indicates more distress. The depression subscale has 13 items. Internal consistency for the depression subscale is .90
and test-retest reliability for all the scales range from .80 to .90 after one week (Derogatis, 1977).

### 3.3.6.4 Personality measures

**TCI**

The TCI was discussed extensively in Chapter 2 therefore only a brief description of the versions used in each trial are given here. The two trials used different versions of the TCI and both forms used a true/false format for each statement. The antidepressant trial used an earlier 238 item version of the TCI than the psychotherapy trial which used a 293 item measure. The later version of the TCI, used in the psychotherapy trial, expanded the persistence scale to include four subscales and added a new reward dependence subscale (RD2: openness to warm communication). Additionally, self-transcendence was expanded from three subscales to five. The two new subscales are called idealism (ST4) and faithfulness (ST5). The two trials used full versions of the TCI, as opposed to the short TCI which only has 140 items. This allowed reliable examination of the subscales of the TCI to be undertaken.

In the current samples internal consistency for the two versions of the TCI was variable (see Appendix J for the internal consistency of the TCI versions used at baseline and follow-up of both samples). Cronbach’s alpha for the seven scales ranged from .67 (reward dependence) to .93 (self-transcendence). The internal consistency for some of the subscales was marginal. Many of the subscales of cooperativeness and novelty seeking had a Cronbach’s alpha of <.7 and mean item correlation of <.2. Overall, harm avoidance subscales had the best internal consistency followed by self-directedness.
3.4  Statistical analyses

3.4.1  Computer packages

Data from each study were entered into relational databases and transferred to SYSTAT (SYSTAT, 2007) for statistical analyses. Statistical techniques and approach to analyses are described in Chapter 6.
Part 3: Methodology

Chapter 4: Overview of the Methodology in the CHALICE Study

4.1 Overview and Introduction

The Canterbury Health, Ageing and Lifecourse (CHALICE) project was established as a multidisciplinary longitudinal study of ageing. The participants were from a random sample chosen from the New Zealand electoral rolls to take part in this prospective longitudinal study of health and well-being. The CHALICE study aimed to track the health of a cohort of 49-51 year olds living in the Canterbury region and to investigate the interactions that lifestyle, nutrition, genes, family, culture and environment have with health and well-being. The participants undertook a four to five hour assessment which included: fasting blood and urine samples, physical measurements and health history, demographic information, heart health measurements, attitudes and opinions (for example job satisfaction), an assessment of diet and exercise, mental health evaluation, a personality questionnaire, a compulsive hoarding questionnaire and a cognitive assessment. Only the assessments relevant to this project will be outlined below and all data are cross-sectional. Further information regarding the CHALICE study has been reported elsewhere (Schluter et al., 2013).

4.2 Methods

4.2.1 Ethical approval

All participants gave written, informed consent for the study (see Appendix K). Ethical approval (see Appendix L) for the CHALICE study was obtained from the Upper South A Regional Ethics Committee on the 14 June 2010 (reference: URA/10/03/021) and progress reporting was completed every 12 months. The study complied with the ethical standards for human experimentation as established by the Helsinki Declaration 1964 (sixth revision 2008).
4.2.2 Eligibility criteria

The eligibility criteria for the CHALICE study were:

- Adults aged 49–51 years
- An intention to reside within the local region (specifically, the Canterbury District Health Board region) for six of the next 12 months
- Living in the community (i.e. not in prison or in a rest home)
- Physically and mentally able to competently complete the 4-5 hour assessment (e.g. proficiently speak English)

4.2.3 Recruitment

Participants were randomly selected from the Canterbury New Zealand electoral rolls. New Zealand has a compulsory electoral roll for those aged 18 years and over which is actively maintained. Extracts from the Canterbury rolls were made annually for electors turning 50 years within the next 12 months. There are two electoral rolls administrated by the New Zealand government, one Māori roll and a general roll. Māori are the indigenous people of New Zealand and choose to be on either electoral roll (but not on both). Registration on one roll is compulsory and enrolment statistics from 2012 estimate that 97.1% of 50-54 year olds were registered to vote in the Christchurch City Council area (Electoral Commission Te Kaitiaki Taki Kowhiri, 2013). In New Zealand 20% of the population are descended from Māori. In the Canterbury region Māori make up 8% of the population therefore this group were oversampled in the CHALICE study to reflect the wider demographic make-up of the country. Simple random sampling was carried out by an independent biostatistician. Potential participants on the two electoral roll extracts (Māori and general) were filed in random order and a selection order was created. The extracts were combined and potential participants were selected sequentially from the randomised list. Oversampling of Māori was achieved by creating a selection order so that there was one Māori roll entrant for every four non-Māori roll entrants. CHALICE study
participants were considered Māori if they identified Māori as one of the ethnic group or groups that they belong to regardless of which electoral roll they were entered on. Recruitment was from August 2010 to October 2013 and the aim was to assess a cohort of 1,000 or more participants. However, funding limitations meant that recruitment was restricted to 404 participants. The participant flow is shown in Figure 4.1.

Those selected were sent a letter and an information sheet (Appendix M) that outlined the study, and they were invited to contact the research team (by free-post). There were two versions of the invite letter, a non-Māori version (Appendix N) and a Māori version (Appendix O). Where no return contact was made, the follow-up protocol was initiated. A maximum of four telephone calls were made at various days/times (including evenings and weekends) over 10–20 days. If contact was unsuccessful, then a second invitation letter was sent approximately 4–6 weeks after the first and a further four telephone calls over 10–20 days were undertaken. If no contact could be made, then two home visits were scheduled (where practical). There was no set time limit for these home visits. If the follow-up protocol was completed and contact had not been made then these potential participants were designated ‘unable to contact’.

Once contact was made, the study was re-outlined and potential participants who expressed an interest were screened for eligibility. Participants were not offered an incentive to take part but they did receive results from some of their tests: Height, weight, derived body mass index, waist circumference, body fat percentage, heart rate, blood pressure, retinal photography, current mental health symptoms, cognitive tests, heart electrocardiogram and heart echocardiogram. The participant’s GP also received a copy of these results if the participant gave consent. An appointment was scheduled to attend the CHALICE study office. All potential participants were telephoned the day before their assessment and reminded of their appointment time and that they should have nothing to eat or drink except water, in the 10 hours prior to their appointment.
**Figure 4.1.** Participant flow for the CHALICE study

- **Invitation letters sent**
  - n=837 (Non-Māori=668, Māori=169)

- **Unable to contact**
  - n=120 (Non-Māori=76, Māori=44):
    - Protocol complete n=37
      - (Non-Māori=20, Māori=17)
    - No valid contact details n=72
      - (Non-Māori=76, Māori=44)
    - Other n=11
      - (Non-Māori=7, Māori=4)

- **Responded**
  - n=717 (Non-Māori=592, Māori=125)

- **Assessment completed**
  - n=404
    - (Non-Māori=343, Māori=61)

- **Declined**
  - n=248
    - (Non-Māori=195, Māori=53)

- **Ineligible**
  - n=65 (Non-Māori=54, Māori=11):
    - Not resident n=43
      - (Non-Māori=36, Māori=7)
    - Language problems n=13
      - (Non-Māori=13, Māori=0)
    - Other n=9
      - (Non-Māori=5, Māori=4)

- **Participation rate**
  - 62.0%
    - (Non-Māori=63.8%, Māori=53.5%)
4.3 Procedure

4.3.1 Assessment

Eligible participants attended a detailed 4-5 hour assessment of physical and mental health. They arrived in the morning after fasting for 10-12 hours. In the week previous to their appointment participants were asked to complete some questionnaires at home, including the short TCI-R (Cloninger, 1999), the Short Form-36 version 2 (SF-36v2, Ware J.E., Kosinski M., & J.E., 2000; Ware & Sherbourne, 1992; Ware et al., 2007) and the Warwick-Edinburgh Mental Well-being Scale (WEMWBS, Stewart-Brown & Janmohamed, 2008; Stewart-Brown et al., 2009). After the blood and urine samples had been collected by a research nurse, participants were given breakfast and then continued the assessment with a dedicated interviewer. The interviewer carried out the remainder of the assessments except for the heart assessments which were completed by a sonographer (echocardiogram) and a cardiac research nurse (electrocardiogram and blood pressure measurement). There were seven assessment modules and a summary of each is provided below.

4.3.1.1 Module 1: Physical

Height, weight, derived body mass index (BMI), body composition (measured by bioimpedance), heart rate, blood pressure, blood (100 ml) and urine (50 ml) including DNA extraction and bio-banking, retinal photography and eye health questions to determine sun exposure sensitivity.

4.3.1.2 Module 2: Health history

Interview questions included demographics: date of birth, ethnicity, relationship status, education, income, employment, economic status, home ownership, medical insurance; chronic conditions: current medication, long-term conditions, infection and immunisation
history, digestive disease, sleep patterns; health service utilisation: general practitioner use, medical specialist, complementary or alternative health care workers, secondary health care services use; risk and protective factors: screening programmes, environment conditions, tobacco and alcohol consumption. Māori participants were asked about their ethnic identity, family, cultural involvement and Māori language fluency.

Participants were asked about household income and if they were in receipt of government benefits. Participants were categorised as receiving income support if they currently received any benefits including in work payments and tax credits. For employment status, full and part time workers, students and those not looking for work were considered employed. Those looking for work or too ill to work were considered unemployed.

4.3.1.3 Module 3: Family and social

Interview questions covered family medical history, attitudes to health, job satisfaction, religion/spirituality and ageing, felt and ideal age, experience of ageing, experience of positive and negative social exchanges, beliefs about major health conditions and preventability, medical scepticism, recent threatening life experiences, strategies for coping under stress, life purpose questions, selected social capital and social standing questions, and discrimination. Questions related to the perception of illness were asked for those participants who had children with specified diagnosed disorders and attitudes to caring questions were asked for those participants who were primary carers for someone with an illness or disability.

4.3.1.4 Module 4: Heart

The heart assessments were electrocardiogram, echocardiogram (supine, 15–20 minutes cardiac data acquisition) and blood pressure (manual and automatic).
4.3.1.5 **Module 5: Mental health**

Most questions were derived from the Mini International Neuropsychiatric Interview (MINI, Amorim, Lecrubier, Weiller, Hergueta, & Sheehan, 1998). Compulsive hoarding was also assessed, as was personality. All of these measures are described in detail below.

4.3.1.6 **Module 6: Cognitive**

Cognitive assessment included a brief screening assessment for mild cognitive impairment, the Montreal Cognitive Assessment (Nasreddine et al., 2005), and a locally developed non-word consonant-vowel-consonant test, adapted from the Rey Verbal Learning Test (Schmidt, 1996), as a verbal test of learning and memory. Assessment of hand dominance in everyday activities was also undertaken (Oldfield, 1971).

4.3.1.7 **Module 7: Lifestyle**

Interview questions about lifestyle, exercise, and diet were asked. Recent physical activity (the last seven days and the previous 12 months) was assessed and physical function was measured using balance tests, a gait speed test (4 metre walk) and chair stand tests (5 chair stands). Participants were asked to keep a prospective food and exercise diary in the days following the main assessment. The dietary diary contained a home food inventory, questions on how and what was eaten and a four day food and drink record. The exercise diary was a prospective seven day log developed to capture different domains of physical activity including recreational physical activity, active transport, occupational physical activity and sedentary activities as well as sleeping habits.
4.3.2 Measures

4.3.2.1 Diagnostic measures

Mini-International Neuropsychiatric Interview (MINI) version 5.0.0

This diagnostic interview is a short structured clinical interview which enables researchers to make diagnoses of psychiatric disorders according to DSM-IV criteria (Amorim et al., 1998; Sheehan et al., 1998). The administration time of the interview was approximately 15 minutes. It was used to assess mental health specifically; major depressive episodes (current and lifetime), dysthymia, suicidality, manic and hypomanic episodes, panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, post-traumatic stress disorder, alcohol abuse and dependence, non-alcohol psychoactive substance use disorders and generalised anxiety disorder.

Some sections of the MINI were adapted for this study. Lifetime major depressive episode was assessed in the same way as current depression by changing the time period to lifetime rather than the past two weeks. Major depressive episode with melancholic features was not assessed. Lifetime suicidality was assessed by asking participants if they had ever thought that they would be better off dead or wished that they were dead, if they thought about suicide, if they made a plan and if they had attempted suicide. Also in this section participants were asked if they had ever deliberately harmed themselves to relieve tension or to feel better.

Similar to the DSM-5 (American Psychiatric Association, 2013), that was published during the course of this study, recurrent brief hypomanic episodes were assessed and defined as any hypomanic episode that lasted for one to four days and there was no impairment. Those participants that reported any type of manic episode, including recurrent brief hypomanic episodes in addition to an episode of depression, were classified as having bipolar disorder (see Chapter 7). Current obsessive-compulsive disorder was assessed using a different
screening question and hoarding behaviour was also assessed using the Savings Inventory – Revised (Frost & Hartl, 1996, see Chapter 8). When assessing non-alcohol psychoactive substance use disorders the drug names were changed to reflect names used in a New Zealand setting. Psychotic disorder, psychotic features and eating disorders were not assessed.

4.3.2.2 Self-report questionnaires

The self-report measures specific to each study are described within the relevant chapter. They are; the Short Form 36 version 2 (used in the CHALICE study), the Savings Inventory – Revised (used to assess hoarding) and the Warwick-Edinburgh Mental Well-being Scale (see Chapter 9).

Short TCI-R

The TCI and TCI-R were discussed extensively in Chapter 2 and therefore only a brief description of the version used in the CHALICE study is given here. To reduce participant burden the short TCI-R (136 items and four validity items) was used. The seven domains of the short version correlate highly with their TCI-R equivalents with Pearson correlation coefficients ranging from .93 to .98 (Farmer & Goldberg, 2008b).

Economic Living Standard Index Short Form (ELSI\textsubscript{SF})

Socio-economic status was assessed using the Economic Living Standard Index Short Form (ELSISF, Jensen, Spittal, & Krishnan, 2005), developed for use in New Zealand. The ELSISF asks about ownership restrictions (affordability of basic and luxury items) and restriction in social activities because of cost and economising (Jensen et al., 2005). A total score is derived from all the items on the survey. ELSISF scores range from 0-31. A higher score indicates better living standards. The ELSISF has excellent internal consistency (coefficient alpha of 0.88) and correlates moderately with other measures associated with standard of living (Jensen et al.,
The ELSI$_{sf}$ was chosen for use in CHALICE because it is a measure of all living standards (rather than a measure of deprivation) and therefore gives a better spread of data than alternative questionnaires developed for use in New Zealand (Ministry of Health, 2010).

### 4.4 Statistical Analyses

#### 4.4.1 Computer packages

Data from the studies were stored in secure databases. For data analyses and graphing the data were transferred to IBM SPSS version 22 (IBM, Released 2013) or to R 2.4.1 (R Development Core Team, 2006) and the coin package (Zeileis, Wiel, Hornik, & Hothorn, 2008).

#### 4.4.2 Missing data

Four participants did not complete the TCI and one participant did not complete the SF-36v2 or the WEMWBS. All missing data points of the TCI, ELSI$_{sf}$, WEMWBS and the SF-36 v2 were estimated using the guidelines from the appropriate user manual (Cloninger et al., 1994; Jensen et al., 2005; Stewart-Brown & Jammohamed, 2008; Ware et al., 2007). There were six respondents with one TCI item missing, one with two missing items and one respondent had five missing items, two of which were from the harm avoidance scale. For the validity items four participants had their TCI data omitted from the analyses because they incorrectly completed three or more validity items. Eight participants missed one item from the SF-36v2 and one participant had two items of missing data. For the WEMWBS there were two missing data points, one item of missing data for the ELSI$_{sf}$ and one item missing for the SI-R on the difficulty discarding/saving subscale.
4.4.3  **Statistical techniques and approach to analyses**

Statistical significance was set at a .05 (two-tailed) level, unless stated otherwise. Statistical techniques and approach to analyses are described individually in the following chapters.

4.4.4  **Reliability of measures**

In the current sample internal consistency for the short TCI-R was good with Cronbach’s alpha ranging from .80 (cooperativeness) to .89 (self-transcendence), except for novelty seeking which had a Cronbach’s alpha of .70.
Part 4: Results

Chapter 5: Self-reported Health; the Impact of Recent Exposure to Earthquakes and Relationships with TCI Personality

5.1 Overview

Shortly after beginning recruitment for the CHALICE study, the Canterbury area of New Zealand, experienced a number of strong earthquakes. The first part of this chapter describes self-reported mental and physical health of those participants, who were exposed to major earthquakes within the previous six months, and compares their scores to national norms. The second part of the chapter describes self-reported mental and physical health and their associations with the TCI personality scales. Correlations between physical health and personality are discussed.

5.2 Introduction

5.2.1 Self-reported health and exposure to earthquakes

At 04:35am on 04 September 2010 a 7.1 magnitude earthquake was centred 38km west of Christchurch, New Zealand at a depth of 11km. Despite the strength and shallowness of the earthquake, there were no fatalities but there was widespread damage to buildings and underground infrastructure (sewerage, water etc.) in the Christchurch area. In the first two years from the initial earthquake there were over 4000 aftershocks of magnitude three and over in and around the Christchurch area. The aftershock sequence includes the 22 February 2011 earthquake that resulted in 185 fatalities, a magnitude 6.3 tremor on 13 June 2011 and a 6.2 magnitude earthquake on 23 December 2011. The widespread damage has resulted in a
multitude of stressors for the residents of the Christchurch area. 100,000 homes were
damaged and 10,000 were demolished including the abandonment of whole suburbs. The
estimated cost of the rebuild was 40 billion New Zealand dollars (Reserve Bank of New
Zealand, 2016). Residents have had to negotiate their way through a process of insurance
claims and government buy-outs of their land. A review of stressors in extreme events (Lock et
al., 2012), has identified primary stressors which cause obvious and immediate distress such as
injuries or watching someone die. The review also describes secondary stressors (e.g.
economic, family, continued lack of infrastructure) the effects of which can be more prolonged
and may contribute to on-going stress and mental disorder.

Exposure to earthquakes and disasters has been shown to affect the mental well-being of
survivors (Chou, Chou, Lin, et al., 2004; Chou, Chou, Su, et al., 2004; Wang, Gao, Zhang, et al.,
2000). Survivors are at increased risk of developing post-traumatic stress disorder (Chou,
Chou, Su, et al., 2004; Wang, Gao, Shinfuku, et al., 2000), and depression and anxiety (Chou,
Chou, Su, et al., 2004; Zhang, Wang, Shi, Wang, & Zhang, 2012). These adverse impacts can
continue for years after the event (Tempesta, Curcio, De Gennaro, & Ferrara, 2013; Wu et al.,
2006). An earthquake study in South West China (Ke, Liu, & Li, 2010) reported on the quality of
life after the 2008 Wenchuan earthquake, which resulted in massive loss of life and
destruction. The authors used the Short Form 36 health survey (SF-36, Ware & Sherbourne,
1992) to measure self-reported health across eight domains of physical and mental health. To
my knowledge this was the only earthquake study to compare SF-36 results with national
population norms. The study population were survivors living in earthquake shelters with a
mean age 32.28 years and 40% were full-time students. Survivors reported significantly lower
scores on all eight scales of the SF-36, than the general population and the researchers found
that being older and female were risk factors for poorer SF-36 scores. Other research
comparing post disaster SF-36 scores with national norms or pre disaster scores have
described similar effects. Survivors of a tsunami in Thailand reported lower SF-36 subscale
scores compared to national figures, except for physical functioning, in a cohort of navy personnel (navies) and their spouses, six months after exposure (Kongsakon, Putthavarang, & Thomyangkoon, 2012). Likewise, a study comparing pre and post hurricane disaster SF-36 scores found that all eight scales of the SF-36 declined one year after the event but the decline in the subscale scores of physical health, social functioning and mental health were not statistically significant (Vu & VanLandingham, 2012).

The earthquake described by Ke et al. (2010) caused 70,000 deaths and approximately five million survivors to become homeless which affected both the mental and physical health of the study population. The recent earthquakes in Christchurch, though devastating in many ways, have not caused massive fatalities, homelessness, and injuries. What was not known was how earthquake survivors in this situation respond physically and mentally to the earthquake sequence.

5.2.2 Associations between personality and self-reported health

In 1948 the World Health Organization entered into force its definition of health as follows; “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization, 1948). Over the last 30 years self-report measures of health have become popular. One of the most widely used and valid self-report measures of health is the Short Form 36 (Ware & Sherbourne, 1992) and its successor the Short Form 36 version 2 health survey (SF-36v2, Ware et al., 2007). The CHALICE study used the SF-36v2 to measure health.

The most consistent association between personality and health are traits of negative affect, variously called neuroticism, harm avoidance or trait anxiety, which has been related to increased rates of diagnosed serious health conditions and with reduced longevity (Suls & Bunde, 2005). For physical health strong associations have been found between higher
negative affect and poorer physical health (Cheng & Furnham, 2013; Smith, 2006). Other personality variables linked with poorer physical health are hostility (Smith, 2006), which corresponds with low TCI cooperativeness, and low conscientiousness, which is a five-factor model personality variable that corresponds to TCI subscales of self-directedness and persistence (Cheng & Furnham, 2013). For the TCI, previous research using temperament clusters in a normal population reported that people with high persistence and low aspects of novelty seeking, extravagance and disorderliness, had healthy life habits (Wessman et al., 2012). Further, the authors report that high harm avoidance with low exploratory excitability (a subscale of novelty seeking) and low attachment (a subscale of reward dependence) was associated with the lowest scores of health and well-being. Cloninger and Zohar (2011) have reported on the relationship between character profiles and subjective health. They found that character profiles high in self-directedness were strongly associated with better self-reported physical health and with other indicators of health such as social functioning and life satisfaction. Cooperativeness also made a significant but weak contribution to wellness.

Associations between diagnosed physical illness and the TCI have also been found. Al-Halabi et al. (2009) reported that those with at least one diagnosed physical condition had higher harm avoidance and higher scores on a self-transcendence subscale (transpersonal identification) than those without an illness. Also, for those with a diagnosed condition, they found lower scores on cooperativeness, self-directedness and the attachment subscale of reward dependence. From these research studies it is clear that low harm avoidance and high self-directedness are related to better physical health. The other TCI variables of novelty seeking, persistence and cooperativeness may also make a significant but weaker contribution to physical health.
5.2.3 Personality and post-disaster adjustment

Personality characteristics have been shown to influence how people adjust post-disaster. Indeed, personality researchers have speculated that personality influences how stressful life events are perceived (positively or not) regardless of the stressful event (Sutin, Costa Jr, Wethington, & Eaton, 2010). As with personality and health, the most robust associations with post-disaster adjustment are with the personality trait of negative affect (emotional stability or neuroticism) which in the TCI corresponds with harm avoidance and self-directedness (Borja & Callahan, 2008; Borja, Callahan, & Rambo, 2009; Kuijer, Marshall, & Bishop, 2014; Lawrence & Fauerbach, 2003; Lewin, Carr, & Webster, 1998). Therefore, it is likely that those with more emotional stability (low harm avoidance and high self-directedness) will adjust more positively to stressful events such as earthquakes. Other personality variables that may affect post-disaster adjustment are agreeableness, which corresponds to TCI cooperativeness and conscientiousness which correspond to three TCI domains of novelty seeking, persistence and self-directedness. Higher scores on agreeableness and conscientiousness have been shown to be associated with positive outcome after trauma (Borja & Callahan, 2008).

5.3 Aims

**Aim 1:** To describe the demographic and personality characteristics of the CHALICE subsample.

**Aim 2:** To test the hypothesis that those participants exposed to earthquakes will self-report worse physical and mental health compared to those of a similar age group from the national population who have not been exposed to earthquakes.
**Aim 3a:** To test the hypothesis that harm avoidance will have a negative association and self-directedness will have a positive association with both the mental and physical health subscales of the SF-36v2.

**Aim 3b:** To determine the associations of the other five TCI personality scales with the eight subscales of the SF-36v2.

### 5.4 Methods

#### 5.4.1 Overview

The data were a subsample from a prospective longitudinal study of health and well-being, the CHALICE study described in Chapter 4. Full details of the study design have been presented elsewhere (Schluter et al., 2013).

#### 5.4.2 Participants

This study uses a convenience sample derived from the CHALICE sample. There were 404 participants in the CHALICE study. Excluded from this analyses were five participants who were assessed before the first major earthquake and 104 participants who were assessed more than six months after the last major earthquake (those measuring magnitude six or over on the Richter scale). Consequently the sample size for self-reported physical and mental health was 295. From the 295 participants recently exposed to earthquakes, five did not have valid TCI data and therefore analyses using TCI data was from a sample of 290.
5.4.3 Procedure

5.4.3.1 Assessment

As described previously in Chapter 4, in the week previous to their appointment participants were asked to complete some questionnaires at home, including the short TCI-R (Cloninger, 1999, see Appendix P) and the SF-36v2 (Ware et al., 2007, see Appendix Q). A dedicated interviewer collected demographic data from the participants on the assessment day including socio-economic status which was assessed using the Economic Living Standard Index Short Form (ELSISF, Jensen et al., 2005) described in Chapter 4.

5.4.3.2 Measures: Short Form 36 version 2 (SF-36v2)

The SF-36v2 is a 36 item questionnaire that measures self-reported health. It is considered the ‘gold standard’ in self-reported physical and mental functioning. The first question of the SF-36v2 is a global rating of health and all but one of the 36 items contribute to eight multi-item subscales of health (see Table 5.1 below). These eight subscales are then transformed to provide two summary measures: physical and mental health status. The summary scores are assumed to have a mean of 50 and standard deviation of 10, based on U.S. general population data (Ware et al., 2007).

The questionnaire has high internal consistency with Cronbach’s alpha coefficients of .95 for the physical component summary (PCS) and .93 for the mental component summary (MCS). Good test-retest reliability has been established with intraclass correlation coefficients of .87 (PCS) and .59 (MCS) across two weeks. The concurrent validity estimates for the 8 subscales are between .76 (role-emotional) to .93 (general health and mental health) (Ware et al., 2007). In the CHALICE sample the SF-36v2 Cronbach’s alpha ranged from .80 (social functioning) to .94 (role-physical). The SF-36v2 measures eight of the most commonly used health concepts
(Ware et al., 2007) however it does not measure other domains such as sleep and cognitive function.

Table 5.1

**Summary of information about SF-36v2 subscales**

<table>
<thead>
<tr>
<th>Scales</th>
<th>Items</th>
<th>Lowest Possible Score (Floor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Functioning</td>
<td>10</td>
<td>Very limited in performing all physical activities, including bathing or dressing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performs all types of physical activities including the most vigorous without limitations due to health</td>
</tr>
<tr>
<td>Role-Physical</td>
<td>4</td>
<td>Problems with work or other daily activities as a result of physical health</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No problems with work or other daily activities</td>
</tr>
<tr>
<td>Bodily Pain</td>
<td>2</td>
<td>Very severe and extremely limiting pain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No pain or limitations due to pain</td>
</tr>
<tr>
<td>General Health</td>
<td>5</td>
<td>Evaluates personal health as poor and believes it is likely to get worse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluates personal health as excellent</td>
</tr>
<tr>
<td>Vitality</td>
<td>4</td>
<td>Feels tired and worn out all of the time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feels full of pep and energy all of the time</td>
</tr>
<tr>
<td>Social Functioning</td>
<td>2</td>
<td>Extreme and frequent interference with normal social activities due to physical and emotional problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performs normal social activities without interference due to physical or emotional problems</td>
</tr>
<tr>
<td>Role-Emotional</td>
<td>3</td>
<td>Problems with work or other daily activities as a result of emotional problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No problems with work or other daily activities</td>
</tr>
<tr>
<td>Mental Health</td>
<td>5</td>
<td>Feelings of nervousness and depression all of the time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feels peaceful, happy, and calm all of the time</td>
</tr>
</tbody>
</table>
Table 5.1 (Ware et al., 2007, pg. 76) provides a summary of the eight subscales including the number of items for each scale and a description of the meaning of high and low scores for each subscale. The first four subscales are related to physical health and the last four relate more to mental health.

5.4.3.3 Earthquake sequence

The Christchurch earthquake sequence began on the 4th September 2010 and the last earthquake of magnitude five or over was in May 2012. Table 5.2 lists the most destructive earthquakes during that period. As well as the four earthquakes shown below, there were 62 earthquakes of magnitude five or over during this time.

Table 5.2

<table>
<thead>
<tr>
<th>Date</th>
<th>Richter Magnitude (ML)</th>
<th>Maximum Intensity (MM)</th>
<th>Focal Depth (KMs)</th>
<th>Distance from Christchurch City Centre (KMs)</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 Sep 2010</td>
<td>7.1</td>
<td>X (intense)</td>
<td>11</td>
<td>37.8</td>
<td>0</td>
</tr>
<tr>
<td>22 Feb 2011</td>
<td>6.3</td>
<td>VIII (destructive)</td>
<td>5</td>
<td>6.7</td>
<td>185</td>
</tr>
<tr>
<td>13 June 2011</td>
<td>6.4</td>
<td>VIII (destructive)</td>
<td>6.9</td>
<td>9.2</td>
<td>0</td>
</tr>
<tr>
<td>23 Dec 2011</td>
<td>6.0</td>
<td>VI (very strong)</td>
<td>6</td>
<td>8.5</td>
<td>0</td>
</tr>
</tbody>
</table>

5.4.3.4 Missing data

Missing data points of the scored instruments (i.e. ELSI$_{SF}$ and SF-36v2) were estimated using the guidelines from the appropriate user manual (Jensen et al., 2005; Ware et al., 2007). There was one item of missing data for the ELSI$_{SF}$ and eight missing data points for the SF-36v2.
5.4.3.5 Statistical analyses

For the comparison of SF-36v2 means between the CHALICE and New Zealand Health Survey (NZHS) data from the study was transferred to Stata version 12.0 for statistical analyses (StataCorp, 2011). A two-sided \( \alpha=5\% \) defined significance for all tests. To test for differences Student’s t-test was used, with degrees of freedom derived from the Welch–Satterthwaite equation to account for any difference between the variances.

For the rest of the analyses data were transferred to SPSS version 22 (IBM, Released 2013). Pearson correlations were used for TCI and SF-36v2 subscale associations. Cohen’s \( d \) was calculated using an online effect size calculator (Becker, 2000).

5.4.3.6 NZHS comparison data

Data collection for the NZHS was carried out between October 2006 and November 2007 (Ministry of Health, 2008). The survey followed a multi-stage, stratified, probability proportionate to size sample design and included oversampling for some ethnic groups. Survey weights were calculated for every participant to ensure that there was accurate representation of the population currently living in private dwellings. The recruitment areas were randomly selected throughout New Zealand. The recruitment rate was 68% and 12,488 adults (aged 15 years and older) took part. The comparisons used for the CHALICE study were for the 45-54 years age group (\( N=2097 \)).

5.5 Results

5.5.1 Participants

The participants were 295 individuals who had completed the SF-36v2 and were recently exposed to earthquakes. The sample for the personality data was 290 individuals with
complete TCI personality data. The means and standard deviations of the seven scales of the TCI are shown in Table 5.3.

**Table 5.3**

*CHALICE subsample means and standard deviations for the TCI scales*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty seeking</td>
<td>54.5</td>
<td>8.2</td>
</tr>
<tr>
<td>Harm avoidance</td>
<td>57.0</td>
<td>12.6</td>
</tr>
<tr>
<td>Reward dependence</td>
<td>65.6</td>
<td>10.7</td>
</tr>
<tr>
<td>Persistence</td>
<td>69.1</td>
<td>10.8</td>
</tr>
<tr>
<td>Self-directedness</td>
<td>73.5</td>
<td>11.0</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>77.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Self-transcendence</td>
<td>40.2</td>
<td>11.1</td>
</tr>
</tbody>
</table>

**5.5.2 Sample characteristics**

For the first 300 participants the participation rate was 63.7%. The demographic characteristics of the subsample of CHALICE study participants at baseline compared to New Zealand 2006 census data (Statistics New Zealand, 2013) for the Canterbury region (where possible) are shown in Table 5.4. In the CHALICE study there was a slightly higher percentage of females, and the percentage of people with a post-secondary qualification or university degree was also higher than the census data. There were marginally fewer home owners in the CHALICE sample. Māori were over-represented in the CHALICE study reflecting the sampling strategy.
Table 5.4

*CHALICE subsample demographic characteristics and New Zealand Census data 2006*

<table>
<thead>
<tr>
<th></th>
<th>CHALICE</th>
<th>NZ Census Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>2006 50-54 years</td>
</tr>
<tr>
<td><strong>Gender:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>136</td>
<td>46.1%</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>159</td>
<td>53.9%</td>
<td>50.7%</td>
</tr>
<tr>
<td><strong>Ethnicity:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Māori</td>
<td>252</td>
<td>85.4%</td>
<td></td>
</tr>
<tr>
<td>Māori</td>
<td>43</td>
<td>14.6%</td>
<td>4.5%</td>
</tr>
<tr>
<td><strong>Married (or living together &gt;1 year):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>73</td>
<td>24.7%</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>222</td>
<td>75.3%</td>
<td>77.2%</td>
</tr>
<tr>
<td><strong>Home owner:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>80</td>
<td>27.1%</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>215</td>
<td>72.9%</td>
<td>78.7%</td>
</tr>
<tr>
<td><strong>Living standard (ELSI₃₅):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>25</td>
<td>8.5%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Medium</td>
<td>87</td>
<td>29.5%</td>
<td>29.4%</td>
</tr>
<tr>
<td>High</td>
<td>183</td>
<td>62.0%</td>
<td>62.5%</td>
</tr>
<tr>
<td><em><em>Household Income</em>:</em>*</td>
<td></td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Low</td>
<td>55</td>
<td>19.4%</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>103</td>
<td>36.3%</td>
<td>n/a</td>
</tr>
<tr>
<td>High</td>
<td>126</td>
<td>44.4%</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Education:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No qualifications</td>
<td>47</td>
<td>15.9%</td>
<td>23.9%</td>
</tr>
<tr>
<td>Secondary school</td>
<td>76</td>
<td>25.8%</td>
<td>35.2%</td>
</tr>
<tr>
<td>Post-secondary school</td>
<td>117</td>
<td>39.7%</td>
<td>25.6%</td>
</tr>
<tr>
<td>University degree</td>
<td>55</td>
<td>18.6%</td>
<td>15.2%</td>
</tr>
</tbody>
</table>

*ELSI₃₅: Economic Living Standard Index Short Form. n/a: not available. * 12 items of missing data*
5.5.3 SF-36v2 scores CHALICE v NZHS

Table 5.5 shows that the CHALICE study participants had significantly lower scores on the mental health aspects of the SF-36v2 subscales than the New Zealand average for a similar age group. The mean scores for physical functioning, role-physical and bodily pain subscales were similar for both groups. The largest estimated absolute difference between the two groups was seen in the subscale mental health where post-earthquake Cantabrians had a score that was 7.3 points lower than the national average ($p<.001$). Just over five percent of the sample scored two standard deviations below the NZHS mean on the mental health subscale. The Pearson correlation between physical functioning and mental health subscales was $r = .39$ (not shown in the table). There were also significant differences in mean scores between the two groups for vitality, social functioning and role-emotional (Table 9.3). Cohen’s $d$ showed a small effect size (-0.36) for differences in the mental health subscale.

Further analysis on a subset of the sample ($N=212$) showed that there were no significant differences in mean SF-36v2 scores between those who lost a close friend or relative because of the earthquakes ($n = 22$) and those who did not, or those people who reported more damage to their home ($n = 19$) compared to those reporting less damage.
Table 5.5

The baseline SF-36v2 subscale scores of CHALICE study participants compared to national figures. The range for all subscales is 0-100.

<table>
<thead>
<tr>
<th>SF-36v2 subscale</th>
<th>0-100 scores</th>
<th>0-100 scores</th>
<th>Cohen’s d</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHALICE</td>
<td>NZHS 45-54 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(CIs 95%)</td>
<td>2006/07 (CIs 95%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=295</td>
<td>N=2097</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Functioning</td>
<td>88.6 (86.7 – 90.5)</td>
<td>87.4 (86.3 – 88.5)</td>
<td>0.05</td>
<td>.43</td>
</tr>
<tr>
<td>Role-Physical</td>
<td>86.1 (83.4 – 88.8)</td>
<td>87.1 (85.8 – 88.4)</td>
<td>-0.03</td>
<td>.58</td>
</tr>
<tr>
<td>Bodily Pain</td>
<td>73.0 (70.3 – 75.8)</td>
<td>75.2 (73.6 – 76.7)</td>
<td>-0.06</td>
<td>.31</td>
</tr>
<tr>
<td>General Health</td>
<td>71.1 (68.6 – 73.5)</td>
<td>75.4 (74.2 – 76.6)</td>
<td>-0.16</td>
<td>.011</td>
</tr>
<tr>
<td>Vitality</td>
<td>58.8 (56.4 – 61.2)</td>
<td>65.3 (64.2 – 66.3)</td>
<td>-0.27</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Social Functioning</td>
<td>83.1 (80.3 – 86.0)</td>
<td>89.6 (88.5 – 90.6)</td>
<td>-0.27</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Role-Emotional</td>
<td>87.3 (84.8 – 89.7)</td>
<td>94.0 (93.0 – 94.9)</td>
<td>-0.31</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mental Health</td>
<td>75.5 (73.5 – 77.6)</td>
<td>82.8 (81.9 – 83.7)</td>
<td>-0.36</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

CIs: confidence intervals

5.5.4 Pearson correlations of the TCI and SF-36v2 subscales

Table 5.6 shows the correlations between the seven TCI subscales and the eight subscales of the SF-36v2. Both harm avoidance and self-directedness showed moderate or strong correlations (p<.001) with all of the SF-36v2 subscales except for bodily pain which had a small correlation with both of these traits.
### Table 5.6

*Pearson correlations for the TCI and SF-36v2 subscales (n=290)*

<table>
<thead>
<tr>
<th></th>
<th>Physical functioning</th>
<th>Role-physical</th>
<th>Bodily pain</th>
<th>General health</th>
<th>Vitality</th>
<th>Social functioning</th>
<th>Role-emotional</th>
<th>Mental health</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>-.15</td>
<td>-0.09</td>
<td>-.05</td>
<td>-.16</td>
<td>-.06</td>
<td>-.14</td>
<td>-.10</td>
<td>-.07</td>
</tr>
<tr>
<td>HA</td>
<td>-.37***</td>
<td>-.38***</td>
<td>-.23***</td>
<td>-.45***</td>
<td>-.53***</td>
<td>-.34***</td>
<td>-.43***</td>
<td>-.53***</td>
</tr>
<tr>
<td>RD</td>
<td>.05</td>
<td>.01</td>
<td>.06</td>
<td>.04</td>
<td>.09</td>
<td>.02</td>
<td>-.03</td>
<td>-.02</td>
</tr>
<tr>
<td>PS</td>
<td>.19</td>
<td>.09</td>
<td>.07</td>
<td>.23***</td>
<td>.16</td>
<td>.00</td>
<td>.12</td>
<td>.12</td>
</tr>
<tr>
<td>SD</td>
<td>.37***</td>
<td>.33***</td>
<td>.19</td>
<td>.44***</td>
<td>.44***</td>
<td>.43***</td>
<td>.42***</td>
<td>.52***</td>
</tr>
<tr>
<td>CO</td>
<td>.04</td>
<td>-.03</td>
<td>-.02</td>
<td>.17</td>
<td>.07</td>
<td>.01</td>
<td>.06</td>
<td>.10</td>
</tr>
<tr>
<td>ST</td>
<td>-.07</td>
<td>-.17</td>
<td>-.01</td>
<td>-.10</td>
<td>-.08</td>
<td>-.16</td>
<td>-.12</td>
<td>-.08</td>
</tr>
</tbody>
</table>

Correlations ≥ .30 are shown in bold. Statistical significance: ***p<.001.
5.6 Discussion

5.6.1 Self-reported health and exposure to earthquakes

Mental but not physical health was significantly worse than pre-earthquake population norms for the earthquake affected Canterbury population. The 50 year olds recently exposed to earthquakes had significantly lower scores on the mental health, role-emotional, social functioning, vitality and general health scales of the SF36v2 compared to national data; but not on physical functioning, role-physical or bodily pain. Further, the physical functioning and mental health scales of the SF-36v2 were moderately correlated which suggests that the association between earthquakes and mental health outcomes is specific. The hypothesis that those participants exposed to earthquakes will self-report worse physical and mental health compared to those from the national population who had not been exposed to earthquakes was partially supported (aim 2).

This study replicated the findings of a study conducted after the 2008 Wenchuan earthquake for the SF-36 mental health scales but not for the physical health subscales. Ke et al., (2010) found significant differences between all eight subscale scores of the SF-36 for earthquake survivors as compared to previously derived population norms (Ke et al., 2010). Disaster research examining the effects of tsunami (Kongsakon et al., 2012) found very similar SF-36 results to Ke et al., (2010) and also a study of pre and post hurricane disaster SF-36 scores found all eight subscales to be lower although not all were significant (Vu & VanLandingham, 2012). In Christchurch only the mental health subscales were significantly different suggesting that this may be because of differences in actual or perceived threat of physical danger. The lack of impact on the physical scales in the CHALICE study can probably be attributed to there being fewer deaths or serious injuries caused by the earthquakes. In Christchurch the majority of fatalities happened when one six-storey building collapsed. Most of the buildings in and
around Christchurch remained intact although damaged, thereby keeping fatalities and injuries to a minimum. In the Wenchuan earthquake many buildings collapsed and at least five million were made homeless. The New Zealand building regulations, which have made provision for earthquake resistant design since 1935, are stringent and well enforced (McSaveney, 2012). In China earthquake resistant design was not introduced until 1976 and many of buildings in the rural area affected by the earthquakes were built before the 1970s (Bryner, 2008).

It may be that Christchurch residents were experiencing more secondary stressors, which affected their mental but not their physical health, as opposed to primary stressors such as fearing for one’s life or being injured (Lock et al., 2012). Many secondary stressors, for example economic challenges, stress arising from repairs to the home or rebuild, or the continued lack of infrastructure, are avoidable or modifiable (Lock et al., 2012). In order to alleviate the burden of survivors, local authorities and health professionals need to be aware of the role of secondary stressors and develop plans to address these potential problems in the aftermath of a disaster.

The results of this study are in agreement with other research regarding the Canterbury earthquake sequence. The Canterbury Earthquake Recovery Authority have reported that physical health indicators had little earthquake impact while mental wellbeing indicators revealed that the Canterbury population were more stressed and less people were reporting a high quality of life (Canterbury Earthquake Recovery Authority, 2014). Research investigating demographically matched groups of participants, in two suburbs differentially impacted by the September 2010 earthquake, found that both groups were acutely stressed. However, the group that lived in the suburb with more adverse earthquake impact had higher rates of depression and anxiety symptoms (Dorahy & Kannis-Dyman, 2012). The level of exposure to the Canterbury earthquakes also determined symptoms of mental disorder in a well-
controlled study of a large cohort of 35 year olds (Fergusson, Horwood, Boden, & Mulder, 2014). Higher exposure resulted in higher rates of mental disorder and the authors concluded that living in a disaster area does not result in increased mental disorder unless it is accompanied by trauma and adversity (Fergusson et al., 2014). In this study the participants reported lower SF-36 mental health scores that may be as a result of general stress arising from the earthquakes. For some who had higher exposure to the earthquakes and experienced trauma and adversity they may have experienced more mental health symptoms, resulting in the higher rates of depression reported in Chapter 7.

An interesting aspect to the results was the age of the CHALICE group in relation to previous SF-36 research. The 2006/07 New Zealand Health Survey showed that the means for the physical subscales of the SF-36v2 decrease with age while the mean mental health subscale scores rise with age, peak in middle age and decline again in old age (Ministry of Health, 2008). The results presented here are for a middle-aged cohort and, if the change in scores holds true for older or younger age groups, then their mental health related quality of life scores may be even lower. However, many previous studies on the effects of earthquakes on quality of life show that the effects are more marked with age (Chou, Chou, Su, et al., 2004; Ke et al., 2010). One study found that the psychological impact of earthquakes was strongest in the 54-70 year old age group and that people above that age seemed to be more resilient (Chou, Chou, Lin, et al., 2004). Further research into the effects for specific age groups is warranted.

There have been adverse mental health impacts on this middle-aged cohort during and following the earthquakes. Future emergency management planning for earthquakes and possibly other disasters may expect that, even in the absence of massive casualties and homelessness, there will be enduring mental health affects for the local population. Potentially, in the years following the earthquakes, the stress and burden on survivors may be exacerbated further by secondary stressors (Lock et al., 2012). There may need to be long-
term provision of additional mental health services, whether via primary care or specialist mental health services, to the people of Canterbury. Additionally, an understanding of the ongoing adverse mental health effects in relation to other social policies, such as resolution of insurance related earthquake claims and the pace of the rebuild of the city, remains necessary and fundamental.

5.6.2 Associations between personality and self-reported health

The consistent associations of harm avoidance and self-directedness to self-reported mental and physical health have been confirmed by this research. Harm avoidance was negatively correlated to all eight SF-36v2 subscale scores and self-directedness was positively associated with the eight SF-36v2 subscales, as hypothesised in aim 3a. Other TCI subscales that had some associations with self-reported health (aim 3b) were persistence, cooperativeness, novelty seeking and self-transcendence.

For the TCI personality traits harm avoidance was negatively associated with SF-36v2 subscales. Associations between poorer physical health and negative affect have been reported before (Cheng & Furnham, 2013; Wessman et al., 2012). Intuitively aspects of high harm avoidance such as pessimism, fear and fatigue are likely to influence ratings of physical and mental health and may impact the course of disease over many years through lower immunity and heightened stress reactions (Salovey, Rothman, Detweiler, & Steward, 2000). The data presented here did not include objective measures of physical health, however a recent study (Cheng & Furnham, 2013) in a similarly aged cohort did control for current health conditions. They reported that emotional stability (low harm avoidance) was the strongest predictor of good physical health.

Self-directedness was significantly positively correlated with physical health scores in agreement with other TCI studies reporting associations with self-reported physical health.
(Cloninger & Zohar, 2011) and diagnosed conditions (Al-Halabi et al., 2009). Similar to the negative association of high harm avoidance discussed above, the positive association of high self-directedness was not surprising. Those with higher self-directedness are responsible, goal orientated and well-integrated. These qualities may lead to healthier behaviour in general and impact on physical health in a positive way.

As expected persistence and novelty seeking were weakly associated with physical health. Persistence had a positive correlation with physical functioning and general health and novelty seeking had a weak, inverse relationship with these subscales of the SF-36v2. Novelty seeking reduces with age (Al-Halabi et al., 2010; Cloninger et al., 1994; Mendlowicz et al., 2000) and it may be that in younger cohorts novelty seeking has a stronger inverse correlation to physical health. People with higher persistence are eager, determined and less likely to suffer fatigue which may have a positive effect on physical health. Thus it was not only harm avoidance and self-directedness that affect physical health although the contributions of the other scales were weaker.

Self-transcendence had weak but significant inverse correlations with three of the SF-36v2 subscales; social functioning, role-physical and role-emotional. The latter two subscales assess limitations with work or other activities because of physical or mental health. It is hard to explain why higher self-transcendence scores would result in more limitations with daily activities. Some researchers have found an association between worse physical health and higher scores on self-transcendence (Al-Halabí et al., 2009) while others, who investigated an older group, found no association (Kirk et al., 1999). It is possible that the associations seen here were a chance finding.

Largely unrelated to physical health was reward dependence and cooperativeness. Previous research has shown stronger associations for cooperativeness and physical health (Al-Halabi et al., 2009; Cloninger & Zohar, 2011). Also, it was not associated with social functioning which
was surprising but social functioning in the SF-36v2 asks about limitations to social activities rather than asking how sociable you are or about the quality of social relationships. Cloninger and Zohar (2011) used non-linear character profiles to investigate perceived physical health whereas this study utilised simple correlation of variables which may explain the differing results. Likewise, the results presented here were self-reported physical health rather than diagnosed conditions as was used in another study that found associations between cooperativeness and physical health (Al-Halabí et al., 2009; Cloninger & Zohar, 2011). Thus, there are some personality variables, such as harm avoidance and self-directedness, which have strong associations with subjective health and others that have very little or no influence. Participants reported better health when harm avoidance and novelty seeking were lower and when self-directedness and persistence were higher. In the years that follow the seismic activity future research could address which TCI variables are predictive of health scores, especially if or when the mental health subscales of the SF-36v2 improve and move towards the national population norms.

### 5.6.3 Personality and post-disaster adjustment

Without any measure of pre-disaster personality for most of the CHALICE participants it is difficult to make any firm conclusions about post disaster adjustment and its associations with personality. It is known that current mood disorder impacts on how people describe their personality (see Chapter 6) and it is possible that earthquake exposure may have influenced how CHALICE participants describe their personality. If this is the case, then the key impacts on description of TCI personality is highly likely to be on the scales of harm avoidance and self-directedness. For the CHALICE participants, it may be possible to examine associations of personality and long-term post-disaster adjustment when future data collection is undertaken. Additionally, any mean changes of an individual’s personality between assessments could also be explored.
5.6.4 Limitations

While having salient strengths, the reported findings also have limitations, including that the SF-36v2 comparison group was historical rather than current. However, when recruiting to this study, which began only days before the first earthquake, a comparison was never planned or available. To negate this limitation, the most recent valid and reliable dataset available for a similar age group were selected for the comparison group. Completion of the SF36v2 should be comparable across different studies and the CHALICE results for the physical health scales of the SF-36v2 were similar to those seen in the national population suggesting that the comparisons were valid.

The limited age range of the CHALICE study cohort means that the results may only be applicable to this age range. However studying a cohort of one age group was also a strength, as it essentially removed age as a confounding variable. Additionally, at 50 years of age, this group was neither a young nor old sample and they may be more stable and financially secure than a younger sample. Furthermore, the study cohort was a random sample selected to take part in a study unrelated to earthquake research and the response rate for this subset of the CHALICE cohort was 64%. In the face of this good recruitment rate, despite the on-going disruption to the population of Canterbury, and that the CHALICE cohort SF-36v2 physical functioning subscale mean was largely no different from the age-matched national figures, any recruitment bias was likely to be modest. Other limitations are that the data was cross-sectional so causation cannot be determined and self-report data may be influenced by subjective bias.

5.7 Conclusions

Those exposed to earthquakes had lower self-reported mental but not physical health when compared to national population means. High harm avoidance and low self-directedness were
strongly associated with poorer self-reported mental and physical health. Lower mental and physical health scores were also weakly associated with lower persistence and higher novelty seeking and self-transcendence scores. Aspects of personality, especially harm avoidance and self-directedness, may influence post-disaster recovery.
Part 4: Results

Chapter 6: Impact of Depression Severity on Measures of Personality

6.1 Overview

Current mood affects how people describe their personality. The associations between mood, before and after treatment for mood disorder, in patients with a principal diagnosis of major depressive episode were investigated using data from the clinical trials of depression outlined in Chapter 3. Further, the impact of depression severity on TCI personality scales and subscales were examined by investigating how change in personality measures can be attributed to change in mood.

6.2 Introduction

It is widely known that an individual’s current mood, especially depression, impacts on how they describe some aspects of their personality. Some clinician’s even argue that personality should not be assessed when an individual is depressed (Costa, Bagby, Herbst, & McCrae, 2005). The best described effects of depression are on the personality trait of negative affect. It is less clear how other personality traits are affected by an individual’s current level of depression.

A number of studies have examined the impact of depression on the TCI scales and its subscales. Harm avoidance and self-directedness have repeatedly been shown to be influenced by depressed mood (Bayon, Hill, Svrakic, Przybeck, & Cloninger, 1996; Brown, Svrakic, Przybeck, & Cloninger, 1992; Cloninger et al., 1998; Farmer et al., 2003; Hansenne et
al., 1999; Naito, Kijima, & Kitamura, 2000; Peirson & Heuchert, 2001; Richter, Eisemann, & Richter, 2000a).

Additionally, depression and depressed mood have sometimes been associated with low cooperativeness (Hansenne et al., 1999; Hirano et al., 2002; Tanaka, Sakamoto, Kijima, & Kitamura, 1998) and with higher self-transcendence scores (Farmer et al., 2003; Hansenne et al., 1999). Farmer (2003) reported that the self-transcendence scale correlated weakly with depression severity and that novelty seeking scores were lower in depressed participants. However, the total scores of novelty seeking, reward dependence, persistence and self-transcendence usually do not show statistically significant associations with depression or depressed mood.

As discussed previously each of the four TCI temperament scales has four subscales, while the three character scales have five subscales. Generally the subscale scores correlate with each other and with the total score at approximately $r=.5$. Of the harm avoidance subscales HA1 (anticipatory worry) and HA4 (fatigability) correlate most strongly with mood, while HA2 (fear of uncertainty) and HA3 (shyness) appear to have lower correlations with mood (Brown et al., 1992; Elovainio et al., 2004; Peirson & Heuchert, 2001). For self-directedness all five of the subscales had a strong negative correlation with mood in one study (Peirson & Heuchert, 2001). However, Hansenne et al., (1999) compared the scores of a non-depressed control group to depressed in-patients and found that all the self-directedness subscales were significantly lower in the depressed group except for self-acceptance (SD4).

Some of the harm avoidance and self-directedness subscale items appear to be directly related to depressive symptoms. For example, the first item of the HA4 subscale (fatigability) asks whether the following statement is true or false “I have less energy and get tired more quickly than most people” (item 22, Appendix H and item 32 Appendix I) which is essentially describing a symptom of depression. Likewise, an item of SD2 (purposefulness) asks “often I
feel that my life has little purpose or meaning” (item 9, Appendix H and item 13 Appendix I) which may be endorsed as true by people in a depressive episode who have feelings of hopelessness. Therefore the underlying mechanism of why some subscales are affected by mood while others are not may be related to how much they describe symptoms or feelings associated with a depressive episode.

Corruble et al. (2002) investigated early (after one month) and delayed (after one year) changes in TCI personality measures associated with depression recovery. The severely depressed in-patients were treated with antidepressants and a range of therapies. At the end of the study period the patients were divided into poor and favourable outcome groups. The favourable outcome group was defined as achieving a 50% reduction in depression scores compared to baseline scores after one month and after 12 months. For the poor outcome group there was no change in personality over the study period. For those with a favourable outcome of depression, change in mood was associated with early and delayed personality change. Early and significant changes in the subscales of the TCI were an overall decrease in harm avoidance and in the subscale HA1 (worry and pessimism). The domain of self-directedness increased significantly as did all of the subscales except SD5 (congruent second nature). Delayed changes (between one month and one year) were an increase in overall self-directedness and the subscales of SD1 (responsibility), SD4 (self-acceptance) and SD5 (congruent second nature). Additionally there was decreased self-transcendence, particularly in the subscale ST2 (transpersonal identification).

Of the other TCI scales there is less convincing evidence that total novelty seeking and cooperativeness are affected by mood but there are suggestions that the novelty seeking subscale exploratory excitability (NS1) and the cooperativeness subscale acceptance (CO1) may be influenced by mood (Hansenne et al., 1999; Richter et al., 2000a). In factor analyses studies NS1 has been shown to load on to both novelty seeking and, negatively, on harm
avoidance (Brandstrom et al., 1998; Farmer & Goldberg, 2008b; Hansen et al., 2005; Pélissolo & Lépine, 2000) which may explain why it has sometimes been linked with mood.

Overall, while harm avoidance and self-directedness have been shown to play a role both in comparisons between depressed and healthy people and in treatment changes over time, not much is known for the other dimensions.

6.3 Aims

Aim 1: To examine the associations of each TCI scale and subscale with current mood state before treatment.

Aim 2: To examine the associations of each TCI scale and subscale with current mood state after treatment.

Aim 3: To examine the extent to which change in any TCI personality scale and subscale following treatment can be attributed to change in depression severity.

6.4 Methods

6.4.1 Overview

The data from two randomised clinical trials, described in Chapter 3, were used in the analyses. Full details of the studies design and outcome have been presented elsewhere (Joyce et al., 2002; Luty et al., 2007).

6.4.2 Patients

The patients were 195 individuals (antidepressant study) and 177 individuals (psychotherapy study) with a principal diagnosis of DSM-III-R major depressive episode. Within the antidepressant trial sample of 195 depressed patients complete TCI personality data were
available for 189 individuals at baseline and 134 individuals after six months of treatment with one or more antidepressant drugs. For the psychotherapy trial, eight participants had TCI data missing at baseline and data for seven patients were missing at the nine month follow-up. Therefore TCI personality data were available for 169 individuals at baseline and 110 after about nine months of treatment.

6.4.3 Procedure

6.4.3.1 Baseline assessment

As described previously in Chapter 3, a clinical assessment was conducted by a psychiatrist or clinical psychologist using the Structured Clinical Interview for DSM-III-R (SCID, Spitzer et al., 1992a, 1992b).

Major depressive episode definition

The DSM-III-R diagnostic criteria for major depressive episode were used in both studies (American Psychiatric Association, 1987). The diagnostic criteria were that five of the following symptoms were present for at least two weeks, that they are present for most of the day and nearly every day, that the symptoms represented a change in functioning and that symptoms cause significant distress or impairment in everyday functioning. One of the five symptoms must be depressed mood/irritability or loss of interest or pleasure in all or almost all activities. The other symptoms were; significant weight loss or gain or significant decrease or increase in appetite, insomnia or hypersomnia, psychomotor change, fatigue or loss of energy, feelings of worthlessness or excessive guilt, diminished concentration or indecisiveness and recurrent thoughts of death.

Depression severity was rated with the Montgomery-Asberg Depression Rating Scales (MADRS, Montgomery & Asberg, 1979). Additionally, patients completed a series of self-report
questionnaires, including the Hopkins Symptom Checklist (SCL-90, Derogatis et al., 1974) and the Temperament and Character Inventory (TCI, Cloninger et al., 1994; Cloninger et al., 1993).

6.4.3.2 Treatment

Patients in the antidepressant trial were randomised to treatment with either fluoxetine or nortriptyline. They were seen for 20 to 40 minutes at least weekly for six weeks, depending on patient need. After the weekly sessions, if the antidepressant had been effective, patients continued with the drug, with a recommendation they continue the drug for a minimum of a further six months. In the psychotherapy trial patients were randomised to IPT or CBT. Patients initially received a weekly 50 minute session of IPT or CBT sessions for three months. Those with severe symptoms or suicidal ideation could receive twice weekly sessions. Following the weekly sessions, patients then received three to eight monthly maintenance sessions over a further period of six months.

6.4.3.3 Follow-up assessment

In the antidepressant trial, after six months patients again completed the TCI and were rated once more on the MADRS by their treating clinician. In the psychotherapy trial, at the conclusion of the monthly maintenance sessions, which was approximately nine months after baseline, patients repeated the TCI and were rated on the MADRS by an independent research nurse.

6.4.3.4 Statistical analyses

Data from each study were transferred to SYSTAT (SYSTAT, 2007) for statistical analyses. Correlational statistical analyses used the Pearson product-moment correlation coefficient. Standard linear multiple regression was used to assess the impact of depression severity on measures of personality and all variables entered the equation simultaneously. Separate
multiple regression equations were used for each subscale of the TCI. The dependent variable was the TCI score after treatment and the independent variables were change in MADRS score (from baseline to after treatment) and TCI score at baseline. As multiple statistical tests were performed, to reduce Type I error, \( p < 0.01 \) was used as an appropriate level to define statistical significance. Paired samples \( t \)-test was used to assess whether there were significant changes in the seven TCI scales between baseline and follow-up.

6.5 Results

6.5.1 Patients

The patients were 195 individuals (antidepressant study) and 177 individuals (psychotherapy study).

6.5.2 Sample characteristics

Table 6.1 presents the baseline demographic and clinical characteristics of the two clinical samples. The psychotherapy sample was comprised of more women, was marginally older and less severely depressed. The samples were generally comparable in terms of lifetime comorbidity, but notable differences were a lower proportion of lifetime suicide attempt and alcohol dependence in the psychotherapy trial sample.
Table 6.1

Baseline clinical and demographic characteristics of the two clinical trial samples

<table>
<thead>
<tr>
<th></th>
<th>Antidepressant Trial</th>
<th>Psychotherapy Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>195</td>
<td>177</td>
</tr>
<tr>
<td>Female gender</td>
<td>57%</td>
<td>72%</td>
</tr>
<tr>
<td>Age, years: mean (SD)</td>
<td>31.6 (11.3)</td>
<td>35.2 (10.3)</td>
</tr>
<tr>
<td>Depression Severity Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline MADRS, mean (S.D.)</td>
<td>31.0 (6.6)</td>
<td>23.8 (6.3)</td>
</tr>
<tr>
<td>Depression Specifiers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melancholia</td>
<td>44%</td>
<td>55%</td>
</tr>
<tr>
<td>Atypical</td>
<td>8%</td>
<td>29%</td>
</tr>
<tr>
<td>Bipolar 2</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Recurrent</td>
<td>62%</td>
<td>70%</td>
</tr>
<tr>
<td>Chronic</td>
<td>64%</td>
<td>74%</td>
</tr>
<tr>
<td>Lifetime Comorbidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicide attempt</td>
<td>34%</td>
<td>22%</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Social phobia</td>
<td>21%</td>
<td>24%</td>
</tr>
<tr>
<td>Specific Phobia</td>
<td>11%</td>
<td>15%</td>
</tr>
<tr>
<td>OCD</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>30%</td>
<td>22%</td>
</tr>
<tr>
<td>Cannabis dependence</td>
<td>13%</td>
<td>16%</td>
</tr>
<tr>
<td>Anorexia nervosa</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Bulimia nervosa</td>
<td>13%</td>
<td>8%</td>
</tr>
</tbody>
</table>

MADRS: Montgomery-Asberg Depression Rating Scale; OCD: Obsessive-compulsive disorder
6.5.3 Association between the TCI and mood

Tables 6.2 and 6.3 respectively show the MADRS scores, TCI scores, their correlations at baseline and at six months for the antidepressant trial (Table 6.2) and the same variables and correlations at baseline and nine months for the psychotherapy trial (Table 6.3). Correlations between TCI and MADRS were linear.

At baseline in the antidepressant trial, the only significant correlation with a $p$ value $<.01$ was a negative association between the MADRS score and the self-directedness subscale low responsibility (SD1). In contrast, at baseline in the psychotherapy trial the MADRS score correlated with low self-directedness (and all five self-directedness subscales), with high harm avoidance (and three of four harm avoidance subscales) and low reward dependence (and two of four subscales). There was also a significant negative correlation of the MADRS score with the novelty seeking subscale of exploratory excitability. In neither sample were there significant correlations at baseline between the MADRS and total scores on novelty seeking, persistence, cooperativeness or self-transcendence.

After treatment in both studies, when there was a greater variability in the MADRS scores, there was more consistency in the results, such that depression severity correlated significantly with harm avoidance ($r=.37$ and $r=.37$) and negatively with self-directedness ($r=-.35$ and $r=-.35$). There were no significant correlations between the MADRS score and total scales for novelty seeking, reward dependence, persistence, cooperativeness or self-transcendence. On TCI subscales, there was a consistent negative correlation across studies between the MADRS and the exploratory excitability subscale of novelty seeking.
**Table 6.2**

**TCI and MADRS scores and correlations at baseline and 6 months and the effect of changes in depressive symptoms (MADRS score) on TCI sub-scores after 6 months of antidepressant treatment**

<table>
<thead>
<tr>
<th></th>
<th>Week 0</th>
<th>Week 26</th>
<th>TCI and MADRS correlation coefficients</th>
<th>Change in TCI attributed to change in MADRS</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=189</td>
<td>N=134</td>
<td>r</td>
<td>r</td>
<td>β</td>
</tr>
<tr>
<td><strong>MADRS</strong></td>
<td>31.0</td>
<td>7.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SCL-Dep</strong></td>
<td>2.3</td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NS1: Exploratory excitability</strong></td>
<td>5.6</td>
<td>6.0</td>
<td>-.08</td>
<td>-.27*</td>
<td>0.16</td>
</tr>
<tr>
<td><strong>NS2: Impulsiveness</strong></td>
<td>4.7</td>
<td>4.6</td>
<td>.07</td>
<td>-.06</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>NS3: Extravagance</strong></td>
<td>5.6</td>
<td>5.9</td>
<td>.00</td>
<td>-.11</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>NS4: Disorderliness</strong></td>
<td>4.8</td>
<td>4.4</td>
<td>.02</td>
<td>-.01</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Novelty Seeking Total</strong></td>
<td>20.7</td>
<td>20.8</td>
<td>.00</td>
<td>-.18</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>HA1: Anticipatory worry</strong></td>
<td>7.1</td>
<td>6.1</td>
<td>.07</td>
<td>.27*</td>
<td>-0.12</td>
</tr>
<tr>
<td><strong>HA2: Fear of uncertainty</strong></td>
<td>4.8</td>
<td>4.4</td>
<td>.08</td>
<td>.25*</td>
<td>-0.10</td>
</tr>
<tr>
<td><strong>HA3: Shyness</strong></td>
<td>5.6</td>
<td>4.9</td>
<td>.08</td>
<td>.38**</td>
<td>-0.18</td>
</tr>
<tr>
<td><strong>HA4: Fatigability</strong></td>
<td>5.9</td>
<td>5.1</td>
<td>.07</td>
<td>.27*</td>
<td>-0.11</td>
</tr>
<tr>
<td><strong>Harm Avoidance Total</strong></td>
<td>23.5</td>
<td>20.6</td>
<td>.09</td>
<td>.37**</td>
<td>-0.15</td>
</tr>
</tbody>
</table>
### Table 6.2  
**Continued**

<table>
<thead>
<tr>
<th></th>
<th>Week 0</th>
<th>Week 26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=189</td>
<td>N=134</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD1: Sentimentality</td>
<td>6.8 (2.1)</td>
<td>6.8 (2.1)</td>
</tr>
<tr>
<td>RD3: Attachment</td>
<td>4.0 (2.3)</td>
<td>4.8 (2.3)</td>
</tr>
<tr>
<td>RD4: Dependence</td>
<td>4.1 (1.4)</td>
<td>4.2 (1.5)</td>
</tr>
<tr>
<td>Reward Dependence Total</td>
<td>14.9 (3.9)</td>
<td>15.8 (3.7)</td>
</tr>
<tr>
<td>Persistence (RD2) Total</td>
<td>4.3 (2.2)</td>
<td>4.4 (2.1)</td>
</tr>
<tr>
<td>SD1: Responsibility</td>
<td>4.8 (2.3)</td>
<td>5.9 (2.2)</td>
</tr>
<tr>
<td>SD2: Purposefulness</td>
<td>3.2 (2.0)</td>
<td>4.4 (2.2)</td>
</tr>
<tr>
<td>SD3: Resourcefulness</td>
<td>2.4 (1.6)</td>
<td>3.0 (1.6)</td>
</tr>
<tr>
<td>SD4: Self-acceptance</td>
<td>7.0 (2.9)</td>
<td>7.6 (3.0)</td>
</tr>
<tr>
<td>SD5: Enlightened second nature</td>
<td>6.6 (3.3)</td>
<td>7.5 (3.2)</td>
</tr>
<tr>
<td>Self-Directedness Total</td>
<td>24.0 (8.6)</td>
<td>28.3 (9.0)</td>
</tr>
<tr>
<td>CO1: Social acceptance</td>
<td>6.6 (1.5)</td>
<td>6.8 (1.5)</td>
</tr>
<tr>
<td>CO2: Empathy</td>
<td>4.9 (1.5)</td>
<td>5.2 (1.7)</td>
</tr>
<tr>
<td>CO3: Helpfulness</td>
<td>6.5 (1.4)</td>
<td>6.7 (1.3)</td>
</tr>
<tr>
<td>CO4: Compassion</td>
<td>7.5 (2.6)</td>
<td>8.2 (2.2)</td>
</tr>
<tr>
<td>CO5: Pure-hearted conscience</td>
<td>6.6 (1.5)</td>
<td>6.9 (1.5)</td>
</tr>
<tr>
<td>Cooperativeness Total</td>
<td>32.0 (5.9)</td>
<td>33.9 (5.5)</td>
</tr>
<tr>
<td></td>
<td>Week 0 N=189 Mean (SD)</td>
<td>Week 26 N=134 Mean (SD)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><strong>ST1: Self-forgetfulness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0 (3.1)</td>
<td>5.3 (3.2)</td>
</tr>
<tr>
<td><strong>ST2: Transpersonal identification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.9 (2.6)</td>
<td>4.1 (2.7)</td>
</tr>
<tr>
<td><strong>ST3: Spiritual acceptance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.1 (1.7)</td>
<td>2.1 (1.8)</td>
</tr>
<tr>
<td><strong>Self-Transcendence Total</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.0 (5.8)</td>
<td>11.5 (6.1)</td>
</tr>
</tbody>
</table>

Bold r values are significant at *p*=.01 and **p**=.001. Bold Beta coefficients are significant at *p*<.01 and **p**<.005.
Table 6.3

TCI and MADRS scores and correlations at baseline and 6 months and the effect of changes in depressive symptoms (MADRS score) on TCI sub-score after 6-9 months of psychotherapy treatment

<table>
<thead>
<tr>
<th></th>
<th>Week 0 N=169 Mean (SD)</th>
<th>Week 38 N=110 Mean (SD)</th>
<th>TCI and MADRS correlation coefficients</th>
<th>Change in TCI attributed to change in MADRS</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Week 0</td>
<td>Week 38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MADRS</td>
<td>23.8   (6.3)</td>
<td>9.3  (9.1)</td>
<td>r</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCL-Dep</td>
<td>2.0    (0.8)</td>
<td>0.7  (0.7)</td>
<td>-0.31**</td>
<td>-0.25*</td>
<td>0.12</td>
<td>0.093</td>
</tr>
<tr>
<td>NS1: Exploratory excitability</td>
<td>5.2    (2.5)</td>
<td>6.3  (2.6)</td>
<td>-0.13</td>
<td>0.09</td>
<td>-0.12</td>
<td>ns</td>
</tr>
<tr>
<td>NS2: Impulsiveness</td>
<td>4.2    (2.2)</td>
<td>4.1  (2.1)</td>
<td>-0.09</td>
<td>-0.10</td>
<td>0.08</td>
<td>ns</td>
</tr>
<tr>
<td>NS3: Extravagance</td>
<td>5.7    (2.3)</td>
<td>5.6  (2.2)</td>
<td>-0.06</td>
<td>-0.11</td>
<td>0.14</td>
<td>0.026</td>
</tr>
<tr>
<td>NS4: Disorderliness</td>
<td>4.0    (2.1)</td>
<td>3.8  (1.9)</td>
<td>-0.23</td>
<td>-0.16</td>
<td>0.10</td>
<td>0.071</td>
</tr>
<tr>
<td>Novelty Seeking Total</td>
<td>19.1   (6.1)</td>
<td>19.8 (5.5)</td>
<td>-0.20</td>
<td>-0.16</td>
<td>0.10</td>
<td>0.071</td>
</tr>
<tr>
<td>HA1: Anticipatory worry</td>
<td>7.5    (2.6)</td>
<td>6.2  (2.6)</td>
<td>0.30*</td>
<td>0.29*</td>
<td>-0.18</td>
<td>ns</td>
</tr>
<tr>
<td>HA2: Fear of uncertainty</td>
<td>5.3     (1.8)</td>
<td>4.9  (1.7)</td>
<td>0.18</td>
<td>0.13</td>
<td>-0.05</td>
<td>ns</td>
</tr>
<tr>
<td>HA3: Shyness</td>
<td>5.6    (2.2)</td>
<td>4.9  (2.5)</td>
<td>0.26*</td>
<td>0.28*</td>
<td>-0.06</td>
<td>ns</td>
</tr>
<tr>
<td>HA4: Fatigability</td>
<td>6.1    (2.1)</td>
<td>5.0  (2.3)</td>
<td>0.28*</td>
<td>0.36**</td>
<td>-0.26</td>
<td>0.001**</td>
</tr>
<tr>
<td>Harm Avoidance Total</td>
<td>24.5   (6.7)</td>
<td>20.9 (6.7)</td>
<td>0.34**</td>
<td>0.37**</td>
<td>-0.19</td>
<td>0.016</td>
</tr>
<tr>
<td>RD1: Sentimentality</td>
<td>Week 0 N=169 Mean (SD)</td>
<td>Week 38 N=110 Mean (SD)</td>
<td>TCI and MADRS correlation coefficients</td>
<td>Change in TCI attributed to change in MADRS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------</td>
<td>-------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.2 (2.1)</td>
<td>7.5 (2.0)</td>
<td>-0.06</td>
<td>0.02 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD2: Openness to warm communication</td>
<td>6.1 (2.6)</td>
<td>6.6 (2.6)</td>
<td>-0.30*</td>
<td>0.07 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD3: Attachment</td>
<td>4.5 (2.4)</td>
<td>5.2 (2.4)</td>
<td>-0.33**</td>
<td>0.12 .066</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD4: Dependence</td>
<td>4.1 (1.4)</td>
<td>4.0 (1.4)</td>
<td>0.05</td>
<td>-0.02 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward Dependence total</td>
<td>21.9 (6.2)</td>
<td>23.3 (6.1)</td>
<td>-0.26*</td>
<td>0.07 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS1: Eagerness of effort</td>
<td>5.1 (3.2)</td>
<td>6.0 (3.2)</td>
<td>-0.02</td>
<td>0.17 .017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS2: Work hardened</td>
<td>5.4 (2.7)</td>
<td>6.3 (2.5)</td>
<td>-0.09</td>
<td>0.11 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS3: Ambitious</td>
<td>4.5 (2.5)</td>
<td>4.9 (2.7)</td>
<td>0.02</td>
<td>0.12 .091</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS4: Perfectionist</td>
<td>4.6 (2.4)</td>
<td>4.9 (2.5)</td>
<td>0.14</td>
<td>-0.02 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistence Total</td>
<td>19.6 (8.7)</td>
<td>22.0 (9.0)</td>
<td>0.01</td>
<td>0.10 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD1: Responsibility</td>
<td>4.7 (2.4)</td>
<td>5.6 (2.2)</td>
<td>-0.25*</td>
<td>0.23 .002**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD2: Purposefulness</td>
<td>3.3 (1.6)</td>
<td>4.7 (2.1)</td>
<td>-0.42**</td>
<td>0.28 &lt;.001**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD3: Resourcefulness</td>
<td>2.3 (1.6)</td>
<td>3.2 (1.6)</td>
<td>-0.26*</td>
<td>0.28 .001**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD4: Self-acceptance</td>
<td>7.0 (2.8)</td>
<td>7.4 (2.9)</td>
<td>-0.25*</td>
<td>0.14 .014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD5: Enlightened second nature</td>
<td>6.2 (3.1)</td>
<td>7.6 (2.9)</td>
<td>-0.25*</td>
<td>0.09 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Directedness Total</td>
<td>23.4 (9.0)</td>
<td>28.4 (8.6)</td>
<td>-0.37**</td>
<td>0.25 &lt;.001**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.3  **Continued**

<table>
<thead>
<tr>
<th></th>
<th>Week 0 N=169 Mean (SD)</th>
<th>Week 38 N=110 Mean (SD)</th>
<th>TCI and MADRS correlation coefficients</th>
<th>Change in TCI attributed to change in MADRS</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Week 0 r</td>
<td>Week 38 r</td>
<td>β</td>
</tr>
<tr>
<td>CO1: Social acceptance</td>
<td>5.0 (1.6)</td>
<td>7.1 (1.2)</td>
<td>-0.22</td>
<td>-0.14</td>
<td>0.05</td>
</tr>
<tr>
<td>CO2: Empathy</td>
<td>5.0 (1.6)</td>
<td>5.5 (1.5)</td>
<td>-0.19</td>
<td>-0.22</td>
<td>0.07</td>
</tr>
<tr>
<td>CO3: Helpfulness</td>
<td>6.5 (1.4)</td>
<td>6.8 (1.4)</td>
<td>-0.11</td>
<td>-0.21</td>
<td>0.08</td>
</tr>
<tr>
<td>CO4: Compassion</td>
<td>7.8 (2.3)</td>
<td>8.2 (1.9)</td>
<td>-0.10</td>
<td>0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>CO5: Pure-hearted conscience</td>
<td>6.8 (1.5)</td>
<td>7.1 (1.4)</td>
<td>-0.09</td>
<td>-0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>Cooperativeness Total</td>
<td>32.6 (5.8)</td>
<td>34.6 (4.7)</td>
<td>-0.20</td>
<td>-0.17</td>
<td>0.07</td>
</tr>
<tr>
<td>ST1: Self-forgetfulness</td>
<td>3.0 (2.4)</td>
<td>3.0 (2.3)</td>
<td>0.09</td>
<td>-0.06</td>
<td>-0.06</td>
</tr>
<tr>
<td>ST2: Transpersonal identification</td>
<td>1.3 (1.6)</td>
<td>1.5 (1.2)</td>
<td>-0.07</td>
<td>-0.04</td>
<td>-0.17</td>
</tr>
<tr>
<td>ST3: Spiritual acceptance</td>
<td>4.4 (3.1)</td>
<td>4.6 (3.1)</td>
<td>-0.10</td>
<td>0.04</td>
<td>-0.17</td>
</tr>
<tr>
<td>ST4: Idealism</td>
<td>3.3 (3.2)</td>
<td>3.6 (3.3)</td>
<td>-0.10</td>
<td>0.08</td>
<td>-0.16</td>
</tr>
<tr>
<td>ST5: Faithfulness</td>
<td>4.0 (2.4)</td>
<td>4.2 (2.3)</td>
<td>-0.10</td>
<td>-0.04</td>
<td>-0.06</td>
</tr>
<tr>
<td>Self-Transcendence Total</td>
<td>16.0 (10.1)</td>
<td>16.9 (10.3)</td>
<td>-0.08</td>
<td>0.01</td>
<td>-0.17</td>
</tr>
</tbody>
</table>

Bold r values are significant at *p=.01 and **p=.001. Bold Beta coefficients are significant at *p<.01 and **p<.005. †n=108
### 6.5.4 Change in the TCI attributed to change in MADRS

In addition to the correlations, Tables 6.2 and 6.3 show the results of multiple regression analyses within which the TCI score after treatment was predicted from baseline TCI score and change in MADRS score. The analyses potentially quantified the influence mood has on change in TCI scores. To ensure no violation of the assumptions of normality, linearity, and homoscedasticity initial analyses were conducted. Two outliers were found in the antidepressant study. One was in the regression analysis for C1 and the other was in the analysis for ST3. The outliers were removed and the analyses were run again. There was no change in the results when the outliers were removed and therefore the scores were kept in the analysis.

The largest consistent finding was the extent to which increases in self-directedness during treatment were related to improvement in depression scores. There was also a smaller, but consistent finding that decreases in harm avoidance during treatment was related to improvement in depression scores. Across both studies changes in novelty seeking, reward dependence, persistence or cooperativeness were not significantly related to change in depression scores.

On first examination in the psychotherapy trial there appeared to be a significant relationship between change in self-transcendence and improvement in mood, despite no significant correlations in either study between MADRS scores and self-transcendence at either baseline or after treatment. Closer inspection of the data revealed two participants whose total self-transcendence scores decreased by 22 points between baseline and after treatment. All other scores for these two participants were within normal limits. These two participants had a strong influence on the outcome as removing them increased the $p$ value above the significance level of $p<.01$. Therefore the conservative result (non-significance) was reported.
here which was indicated by the majority of the data, omitting these two outlying observations.

Paired samples $t$-test (not shown in the tables) revealed that the means for the seven TCI scales changed significantly between baseline and after treatment in the antidepressant study with the exception of novelty seeking and self-transcendence. In the therapy trials six TCI scales changed significantly but self-transcendence did not. In both trials the largest changes were for harm avoidance (antidepressant trial: $t$ (142) = 6.65, $p$<.001, eta squared=.24, psychotherapy trial: $t$ (109) = -6.63, $p$<.001, eta squared=.29) and self-directedness (antidepressant trial: $t$ (142) = -8.06, $p$<.001, eta squared=.31, psychotherapy trial: $t$ (109) = -5.75, $p$<.001, eta squared=.23) and eta squared statistics indicated large effect sizes.

6.6 Discussion

This study has established that harm avoidance and self-directedness were correlated with depression severity in both an antidepressant trial and a psychotherapy trial. Further, after treatment for depression, harm avoidance decreased and self-directedness increased and part of these changes can probably be attributed to improvement in mood. These findings are consistent with previous reports of the effect of mood on these two negatively correlated traits (Bayon et al., 1996; Brown et al., 1992; Cloninger et al., 1998; Farmer et al., 2003; Hansenne et al., 1999; Naito et al., 2000; Peirson & Heuchert, 2001; Richter et al., 2000a). A number of personality traits, including novelty seeking, reward dependence, persistence, cooperativeness and self-transcendence were largely unrelated to mood.

Not all of the subscales of harm avoidance and self-directedness were associated with or affected by mood. In contrast to the other harm avoidance subscales, fear of uncertainty (HA2) showed a weak correlation at both time points in the antidepressant sample but considerably lower correlation with mood both before and after treatment in the
psychotherapy trial. This is consistent with an earlier study by Peirson and Heuchert (2001) who reported a moderate association between mood (measured by the Beck Depression Inventory) and all the subscales of harm avoidance but less so for HA2. Further, Eloainio et al. (2004) found HA3 and HA4 to be more important in the development of depressive symptoms for their population based sample of healthy men and women.

Across both samples self-acceptance (SD4) had the lowest correlation with mood after treatment. In the antidepressant sample the correlation appears to be lower when compared to the rest of the self-directedness subscales. Previous research (Hansenne et al., 1999) reported a similar effect with this subscale, that self-acceptance scores did not differ between a control group and a depressed group.

As discussed above, most of the significant correlations were on the scales and subscales of harm avoidance and self-directedness. One of the exceptions was NS1 (exploratory excitability) which showed significant correlation with mood in both trials at six months but the change in this subscale was not significantly explained by change in mood. Other studies have reported that NS1 was not affected by depressed mood (Brown et al., 1992; Eloainio et al., 2004; Richter et al., 2000a) However, Hansenne et al. (1999) found that NS1 was lower in a depressed group of inpatients as compared to controls. The authors speculated that it could be indicative of a general tendency of chronically depressed people to be less exploratory which matches one of the core symptoms of depression, anhedonia. Interestingly, factor analysis studies have found NS1 to be related to harm avoidance (Hansenne et al., 2005; Mulder & Joyce, 1994) which may explain why it was associated with mood in both trials. There is a possibility that NS1 should be included as a harm avoidance subscale however, a more recent factor analysis (Farmer & Goldberg, 2008b) found NS1 to be grouped with NS2 (impulsiveness) and NS3 (extravagance).
Neither trial found any significant association between subscale CO1 (acceptance) or cooperativeness in general. There is conflicting evidence about the relationship between cooperativeness and mood. Some researchers have reported it may be related to depression (Chien & Dunner, 1996; Hansen et al., 1999; Hirano et al., 2002; Strakowski, Dunayevich, Keck, & McElroy, 1995) while others have not (Black & Sheline, 1997).

Cooperativeness and reward dependence moderately and positively correlate with each other (Farmer & Goldberg, 2008b; Hansen et al., 2005). So, it was not unexpected that there were no significant correlations for reward dependence in both trials. One exception to this is RD2 (openness to warm communication) which was negatively associated with mood on the psychotherapy trial. This trial used a later version of the TCI (Cloninger et al., 1994). Consequently, there was no comparable subscale in the antidepressant trial. It is perhaps not surprising that this new subscale, which is linked to how sociable someone feels, was associated with mood. Further research using the later version of the TCI is needed to replicate these findings.

Persistence and self-transcendence were relatively stable over the six month treatment period and show no significant correlations with mood. As with the antidepressant trial reported here, most of the research available at this time uses the older version of the TCI (where persistence is called RD2) rather than later versions which have persistence as a scale in its own right with four subscales. The lack of correlation between mood and persistence has been reported elsewhere (Corruble et al., 2002; Hirano et al., 2002). None of the scales or subscales of self-transcendence showed correlations with mood at baseline or six months.

At baseline the association between MADRS score and personality, as measured by the TCI, was different for the two studies. The antidepressant trial has only one significant correlation before treatment compared with 14 significant correlations in the psychotherapy trial. In the antidepressant trial the mean baseline MADRS score was just over seven points higher than
the psychotherapy trial and reflected a more severely depressed group of patients which has restricted the range of scores. Range restriction usually results in fewer correlations as reflected at baseline in the antidepressant trial. After treatment the mean score for the MADRS was similar in both trials and there were a comparable number of significant correlations.

This study shows remarkably similar results for self-directedness across both the trials, despite presumably different mechanisms for the change in scores. However, the subscales of harm avoidance do show differing effects with shyness (HA3) significantly changing with depression severity in the antidepressant trial, while fatigability (HA4) was significant in the psychotherapy trial. These differences raise questions as to whether the subscales deserve more investigation.

6.6.1 Limitations

Results of this study may be limited to out-patients, with mild-moderate depression who may have more motivation and willingness to participate in such trials than those with severe depression. Both samples were relatively young; however there was a large proportion, at least two-thirds, of chronic depression (more than two years of depression in the last five years). The trials were carried out in the same clinical research unit with out-patients which was more representative of the clinical population than many trials using in-patient samples. Furthermore, this study reports on a large sample size overcoming a common problem of small samples when dealing with clinical populations. Although changes in the TCI can probably be attributed to improvement in mood, causality cannot be inferred.
6.7 Conclusions

The results for this study extend the well-known impact of depression severity on self-rated measures of negative affect, notably harm avoidance and self-directedness. For those with mild to moderate depression the results show that reward dependence, persistence, cooperativeness and self-transcendence were not impacted upon by mood. In these trials a subscale of novelty seeking, exploratory excitability was associated with mood after treatment adding to the conflicting evidence that it may be affected by mood. Different types of therapy show similar but not identical changes in personality as measured by the TCI.
Part 4: Results

Chapter 7: Personality, Mood Disorders and Current Level of Depression

7.1 Overview

Personality traits of harm avoidance and self-directedness are impacted on by depression severity while others are not. Even when mood has improved it has been shown (Halvorsen et al., 2009; Smith, Duffy, Stewart, Muir, & Blackwood, 2005) that some personality domain scores in people diagnosed with mood disorders may not be equivalent to the scores seen in non-affected populations. To further examine the association of mood on the TCI scales, data from a community random sample of 50 year olds enrolled in the CHALICE study were used. Personality traits may determine responses to stress thereby affecting mood expression. This study examines the associations of TCI scales with a lifetime mood disorder diagnosis in the CHALICE sample including a description of differences in the TCI associations of major depression and bipolar disorder. An examination of univariate and multivariate prediction of lifetime depression was carried out. The final aspect of the chapter explores how current mood state impacts on the associations of personality with mood disorders.

7.2 Introduction

7.2.1 TCI correlates of lifetime mood disorder

Research into TCI personality traits have consistently shown that high harm avoidance (negative affect) and low self-directedness (autonomy) are associated with mood disorders (Engström et al., 2004a; Farmer et al., 2003; Farmer & Seeley, 2009; Loftus, Garno, Jaeger, &
Malhotra, 2008; Nowakowska, Strong, Santosa, Wang, & Ketter, 2005). Furthermore, a recent systematic review of 88 studies, which included 19 papers on mood disorders, identified high harm avoidance and low self-directedness as features of mental disorder in general (Fassino, Amianto, Sobrero, & Abbate, 2013). In Fassino’s review (2013) all of the 10 studies of major depression and the TCI reported high harm avoidance and low self-directedness (Celikel et al., 2009; De Winter, Wolterbeek, Spinhoven, Zitman, & Goekoop, 2007; Farmer et al., 2003; Halvorsen et al., 2009; Hansenne & Bianchi, 2009; Hirano et al., 2002; Hur & Kim, 2009; Kimura et al., 2000; Marijnissen, Tuinier, Sijben, & Verhoeven, 2002; Nery et al., 2009; Smith et al., 2005). Cooperativeness was also reported to be lower in six of the studies (Farmer et al., 2003; Hansenne & Bianchi, 2009; Hirano et al., 2002; Hur & Kim, 2009; Kimura et al., 2000; Nery et al., 2009). In the other TCI scales there was no clear pattern; two of the depression studies reported lower novelty seeking (Farmer et al., 2003; Hur & Kim, 2009) and one higher (Nery et al., 2009), three studies reported differences for reward dependence but one found higher scores (Celikel et al., 2009) and two lower scores (Hur & Kim, 2009; Nery et al., 2009). One study described lower persistence (Hansenne & Bianchi, 2009) and three studies reported differences in self-transcendence but two found higher scores (Celikel et al., 2009; Nery et al., 2009) and one lower scores (Hur & Kim, 2009).

Similarly, six of the seven bipolar disorder studies reporting full TCI results in the systematic review (Fassino et al., 2013) show consistent patterns of high harm avoidance and low self-directedness (Engström et al., 2004a; Loftus et al., 2008; Nery et al., 2008; Nowakowska et al., 2005; Olvera et al., 2009; Sasayama et al., 2011). Cooperativeness was also fairly consistent with five of the studies reporting lower scores for this domain (Engström et al., 2004a; Nery et al., 2008; Olvera et al., 2009; Sasayama et al., 2011). For the other TCI domains three studies reported higher novelty seeking (Nery et al., 2008; Nowakowska et al., 2005; Olvera et al., 2009), two described lower reward dependence (Engström et al., 2004a; Olvera et al., 2009),
two reported higher self-transcendence (Loftus et al., 2008; Nery et al., 2008) and one study found persistence scores to be lower in those with bipolar disorder (Olvera et al., 2009).

7.2.2 Personality differences between major depressive disorder and bipolar disorder

Previous studies have compared patients with bipolar disorder to those with major depressive disorder. The most consistent reported difference between bipolar and depressed patients is that bipolar patients report higher self-transcendence (Engström et al., 2004a; Harley et al., 2011; Jylhä et al., 2011; Nowakowska et al., 2005). Lower harm avoidance and higher novelty seeking scores have also been reported (Jylhä et al., 2011).

7.2.3 The impact of mood state on associations between personality and mood disorders

There is clear evidence that the traits of negative affect are associated with depression (Kendler, Gatz, Gardner, & Pedersen, 2006). The debate is whether negative affect is a risk factor for depression, whether depressive episodes have a scarring effect on personality, or if trait negativity and depression are part of an affective spectrum (Klein, Kotov, & Bufferd, 2011). The risk factor model, assumes that an individual’s personality predisposes them to develop a mood disorder. The scar model suggests that an episode of a mood disorder permanently or temporarily changes personality. The spectrum theory hypothesises that there is an underlying continuum of mood, ranging from normal processes to psychopathology, caused by genetic make-up and/or environmental triggers (such as stressful experiences).

None of these models fully explain the association between personality and depression but there is some consensus that the risk factor model best accounts for the different personality traits seen in individuals with a mood disorder (Kendler et al., 2006). As reported in the previous chapter, a further complication is that current mood affects personality assessment
but there is some evidence that depressive episodes may not produce lasting changes in personality (Hansenne et al., 1999; Ormel, Oldehinkel, & Vollebergh, 2004).

Longitudinal research has often been suggested as the best method to explore causality (Bagby, Psych, Quilty, & Ryder, 2008) but prospective studies that have begun in adolescence or young adulthood are confounded because, for some, mood disorders become apparent before or during this life period (Kessler et al., 2005). A further problem with studying personality and mood disorders is that personality is not stable in adolescence and may not be so until approximately age 30 (Terracciano, Costa, & McCrae, 2006), which is after the median age of onset of depression.

In the previous chapter, and similar to other research findings (Hirano et al., 2002), I reported that harm avoidance and self-directedness were associated with depression severity and that changes in these two measures of personality after treatment for depression may be attributed to change in mood. The evidence outlined above for the role of the other TCI variables in depression and bipolar disorder was conflicting and warrants further investigation. Furthermore, self-directedness and harm avoidance are two domains where the scores of those who have recovered from depression frequently do not reflect scores in the healthy population (Halvorsen et al., 2009; Smith et al., 2005) which could be caused by scarring of mood disorder episodes or by having personality traits that make one vulnerable to mood disorders (Bagby et al., 2008; Klein et al., 2011).

7.3 Aims

Aim 1: To describe the demographic characteristics, personality characteristics, mood disorder history and current level of depression in the CHALICE sample.
Aim 2: To replicate the association of high harm avoidance and low self-directedness with lifetime mood disorder and explore the association of the other TCI scales in lifetime mood disorder.

Aim 3: To examine whether there are differences in TCI scale scores between those with lifetime depression and those with lifetime bipolar disorder.

Aim 4: To evaluate which TCI scales independently predicted depression.

Aim 5: To examine the association of current mood with TCI scale scores in the CHALICE sample, allowing for the presence of a lifetime mood disorder.

7.4 Methods

7.4.1 Overview

The data used for the analyses were from the CHALICE study described in Chapter 4.

7.4.2 Participants

There were 404 participants in the CHALICE study and the participation rate was 62%. From this sample 396 provided valid TCI personality data. Four individuals did not complete the TCI and a further four completed the TCI but did not accurately complete 50% or more of the validity items. Those without valid TCI data were excluded from all analyses.

7.4.3 Procedure

7.4.3.1 Assessment and measures

As described in Chapter 4, in the week previous to their appointment participants were asked to complete some questionnaires at home, including the short TCI-R (Cloninger, 1999) and the Short Form-36 version 2 (SF-36v2, Ware J.E. et al., 2000; Ware & Sherbourne, 1992; Ware et
al., 2007). The SF-36v2 was described in detail in Chapter 5. At the assessment a dedicated interviewer collected demographic data from the participants and assessed their mental health using the Mini International Neuropsychiatric Interview (MINI, Amorim et al., 1998).

7.4.3.2 Definitions of mood disorders

Mood disorders are mental disorders characterised by episodes of mood disturbance. Mood can be depressed, as with major depressive disorder (MDD), and it can also be irritable or elevated as it is, for example, in mania. The lifetime prevalence of mood disorders is approximately one in five (Kessler et al., 2005; Oakley Browne, Wells, Scott, & (eds), 2006) and the median age of onset is around 30 years of age (Kessler et al., 2005; Oakley Browne et al., 2006). By the age of 49 years 75% of those who will experience a lifetime mood disorder will have already developed the disorder (Oakley Browne et al., 2006).

A widely used diagnostic system is the Diagnostic and Statistical Manual of Mental Disorders (DSM). The 5th edition (DSM-5, American Psychiatric Association, 2013) was introduced in 2013, but has many similarities to the 4th edition (DSM-IV-TR, American Psychiatric Association, 2000). Likewise the depression criteria of DSM-III-R described in Chapter 6 is essentially the same as the criteria described here for DSM-IV-TR. The data in the CHALICE study was collected using DSM-IV-TR and below are the definitions for the disorders.

Major depressive disorder

Major depressive disorder is characterised by having one or more major depressive episodes (MDE) without mania or hypomania. There are two core symptoms of MDE, at least one of which must be experienced all or most of the day for at least two weeks. The core symptoms are depressed mood and/or lack of interest or pleasure in daily activities. Additionally, those with MDE may experience some or all of the following; significant change in weight or appetite, sleep disruption, psychomotor disturbance, loss of energy, feelings of worthlessness
or guilt, lack of concentration or indecisiveness or suicidal thoughts (American Psychiatric Association, 2000). The diagnostic criteria is met if five or more of the symptoms above are experienced over the same two week period or more, one of which must be one of the two core symptoms. If the symptoms are related to a bereavement then criteria is met if the duration is two months or more. The major change to depressive disorders in DSM-5 (American Psychiatric Association, 2013) was to remove the bereavement exclusion. Most of the symptoms have to be present every day or nearly every day. The lifetime risk of MDD is between 10% and 25% for women and between 5% and 12% for men (American Psychiatric Association, 2000).

**Dysthymic disorder**

Dysthymic disorder (DD) is a chronic type of depression, the symptoms of which must be present most of the day, on more days than not for two years or more. The symptoms are similar to MDD but they are less severe. The criteria for DD are depressed mood for most of the day, on more days than not and two or more of the following symptoms; overeating or reduced appetite, under or over sleeping, low energy, low self-esteem, poor concentration or difficulty with decision making and feeling hopeless (American Psychiatric Association, 2000). In this project those experiencing a current MDE are classified as such even if dysthymia is present as well. The lifetime prevalence for DD is lower than for MDD at about 6% (American Psychiatric Association, 2000). In DSM-5 (American Psychiatric Association, 2013) dysthymia was renamed as persistent depressive disorder.

**Bipolar disorder**

The essential feature of bipolar disorder is a history of mania or hypomania. DSM-IV (TR) (American Psychiatric Association, 2000) listed four bipolar disorder (BD) diagnoses; bipolar I,
bipolar II, cyclothymia and bipolar disorder not otherwise specified:

- Bipolar I: at least one manic episode, depression is often featured but not necessary for diagnosis.
- Bipolar II: One or more hypomanic episode with one or more MDE.
- Bipolar NOS: One or more brief hypomanic episode with one or more MDE.

A manic episode is defined as a period of seven days or more of feeling an abnormally elevated energy level. The core symptom is feeling elevated, expansive or irritable in mood (American Psychiatric Association, 2000). Additionally, three or more of the following symptoms must be present or four symptoms if the mood is only irritable; exaggerated self-esteem or grandiosity, needing less sleep, talkativeness, racing thoughts, being easily distracted, physical restlessness and engagement in pleasurable activities (such as spending sprees or sexual indiscretions) to the point that the consequences of the activity are ignored (American Psychiatric Association, 2000). If an individual is hospitalised because of their symptoms then the criteria of seven days duration need not be met. The episode must cause significant impairment to be diagnosed as manic.

For hypomania the symptoms are the same and there is definite change in functioning but the duration of the episode is shorter (four days or more) and the episode does not have to cause significant impairment (American Psychiatric Association, 2000). Those with hypomania who experience psychosis are classified as having mania. A brief hypomanic episode does not have to cause impairment and it can be two to three days in duration but it must be recurring to be classified as BD. A mixed episode features both manic episode and MDE, however the two week duration period of MDE does not have to be met. The episode should be present nearly every day during at least a one week period and does have to cause impairment.
In the CHALICE study the MINI was adapted to assess recurrent brief hypomanic episodes (defined as any hypomanic episode that lasted for one to four days and there was no impairment). Those participants that reported any type of manic episode, including recurrent brief hypomanic episodes, were classified as having bipolar disorder.

In DSM-5 (American Psychiatric Association, 2013) the core symptom of change in mood has been expanded to include changes in activity and energy as well as mood. For bipolar I the requirement that full criteria for both mania and major depressive episode be met has been replaced with a ‘mixed features’ specifier. Additionally, those who have past history of major depressive disorder who do not meet the duration criteria for hypomania of four days can be diagnosed under “other specified bipolar and related disorder” (pg. 148) if the hypomanic episode has lasted only two or three days (American Psychiatric Association, 2013).

7.4.3.3 Missing data

For the 396 participants with valid TCI data there were some items of missing data for the other variables. Some missing items in the diagnostic interview were because of interviewer error whereas, for household income, the participants were unsure of the collective income for all family members. The number of participants missing data for the diagnostic interview (MINI) were four in the dysthymia section and two in the mania section. For the demographic data there were 12 participants with missing data for household income.

7.4.3.4 Statistical analyses

Data from the study were transferred to SPSS version 22 (IBM, Released 2013) for statistical analyses. For the demographic data participants were split into three groups by ELSI_{SF} score; 0-16 (low standard of living, hardship), 17-24 (medium standard of living, comfortable) and scores of 25 or above (socio-economically good or very good). For yearly household income participants were grouped as follows: low (less than NZ$ 5,000-50,000), medium (NZ$ 50,001-
100,000) and high (NZ$ 100,001-150,001 or more). The CHALICE sample were compared to data from the 2006 New Zealand census data where possible (Statistics New Zealand, 2013) and, for psychiatric morbidity, to the 2006 New Zealand Mental Health Survey (NZMHS, Oakley Browne et al., 2006). To compare TCI scores for different demographic groups independent samples t-test and one-way between groups ANOVA were used.

Differences in personality measures between those with and without mood disorder were assessed using independent samples t-test. Cohen’s d was calculated using an online effect size calculator (Becker, 2000). For all other group difference tests one-way between groups ANOVA with Tukey’s HSD post-hoc test were used. A one-way ANCOVA was used to test whether lifetime bipolar and depression groups were still different on selected TCI scales after controlling for symptoms. To predict lifetime depression (dependent variable) those with lifetime bipolar disorder (n=21) were removed from the sample and binary logistic regression was used. The seven TCI scales (independent variables) were converted to z scores. Each TCI scale was entered separately for the univariate analysis and in one block for the multivariate analysis.

For the analyses to examine the association of TCI and current mood, and to allow for current comorbidities, the participants were split into two groups; asymptomatic and symptomatic. Comorbidity and symptom overlap of mood disorders with other mental disorders is common (Hirschfeld, 2001) but it is beyond the remit of this thesis. Based on the recommendation of Ware et al. (2007, pg. 75) participants were considered symptomatic if they scored less than 47 on the SF-36v2 mental component summary score. Linear regression was used to predict TCI scores from current symptoms and lifetime mood disorder diagnosis.
7.5 Results

7.5.1 Participants and sample demographic characteristics

The participants were 396 individuals with complete personality data who were participating in the CHALICE study. Table 7.1 presents the baseline demographic characteristics of the CHALICE sample compared to the 2006 New Zealand census data (Statistics New Zealand, 2013) for a similar age group living in the Canterbury region. In the CHALICE study there was a slightly higher percentage of females, home-owners and the percentage of people with a low living standard was slightly lower in the CHALICE sample. For education the CHALICE sample was under represented in none and secondary school qualifications and over represented in postsecondary qualifications or university degree. Māori were over-represented in the CHALICE study reflecting the sampling strategy.
Table 7.1

**CHALICE sample demographic characteristics and New Zealand Census data 2006**

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<td>Yes</td>
<td>306</td>
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<td>Home owner:</td>
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<td>No</td>
<td>70</td>
</tr>
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<td>Yes</td>
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<tr>
<td>University degree</td>
<td>72</td>
</tr>
</tbody>
</table>

ELSI<sub>sf</sub>: Economic Living Standard Index Short Form. n/a: not available. * 12 items of missing data

7.5.2 CHALICE sample demographic characteristics and TCI measures

The TCI scores for the CHALICE sample by demographic groupings are shown in Table 7.2.

Compared to men, women reported being considerably more harm avoidant, reward dependent, cooperative and self-transcendent but had lower persistence scores. Ethnicity differences were that Māori described themselves as being higher in persistence and self-transcendence. Those who were married had considerably higher self-directedness and were to some extent lower in novelty seeking and self-transcendence than those who were not
married or were not living with someone for more than a year. Homeowners reported slightly less novelty seeking, more self-directedness and marginally more cooperativeness.

Some of the largest mean differences in scores were seen in the living standard groups. The difference in harm avoidance means between those with the lowest or highest living standards was 12.0 ($p<.001$). Those with a medium standard of living had significantly lower harm avoidance than those with low standards of living (mean difference: 6.4, $p<.05$), and significantly higher harm avoidance scores than those with a high standard of living (mean difference: 5.5, $p<.001$). For persistence, scores were significantly higher in the high standard of living group compared to the low group (mean difference: 5.3, $p<.05$). Self-directedness scores differed significantly across all three groups ($p<.001$); as living standard got higher so did self-directedness with the largest mean difference being between low and high standard of living (mean difference: 13.9). Self-transcendence scores were significantly different between medium and high standard of living groups ($p<.01$) with the higher group scoring less on the self-transcendence scale (mean difference: 3.7). The between group differences in TCI scores for household income were largely comparable to those seen for standard of living but with less magnitude. Notably, for harm avoidance scores, low and medium household income were not significantly different and for self-directedness scores the difference between low and medium household income just reached significance (mean difference: 3.9, $p<.05$).
Table 7.2

**CHALICE sample demographic characteristics by TCI scale**

<table>
<thead>
<tr>
<th></th>
<th>NS</th>
<th>HA</th>
<th>RD</th>
<th>PS</th>
<th>SD</th>
<th>CO</th>
<th>ST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Total sample</td>
<td>396</td>
<td>100</td>
<td>54.6</td>
<td>7.9</td>
<td>56.0</td>
<td>12.4</td>
<td>66.2</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>185</td>
<td>46.7%</td>
<td>54.4</td>
<td>7.8</td>
<td>53.0***</td>
<td>11.3</td>
<td>62.4***</td>
</tr>
<tr>
<td>Female</td>
<td>211</td>
<td>53.3%</td>
<td>54.7</td>
<td>8.1</td>
<td>58.6***</td>
<td>12.7</td>
<td>69.5***</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Māori</td>
<td>337</td>
<td>85.1%</td>
<td>54.4</td>
<td>8.0</td>
<td>56.3</td>
<td>12.4</td>
<td>66.4</td>
</tr>
<tr>
<td>Māori</td>
<td>59</td>
<td>14.9%</td>
<td>55.5</td>
<td>7.7</td>
<td>54.2</td>
<td>12.0</td>
<td>64.7</td>
</tr>
<tr>
<td><strong>Married</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>90</td>
<td>22.7%</td>
<td>56.3*</td>
<td>8.3</td>
<td>58.1</td>
<td>13.0</td>
<td>65.9</td>
</tr>
<tr>
<td>Yes</td>
<td>306</td>
<td>77.3%</td>
<td>54.1*</td>
<td>7.8</td>
<td>55.4</td>
<td>12.1</td>
<td>66.2</td>
</tr>
<tr>
<td><strong>Home owner</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>70</td>
<td>17.7%</td>
<td>56.6*</td>
<td>9.5</td>
<td>57.9</td>
<td>13.1</td>
<td>65.1</td>
</tr>
<tr>
<td>Yes</td>
<td>326</td>
<td>82.3%</td>
<td>54.1*</td>
<td>7.5</td>
<td>55.6</td>
<td>12.2</td>
<td>66.4</td>
</tr>
<tr>
<td><strong>Living standard</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>26</td>
<td>6.6%</td>
<td>57.3</td>
<td>7.8</td>
<td>65.5***</td>
<td>14.4</td>
<td>66.8</td>
</tr>
<tr>
<td>Medium</td>
<td>121</td>
<td>30.6%</td>
<td>54.6</td>
<td>8.2</td>
<td>59.1***</td>
<td>12.7</td>
<td>65.6</td>
</tr>
<tr>
<td>High</td>
<td>249</td>
<td>62.9%</td>
<td>54.3</td>
<td>7.8</td>
<td>53.5***</td>
<td>11.2</td>
<td>66.4</td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>68</td>
<td>17.7%</td>
<td>55.7</td>
<td>9.0</td>
<td>60.5***</td>
<td>13.4</td>
<td>66.6</td>
</tr>
<tr>
<td>Medium</td>
<td>144</td>
<td>37.5%</td>
<td>54.0</td>
<td>7.3</td>
<td>57.8***</td>
<td>11.9</td>
<td>65.3</td>
</tr>
<tr>
<td>High</td>
<td>172</td>
<td>44.8%</td>
<td>54.5</td>
<td>8.1</td>
<td>52.7***</td>
<td>11.6</td>
<td>66.6</td>
</tr>
<tr>
<td>Education</td>
<td>N</td>
<td>%</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>-----------------</td>
<td>----</td>
<td>-----</td>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>No qualifications</td>
<td>51</td>
<td>12.9%</td>
<td>56.8</td>
<td>6.7</td>
<td>57.5</td>
<td>14.2</td>
<td>64.3</td>
</tr>
<tr>
<td>Secondary school</td>
<td>106</td>
<td>26.8%</td>
<td>54.3</td>
<td>8.2</td>
<td>57.0</td>
<td>12.9</td>
<td>67.2</td>
</tr>
<tr>
<td>Post-secondary</td>
<td>167</td>
<td>42.2%</td>
<td>54.2</td>
<td>8.1</td>
<td>55.9</td>
<td>12.0</td>
<td>65.8</td>
</tr>
<tr>
<td>University degree</td>
<td>72</td>
<td>18.2%</td>
<td>54.3</td>
<td>7.9</td>
<td>53.7</td>
<td>10.9</td>
<td>66.7</td>
</tr>
</tbody>
</table>

Significantly different mean scores are shown in **bold**. *p<.05, **p<.01, ***p<.001. * 12 items of missing data.
For education self-directedness showed the largest disparity between TCI scores. Those with a university degree were 8.4 points higher than those with no qualifications ($p<.001$). Other differences were between those with no and post-secondary qualifications (mean difference: 4.6, $p=.05$) and between those with secondary school qualifications compared to those with a university degree (mean difference: 5.0, $p<.05$). Despite the overall ANOVA model showing statistically significant differences, there were none between the education groups for cooperativeness.

### 7.5.3 Pearson correlations between temperament and character domains in the CHALICE sample

There were five noteworthy correlations shown in Table 7.3. The largest (-.63) was a negative correlation between harm avoidance and self-directedness. Cooperativeness correlated positively with reward dependence (.49) and self-directedness (.43). Persistence had a negative association with harm avoidance (-.42) and a positive association with self-directedness (.29).

<table>
<thead>
<tr>
<th></th>
<th>NS</th>
<th>HA</th>
<th>RD</th>
<th>PS</th>
<th>SD</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty seeking (NS)</td>
<td></td>
<td>-18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harm avoidance (HA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward dependence (RD)</td>
<td>.08</td>
<td>-21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistence (PS)</td>
<td>-01</td>
<td></td>
<td></td>
<td>-.42*</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>Self-directedness (SD)</td>
<td>-17</td>
<td>-.63*</td>
<td>.24</td>
<td></td>
<td>.29</td>
<td></td>
</tr>
<tr>
<td>Cooperativeness (CO)</td>
<td>-.15</td>
<td>-.22</td>
<td>.49*</td>
<td>.15</td>
<td></td>
<td>.43*</td>
</tr>
<tr>
<td>Self-transcendence (ST)</td>
<td>.21</td>
<td>-.03</td>
<td>.17</td>
<td>.11</td>
<td>-.08</td>
<td>.17</td>
</tr>
</tbody>
</table>

Bold indicates correlations >.25 and *indicates correlations >.40

### 7.5.4 Lifetime and current mood disorders in the CHALICE sample

The depression rates, shown in Table 7.4, were considerably higher in the CHALICE sample when compared to the New Zealand Mental Health Survey (NZMHS), a national morbidity survey.
carried out in 2006 (Oakley Browne et al., 2006). The current depression rates in CHALICE were
three percentage points higher than in the NZMHS (8.1% versus 5.2%) and this difference was
significant (p=.009). Additionally, the prevalence period for NZMHS was one year as opposed to
one month. Current bipolar was 2% in CHALICE and 1.4% in NZMHS but this was not significantly
different (p=.286).

The lifetime prevalence of depression in the CHALICE sample was 41.7%, for bipolar it was 5.3%,
therefore lifetime rates of mood disorder was 47%.

Table 7.4

**CHALICE sample MINI diagnoses**

<table>
<thead>
<tr>
<th></th>
<th>CHALICE Current</th>
<th>NZMH Survey 2006 45-64 years</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood disorders:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>8.1%</td>
<td>5.2%</td>
<td>.009**</td>
</tr>
<tr>
<td>Dysthymia</td>
<td>1.3%</td>
<td>1.2%</td>
<td>.890</td>
</tr>
<tr>
<td>Bipolar I</td>
<td>1.5%</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Bipolar II</td>
<td>0.3%</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Bipolar NOS</td>
<td>0.3%</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Bipolar total</td>
<td>2.0%</td>
<td>1.4%</td>
<td>.286</td>
</tr>
</tbody>
</table>

Significant p values are shown in **bold**

7.5.5 TCI measures and lifetime mood disorder

The mean TCI scales score for those with and without mood disorder are shown in Table 7.5. TCI
scores were significantly different between the two groups for novelty seeking, harm avoidance,
self-directedness and self-transcendence. Those with a mood disorder had significantly higher
scores in harm avoidance, self-transcendence (p<.001) and, to a lesser extent, novelty seeking
(p<.01). Self-directedness was significantly lower in the mood disorder group (p<.001). The effect
sizes show that for harm avoidance and self-directedness the magnitude of difference between
the groups were moderate, with Cohen’s d values of -0.52 and 0.59 respectively. For self-
transcendence Cohen’s $d$ was slightly lower (-0.41) and novelty seeking has the smallest effect size (0.30).

Table 7.5

**Personality Scores for CHALICE Study Participants by Lifetime Mood Disorder**

<table>
<thead>
<tr>
<th>Personality (TCI)</th>
<th>Total N=396</th>
<th>None n=210 (53%)</th>
<th>Lifetime n=186 (47%)</th>
<th>t</th>
<th>Cohen’s $d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>74.6 (11.3)</td>
<td>77.5 (9.9)</td>
<td>71.2 (11.9)</td>
<td>5.74**</td>
<td>0.59</td>
</tr>
<tr>
<td>HA</td>
<td>56.0 (12.4)</td>
<td>53.1 (10.7)</td>
<td>59.3 (13.3)</td>
<td>-5.07**</td>
<td>-0.52</td>
</tr>
<tr>
<td>ST</td>
<td>40.0 (11.4)</td>
<td>37.8 (11.0)</td>
<td>42.4 (11.4)</td>
<td>-4.01**</td>
<td>-0.41</td>
</tr>
<tr>
<td>NS</td>
<td>54.6 (7.9)</td>
<td>53.5 (7.3)</td>
<td>55.8 (8.5)</td>
<td>-2.92*</td>
<td>-0.30</td>
</tr>
<tr>
<td>RD</td>
<td>66.2 (10.4)</td>
<td>65.6 (11.0)</td>
<td>66.8 (9.6)</td>
<td>-1.25</td>
<td>-0.13</td>
</tr>
<tr>
<td>PS</td>
<td>69.4 (10.6)</td>
<td>69.6 (10.1)</td>
<td>69.1 (11.0)</td>
<td>0.54</td>
<td>0.06</td>
</tr>
<tr>
<td>CO</td>
<td>78.3 (8.6)</td>
<td>78.2 (8.7)</td>
<td>78.4 (8.5)</td>
<td>-0.28</td>
<td>-0.03</td>
</tr>
</tbody>
</table>

Significantly different mean scores are shown in **bold** *p<.01, **p<.001

7.5.6 TCI measures, lifetime depression and lifetime bipolar disorder

A comparison of the mean differences between TCI scale scores for no mood disorder, lifetime depression and lifetime bipolar for the four TCI scales that were shown to be significantly different in Table 7.5 are shown in Table 7.6. For self-directedness and harm avoidance, scores were significantly different between those with no mood disorder, depressed participants and bipolar participants. Self-directedness means were lower in the depressed group compared to the no mood disorder group and the bipolar group scored less than the depressed group. The opposite pattern was seen for harm avoidance; harm avoidance increased in the depressed group and increased again in the bipolar group. The effect sizes indicate that the differences between the groups were large for self-directedness ($\eta^2=.11$) and the greatest mean difference was between the no mood disorder group and the lifetime bipolar group (mean difference: 15.1).

Notably for self-directedness the mean difference between lifetime depression and lifetime bipolar was nearly twice that of the difference between the no disorder group and lifetime depression. The ANOVA model for harm avoidance had a moderate effect size ($\eta^2=.08$) and the
largest mean difference (12.0) was between the no mood disorder group and bipolar disorder group. Harm avoidance mean score differences between the no mood disorder group versus lifetime depression and lifetime depression versus bipolar disorder were very similar (-5.5 and -6.5 respectively). Results from the one-way ANCOVA (not shown in the table) revealed that self-directedness scores ($F=5.1, p=.007$, partial eta squared=.03) but not harm avoidance scores ($F=1.37, p=.257$, partial eta squared=.01) were significantly different between bipolar and depressed groups after controlling for symptoms.

Self-transcendence mean scores show a different pattern; the group with no mood disorders had significantly lower scores than both the lifetime depression group (mean difference: -4.0) and the lifetime bipolar group (mean difference: -9.0). Although not statistically significant the actual mean difference between the depression and bipolar groups was 5.0. For novelty seeking only the lifetime bipolar group score was significantly different from the other two groups. The effect sizes for novelty seeking and self-transcendence showed a moderate magnitude of effect.
Table 7.6

Mean Differences of Selected TCI Personality Scales for Lifetime Depression and Lifetime Bipolar Disorder.

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>ANOVA</th>
<th>Comparison group</th>
<th>post hoc p-value</th>
<th>Mean Difference</th>
<th>Lower CI</th>
<th>Upper CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=210) No mood disorder</td>
<td>(n=165) Lifetime depression</td>
<td>(n=21) Lifetime bipolar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>F=25.46</td>
<td>1 Vs 2</td>
<td>&lt;.001***</td>
<td>5.2</td>
<td>2.6</td>
<td>7.8</td>
</tr>
<tr>
<td>SD</td>
<td>77.5 (9.9)</td>
<td>72.3 (11.0)</td>
<td></td>
<td>1 Vs 3</td>
<td>&lt;.001***</td>
<td>15.1</td>
<td>9.4</td>
<td>20.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Vs 3</td>
<td>&lt;.001***</td>
<td>9.9</td>
<td>4.1</td>
<td>15.7</td>
</tr>
<tr>
<td>HA</td>
<td>53.1 (10.7)</td>
<td>58.6 (13.2)</td>
<td>F=16.12</td>
<td>1 Vs 2</td>
<td>&lt;.001***</td>
<td>-5.5</td>
<td>-8.4</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 Vs 3</td>
<td>&lt;.001***</td>
<td>-12.0</td>
<td>-18.4</td>
<td>-5.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Vs 3</td>
<td>.048*</td>
<td>-6.5</td>
<td>-13.0</td>
<td>0.0</td>
</tr>
<tr>
<td>ST</td>
<td>37.8 (11.0)</td>
<td>41.8 (11.2)</td>
<td>F=10.00</td>
<td>1 Vs 2</td>
<td>.002**</td>
<td>-4.0</td>
<td>-6.7</td>
<td>-1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 Vs 3</td>
<td>.001**</td>
<td>-9.0</td>
<td>-14.9</td>
<td>-2.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Vs 3</td>
<td>.134</td>
<td>-5.0</td>
<td>-11.0</td>
<td>1.1</td>
</tr>
<tr>
<td>NS</td>
<td>53.5 (7.3)</td>
<td>54.9 (7.9)</td>
<td>F=15.70</td>
<td>1 Vs 2</td>
<td>.192</td>
<td>-1.4</td>
<td>-3.3</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 Vs 3</td>
<td>&lt;.001***</td>
<td>-9.8</td>
<td>-13.9</td>
<td>-5.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Vs 3</td>
<td>&lt;.001***</td>
<td>-8.4</td>
<td>-12.6</td>
<td>-4.2</td>
</tr>
</tbody>
</table>

η²=eta squared, df= (2,393). *p<.05, **p<.01, ***p<.001
7.5.7 TCI measures as predictors of lifetime depression

The risk for lifetime depression (odds ratios) for each TCI scale using univariate and multivariate (adjusted p value) binary logistic regression are shown in Table 7.7. Each TCI scale was entered separately for the univariate analysis and in one block for the multivariate analysis. In the univariate regression there were three significant independent predictors of lifetime depression. The strongest predictor was harm avoidance; participants with higher harm avoidance were 1.62 times more likely to have lifetime depression (CI: 1.29-2.02). For self-directedness increasing scores indicated less likelihood of having lifetime depression (odds ratio: 0.58, 95% CI: 0.46-0.73). The weakest predictor was self-transcendence with an odds ratio of 1.44 (CI: 1.16-1.78). For the multivariate regression the results were very similar although the odd ratios and significance values were slightly weaker; harm avoidance was still the strongest predictor (OR 1.69, 95% CI: 1.21-2.37), followed by self-directedness (OR 0.66, 95% CI: 0.47-0.93), and self-transcendence was the weakest predictor (OR 1.33, 95% CI: 1.05-1.69).

Table 7.7

<table>
<thead>
<tr>
<th></th>
<th>OR</th>
<th>95% CI for OR</th>
<th>p-value</th>
<th>OR adjusted</th>
<th>p-value adjusted</th>
</tr>
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<tr>
<td>N=375</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Z SD</td>
<td>0.58</td>
<td>0.46</td>
<td>0.73</td>
<td>&lt;.001***</td>
<td>.018*</td>
</tr>
<tr>
<td>Z HA</td>
<td>1.62</td>
<td>1.29</td>
<td>2.02</td>
<td>&lt;.001***</td>
<td>.002**</td>
</tr>
<tr>
<td>Z ST</td>
<td>1.44</td>
<td>1.16</td>
<td>1.78</td>
<td>.001**</td>
<td>.017*</td>
</tr>
<tr>
<td>Z NS</td>
<td>1.22</td>
<td>0.98</td>
<td>1.51</td>
<td>.079</td>
<td>1.30</td>
</tr>
<tr>
<td>Z RD</td>
<td>1.13</td>
<td>0.92</td>
<td>1.38</td>
<td>.252</td>
<td>1.14</td>
</tr>
<tr>
<td>Z PS</td>
<td>0.96</td>
<td>0.78</td>
<td>1.18</td>
<td>.680</td>
<td>1.20</td>
</tr>
<tr>
<td>Z CO</td>
<td>1.04</td>
<td>0.84</td>
<td>1.28</td>
<td>.739</td>
<td>1.29</td>
</tr>
</tbody>
</table>

OR= odds ratio. Significant p-values are shown in **bold** *p<.05, **p<.01, ***p<.001*
7.5.8 TCI measures, current mental state and lifetime mood disorder

To clarify which TCI variables were related to diagnosis and/or symptoms the sample was split into four groups by symptoms and lifetime mood disorder (Table 7.8). Those who scored <47 on the SF-36v2 mental component summary score were considered as having symptoms. Significant self-directedness mean differences were seen across all groups (p<.001) although it was weaker between the asymptomatic groups one and two (p=.026). From the group with no symptoms and no mood disorders to the group with both symptoms and a lifetime mood disorder there was a consistent decrease in self-directedness scores and the effect size was large (η²=.19). The largest mean difference of 12.3 points was seen between the no symptoms and no mood disorders to the group with both symptoms and a mood disorder. Harm avoidance shows a similar pattern of increasing scores across the groups with a large effect size (η²=.15). Those with no symptoms but who did have a mood disorder, had a higher TCI harm avoidance score compared to the those with no symptoms or mood disorder (mean difference of 3.7) but this did not reach statistical significance (p=.052). The other noteworthy difference was between the group who had a lifetime mood disorder and were not symptomatic and those who did not have a mood disorder but did have symptoms (mean difference: -5.1) but, because of the differences in sample size, this did not reach significance.

The results for self-transcendence means showed that the asymptomatic group with no mood disorder (Group 1) had significantly lower scores than both groups with mood disorders; those with a mood disorder and no symptoms (Group 2, mean difference: -4.5) and those with a mood disorder and symptoms (Group 4, mean difference: -5.0). The effect size was medium (η²=.04). Despite the model being significant, there were no significant differences between the groups for novelty seeking. Additionally, there were no significant differences in means for reward dependence, persistence and cooperativeness.
For the SF-36v2 mental summary score the significant mean differences were all large (> 10.0 points) because this was how the groups were defined. The two groups with symptoms showed a significant difference (mean difference: 5.5) but there was no statistical difference between the asymptomatic groups (Groups 1 and 2).

Multiple regression was performed to investigate whether symptoms or diagnosis were able to predict TCI scores. In Table 7.9 self-directedness was predicted by symptoms ($\beta = 0.47$, $p<.001$), and, to a lesser extent, by lifetime diagnosis of mood disorder ($\beta = 0.11$, $p<.022$). Harm avoidance was predicted by symptoms only ($\beta = -0.47$, $p<.001$). Both self-transcendence and novelty seeking were predicted by lifetime diagnosis ($\beta = -0.19$, $p<.001$ and $\beta = -0.14$, $p<.008$ respectively).
Table 7.8

**Significant Mean Differences of Selected TCI Personality Scales for Asymptomatic and Symptomatic CHALICE Study Participants with and without Lifetime Mood Disorder**

<table>
<thead>
<tr>
<th>TCI Scale</th>
<th>Asymptomatic</th>
<th>Symptomatic</th>
<th>ANOVA</th>
<th>Tukey's post hoc</th>
<th>Mean Difference</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (n=176)</td>
<td>78.8 (9.3)</td>
<td>70.8 (10.1)</td>
<td>(F=29.70)</td>
<td>1 Vs 2</td>
<td>.026*</td>
<td>3.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Yes (n=100)</td>
<td>75.2 (10.9)</td>
<td>66.5 (11.4)</td>
<td>(p&lt;.001***)</td>
<td>1 Vs 3</td>
<td>&lt;.001***</td>
<td>8.1</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(\eta^2=.19)</td>
<td>1 Vs 4</td>
<td>&lt;.001***</td>
<td>12.3</td>
<td>8.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Vs 4</td>
<td>&lt;.001***</td>
<td>8.7</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>HA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (n=176)</td>
<td>51.7 (10.5)</td>
<td>63.9 (13.0)</td>
<td>(F=23.96)</td>
<td>1 Vs 2</td>
<td>.052</td>
<td>-3.7</td>
<td>-7.4</td>
</tr>
<tr>
<td>Yes (n=100)</td>
<td>55.4 (12.3)</td>
<td>60.5 (8.8)</td>
<td>(p&lt;.001***)</td>
<td>1 Vs 3</td>
<td>&lt;.001***</td>
<td>-8.8</td>
<td>-14.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(\eta^2=.15)</td>
<td>1 Vs 4</td>
<td>&lt;.001***</td>
<td>-12.2</td>
<td>-16.1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Vs 4</td>
<td>&lt;.001***</td>
<td>-8.5</td>
<td>-12.9</td>
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<tr>
<td><strong>ST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (n=176)</td>
<td>37.6 (10.6)</td>
<td>42.6 (11.5)</td>
<td>(F=5.51)</td>
<td>1 Vs 2</td>
<td>.008**</td>
<td>-4.5</td>
<td>-8.1</td>
</tr>
<tr>
<td>Yes (n=100)</td>
<td>42.1 (11.4)</td>
<td>38.8 (12.8)</td>
<td>(p=.001**)</td>
<td>1 Vs 4</td>
<td>.004**</td>
<td>-5.0</td>
<td>-8.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(\eta^2=.04)</td>
<td>all</td>
<td>ns</td>
<td></td>
<td></td>
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<tr>
<td><strong>NS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (n=176)</td>
<td>53.6 (7.1)</td>
<td>53.1 (8.1)</td>
<td>(F=2.94)</td>
<td>all</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n=100)</td>
<td>56.0 (8.5)</td>
<td>55.6 (8.5)</td>
<td>(p=.033*)</td>
<td>all</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(\eta^2=.02)</td>
<td></td>
<td>ns</td>
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</tr>
</tbody>
</table>

Symptomatic group score <47 on SF-36v2 mental summary. *\(p<.05\), **\(p<.01\), ***\(p<.001\) \(\eta^2=eta\ squared, df= (3,392), ns=not significant.**
Table 7.9

Regression model of Selected TCI scales (dependent variable), current symptoms and lifetime mood disorder.

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>R²</th>
<th>B</th>
<th>SE B</th>
<th>95% CI for B Lower Limit</th>
<th>Upper Limit</th>
<th>β</th>
<th>p value</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-Directedness:</strong></td>
<td>.52</td>
<td>.27***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF-36v2 MSS</td>
<td></td>
<td></td>
<td>0.54</td>
<td>0.05</td>
<td>0.44</td>
<td>0.65</td>
<td>0.47</td>
<td>.000***</td>
</tr>
<tr>
<td>Lifetime mood disorder</td>
<td></td>
<td></td>
<td>-2.41</td>
<td>1.05</td>
<td>-4.47</td>
<td>-0.35</td>
<td>-0.11</td>
<td>.022*</td>
</tr>
<tr>
<td><strong>Harm Avoidance:</strong></td>
<td>.51</td>
<td>.26***</td>
<td></td>
<td></td>
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<tr>
<td>SF-36v2 MSS</td>
<td></td>
<td></td>
<td>-0.60</td>
<td>0.06</td>
<td>-0.71</td>
<td>-0.48</td>
<td>-0.47</td>
<td>.000***</td>
</tr>
<tr>
<td>Lifetime mood disorder</td>
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<td></td>
<td>1.86</td>
<td>1.16</td>
<td>-0.41</td>
<td>4.14</td>
<td>0.08</td>
<td>.109</td>
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<tr>
<td><strong>Self-Transcendence:</strong></td>
<td>.20</td>
<td>.04***</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SF-36v2 MSS</td>
<td></td>
<td></td>
<td>-0.04</td>
<td>0.06</td>
<td>-0.16</td>
<td>0.09</td>
<td>-0.03</td>
<td>.574</td>
</tr>
<tr>
<td>Lifetime mood disorder</td>
<td></td>
<td></td>
<td>4.28</td>
<td>1.21</td>
<td>1.89</td>
<td>6.66</td>
<td>0.19</td>
<td>.000***</td>
</tr>
<tr>
<td><strong>Novelty Seeking:</strong></td>
<td>.15</td>
<td>.02*</td>
<td></td>
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<tr>
<td>SF-36v2 MSS</td>
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<td></td>
<td>-0.01</td>
<td>0.04</td>
<td>-0.09</td>
<td>0.08</td>
<td>-0.01</td>
<td>.872</td>
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<tr>
<td>Lifetime mood disorder</td>
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<td>2.28</td>
<td>0.85</td>
<td>0.60</td>
<td>3.96</td>
<td>0.14</td>
<td>.008**</td>
</tr>
</tbody>
</table>

MSS: mental summary score. Statistical significance: *p<.05, **p<.01; ***<.001

7.6 Discussion

7.6.1 CHALICE sample discussion

On the whole the demographic characteristics of the CHALICE sample are comparable to those of a similar age group, living in the same area. There were two main points of difference between the CHALICE sample and the NZ census data (Statistics New Zealand, 2013). There were more home owners in the CHALICE sample and they were better educated. The significant difference in the clinical characteristics of the CHALICE sample compared to the
NZMHS were that there were more participants with current depression. There may be a number of reasons for the clinical difference between the two groups. The impact of earthquakes on the mental health of a subset of this cohort were discussed in Chapter 5 and the higher than expected rates of depression seen here may be due to earthquake stress. Rates of bipolar in CHALICE were higher, but not significantly, than those seen in the NZMHS. The NZMHS comparison group (Oakley Browne et al., 2006) is historical rather than current and it is a national sample rather than a local sample. The two studies used diverse methods for collecting the clinical data, i.e. the (MINI, Sheehan et al., 1998), used in CHALICE as opposed to Composite International Diagnostic Interview 3.0 (Kessler et al., 2004) used in the NZMHS. The CHALICE study used recurrent brief hypomanic episodes as inclusion criteria for bipolar which the comparison study did not. Also, the NZMHS had a different prevalence period and age group, making strictly meaningful comparisons difficult.

There were significant differences in TCI scales for gender. Compared to men, women had higher harm avoidance, reward dependence, cooperativeness and self-transcendence scores. These differences have been reported elsewhere (Al-Halabi et al., 2010; de la Rie, Duijsens, & Cloninger, 1998). Some studies also report higher novelty seeking in males (Cloninger et al., 1991; Gutierrez-Zotes et al., 2004) but this was not detected in this sample. Novelty seeking declines with age (Mendlowicz et al., 2000) and does so to a greater degree for men compared to women (Al-Halabi et al., 2010). The lack of difference in novelty seeking scores seen here may be because this sample is older and essentially controlled for age.

For living standard and household income, harm avoidance scores were higher as living standard and income decreased and the opposite pattern was seen for self-directedness. These associations have been reported before (Sovio et al., 2007). Harm avoidance is associated with caution, worry, decreased energy and fear and these traits may inhibit achieving a higher income or living standard. Self-directedness and harm avoidance are
strongly and inversely correlated, especially in this sample (see below) so it was not surprising to see the opposite effect happening in self-directedness. The qualities of high self-directedness (responsible, purposeful, mature and resourceful) are more likely to result in achieving personal goals compared to low scorers and this success may be reflected in socio-economic measures. Similarly, in the CHALICE study those with a higher level of self-directedness achieved a higher level of education in agreement with strong correlations seen between years of education, intelligence and self-directedness (Cloninger et al., 1994). The other notable difference in scores for sociodemographic groups were seen for marriage, married participants had higher self-directedness.

The correlations between the seven TCI scales in the CHALICE sample were similar to those described by many others (Cloninger et al., 1993; Dzamonja-Ignjatovic, Svrakic, Svrakic, Jovanovic, & Cloninger, 2010; Farmer & Goldberg, 2008b; Fountoulakis et al., 2015; Jaksic et al., 2015). There were small differences in the strength of two of the associations; harm avoidance correlations with persistence and self-directedness were stronger in the CHALICE sample compared to Cloninger’s sample (Cloninger et al., 1993).

7.6.2 TCI correlates of lifetime mood disorder

The association between lifetime mood disorder and personality measures of high harm avoidance and low self-directedness have been confirmed in this study of 50 year olds from the general population. Low self-directedness has been associated with mood disorder in many previous studies (Engström et al., 2004a; Farmer et al., 2003; Loftus et al., 2008; Nowakowska et al., 2005) and Fassino et al., (2013) proposes that this trait and high harm avoidance may be a core of mental illness.

Self-transcendence scores were higher in those with a lifetime mood disorder. Other studies have also found higher self-transcendence in depressed participants when compared to
healthy controls (Celikel et al., 2009; Hansenne & Bianchi, 2009; Hansenne et al., 1999; Nery et al., 2009) although some studies report no difference (Halvorsen et al., 2009; Kimura et al., 2000).

There were no significant differences in the TCI scales of reward dependence, persistence or cooperativeness in this study. Generally previous studies have also found no associations between mood disorders and reward dependence or persistence (Engström et al., 2004a; Farmer et al., 2003; Nery et al., 2008; Smith et al., 2005) but reports of lower cooperativeness have been fairly consistent (Farmer et al., 2003; Hansenne & Bianchi, 2009; Hirano et al., 2002; Hur & Kim, 2009; Kimura et al., 2000; Nery et al., 2009). It is possible that previous findings of low cooperativeness are linked to specific highly anxious sub types of depression (De Winter et al., 2007; Goekoop et al., 2008), heterogeneous samples especially with regard to age (Smith et al., 2005) or differences between out-patient or in-patient samples (Celikel et al., 2009).

7.6.3 Personality differences between major depressive disorder and bipolar disorder

There were TCI scale differences for lifetime depression and lifetime bipolar disorder. High novelty seeking was clearly associated with bipolar disorder whereas high self-transcendence was linked with both disorders. Those with lifetime bipolar had significantly higher harm avoidance and lower self-directedness scores than those with lifetime depression but, after controlling for symptoms, the difference in harm avoidance was no longer significant.

Those with lifetime bipolar disorder scored considerably less (10 point difference) on self-directedness than those with lifetime depression. This result is not in agreement with most previous studies (Harley et al., 2011; Jylhä et al., 2011; Zaninotto et al., 2015). Zaninotto et al. (2015) did not find a significant difference in self-directedness scores between patients with major depressive disorder and those with bipolar I or II. In this sample just under 50% of the
bipolar group had a current episode and this may have been a factor in that group reporting lower self-directedness because, as noted in the previous chapter, current symptoms were likely to result in lower scores. However, after controlling for symptoms, self-directedness scores between the depressed and bipolar group were still significantly different. Another explanation is that Zanianotto’s et al. (2015) sample of depressed patients may have been experiencing more severe depression than the community sample used here. In the previous study worse depression severity was associated with lower self-directedness scores.

High novelty seeking in bipolar disorder has been reported before (Nery et al., 2008; Nowakowska et al., 2005; Olvera et al., 2009) although not all studies report this association (Engström et al., 2004a; Loftus et al., 2008; Sasayama et al., 2011; Sayın, Kuruoğlu, Güleç, & Aslan, 2007). In the CHALICE sample most of the bipolar group were bipolar I and just over a third were currently experiencing symptoms. The studies that report no association between novelty seeking and bipolar used euthymic bipolar samples (Engström et al., 2004a; Loftus et al., 2008; Sayın et al., 2007) or bipolar II participants (Sasayama et al., 2011). It is possible that high novelty seeking is associated with bipolar only when symptoms are current or that it is a feature exclusive to bipolar I, although other research has found no differences in novelty seeking between bipolar I and bipolar II participants (Jylhä et al., 2011; Zaninotto et al., 2015).

In the CHALICE sample it was not possible to separate out those with and without current symptoms because the sample sizes were too small. Other differences seen in novelty seeking scores relate to age, it decreases as people get older (Cloninger et al., 1991; Mendlowicz et al., 2000), and one study has reported higher novelty seeking in men (Cloninger et al., 1991) but it is not related to other sociodemographic factors (Mendlowicz et al., 2000). In the CHALICE sample all participants were approximately 50 years old and there were no gender or sociodemographic differences in novelty seeking for the whole sample, therefore these factors were highly unlikely to be influencing the novelty seeking score.
Similarly, in bipolar disorder there have been mixed results regarding self-transcendence. The finding that self-transcendence was higher in both the bipolar group and in those with depression does not replicate the findings of other research that self-transcendence is specific to bipolar disorder (Harley et al., 2011; Jylhä et al., 2011). However, the results here and in the previous study agree with earlier studies that self-transcendence is not related to the severity of depression (Hirano et al., 2002) but appears to be a trait marker for depression (Hansenne & Bianchi, 2009) and, in this study, for bipolar disorder. Cloninger has suggested that high self-transcendence is linked to creativity in bipolar subjects (Kitamura & Cloninger, 2011) however, in this sample it is more likely that in the context of low self-directedness, high self-transcendence is a maladaptive personality trait that may be linked to subthreshold thought disorder or mild hypomanic symptoms (Cloninger et al., 1993).

Harm avoidance, self-directedness and self-transcendence were all independent predictors of lifetime depression in both univariate and multivariate analyses, although the effect was slightly weaker in the multivariate regression. Self-transcendence was the weakest predictor but remained significant even after adjusting for the other TCI variables indicating that it makes a unique contribution to predicting lifetime depression.

7.6.4 The impact of mood state on associations between personality and mood disorders

There was a differential impact of mood on the associations of personality and mood disorders. Self-directedness was related to both symptoms and diagnosis of lifetime mood disorder. Harm avoidance was also highly related to symptoms but not related to having a diagnosis. Self-transcendence was associated with a diagnosis of lifetime mood disorder but not to symptoms.
Self-directed behaviour (autonomy, self-esteem, self-reliance etc.) will be difficult to achieve while in a depressive episode and the results here indicate that, even when symptoms have subsided, people with a diagnosis of mood disorder were not achieving the same level of self-directedness as those without. This may be because of sub-syndromal or residual symptoms, scarring from mood disorders or it may indicate a personality risk factor for mood disorders, that is, incomplete character development.

High harm avoidance was highly related to symptoms, this is in agreement with the results of the previous study and other studies which show that change in personality can be attributed to mood improvement (Bayon et al., 1996; Brown et al., 1992; Cloninger et al., 1998; Farmer et al., 2003; Hansenne et al., 1999; Naito et al., 2000; Peirson & Heuchert, 2001; Richter et al., 2000a). This finding is also consistent with studies using personality inventories other than the TCI which have associated negative affect and current mood state (Costa et al., 2005; Larsen & Ketelaar, 1991). It may be that harm avoidance is a reflection of mood state and is not a trait marker for mood disorders. However, a sib-pair study by A. Farmer et al. (2003) showed that never depressed siblings of depressed patients have higher harm avoidance scores than those of controls, indicating that it is a mix of state and trait. Self-directedness, while highly related to mood state, was also related to a lifetime diagnosis. The simplest explanation is that low self-directedness is a risk factor for mood disorder, although there is the possibility that low self-directedness is a ‘scarring’ outcome from past depressive episodes. Novelty seeking and self-transcendence have no relationship to mood, but were highly related to lifetime diagnosis.

In the symptomatic group it was clear from the SF-36v2 mental summary score that those with a lifetime mood disorder diagnosis were experiencing a greater severity of symptoms than those without a diagnosis of mood disorder. In the asymptomatic group this was not the case. This suggests that repeated episodes of mood disorder do not cause a vulnerability to mood
disorders or have a scarring effect. If there was vulnerability or scarring effect, those who have a lifetime mood disorder but were not currently experiencing symptoms would have had significantly higher harm avoidance and lower self-directedness scores than those who had neither a lifetime diagnoses nor symptoms. It is also interesting that there was a group in this sample who did not have a lifetime mood disorder but were experiencing significant symptoms. The SF-36v2 mental summary score of the symptomatic, lifetime mood disorder group is what one would expect to see in those currently experiencing depression (Ware et al., 2007).

7.6.5 Limitations

There are some limitations with the current study. The restricted age range of the sample may mean that the results are only applicable to this age group. The participants were randomly selected from the community and therefore may represent those with a less severe manifestation of mood disorders compared to studies that use in-patient groups. Some of the sample had current mood disorder symptoms which may have affected their responses to the TCI as some of the seven TCI scales are known to be affected by mood state. However, separating the group into those who were symptomatic compared to those who were not effectively controlled for mood state and revealed the same group differences with the exception of novelty seeking. The bipolar group had low sample numbers meaning findings should be interpreted cautiously. All measures were self-report which is open to perceptual bias and the data were cross-sectional so causation cannot be established.

7.7 Conclusions

This study replicated the association of low self-directedness with lifetime mood disorders. Self-directedness was highly related to both symptoms and to diagnosis of lifetime mood disorder suggesting that it is a risk factor for mood disorders. Furthermore, self-directedness
was an independent predictor of depression and was significantly lower in lifetime bipolar compared to lifetime depression. Harm avoidance was highly related to symptoms, perhaps not related to diagnosis, independently predicts lifetime depression and was higher in those with lifetime bipolar compared to those with lifetime depression (but not after controlling for symptoms).

For the other TCI scales the significant findings were that self-transcendence was associated with both depression and bipolar disorder and independently predicted depression. Bipolar disorder was associated with higher novelty seeking.
8.1 Overview

In previous chapters the dominant associations of harm avoidance and self-directedness with health and mood have been demonstrated. Although hoarding is a long recognised psychopathological behaviour, only in the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5, American Psychiatric Association, 2013) has hoarding disorder been given specific diagnostic criteria, independent of links with obsessive compulsive disorder (OCD) and obsessive compulsive personality disorder. Identification of personality traits specific to pathological hoarding may help with understanding the nature and appropriate treatment strategies for pathological hoarding. As with many DSM-5 diagnoses there remain ongoing questions as to the boundaries of hoarding disorder, given that hoarding most likely exists on a continuum. Pathological hoarding behaviours are related to both physical and mental impairment and considerably decrease well-being (Nordsletten et al., 2013). The associations between TCI personality scales and self-reported hoarding behaviours are examined in this study, using data from the 50 year olds recruited to the CHALICE study. The distribution of hoarding behaviours are described and the demographic associations reported. Additionally, the physical and mental health status of those with varying degrees of hoarding behaviour are reported.

8.2 Introduction

Interest in hoarding behaviour has been increasing over the last 20 years. In 2013 the American Psychiatric Association released the DSM-5 (American Psychiatric Association, 2013).
A new chapter for obsessive-compulsive related disorders was created and featured four new disorders including hoarding disorder. Previously DSM-IV (American Psychiatric Association, 2000) classified hoarding as a symptom of obsessive compulsive personality disorder and, in extreme cases, as a feature of obsessive compulsive disorder (OCD). Until recently there was considerable variation in how researchers defined hoarding (Pertusa et al., 2010). Frost and Hartl’s (1996) working definition is widely accepted: persistent difficulty throwing away possessions regardless of their value, a need to save the items and distress associated with throwing things away, cluttered living areas to the extent that they can no longer be used for their intended purpose and significant distress or impairment because of the hoarding behaviours.

Prevalence estimates for the new classification of hoarding disorder are between two and six percent (American Psychiatric Association, 2013). Very few studies have investigated the prevalence and correlates of hoarding behaviours in a random community sample because the low prevalence of pathological hoarding makes obtaining a suitable sample size problematic, and therefore most studies use clinical samples. Results from a random community sample in Germany, that used a hoarding questionnaire, the Savings Inventory-Revised, suggest a prevalence of compulsive hoarding of 4.6% (Mueller, Mitchell, Crosby, Glaesmer, & de Zwaan, 2009) and a study in the UK using stricter DSM-5 criteria found a prevalence of 1.5% for hoarding disorder (Nordsletten et al., 2013).

Recent research has found hoarding to frequently co-occur with other mental disorders including depression, bipolar disorder and personality disorders (Nordsletten et al., 2013; Samuels, Bienvenu, Grados, et al., 2008). Apart from comorbidity with other mental disorders, an epidemiological study carried out in the UK (Nordsletten et al., 2013) found that those with hoarding disorder had a greater likelihood of having a significant physical impairment, being out of work, being older, being single and are more likely to claim government benefits. A US
study found that hoarding prevalence was inversely related to household income (Samuels, Bienvenu, Grados, et al., 2008). Results for gender differences in hoarding are conflicting with one community-based study reporting more men being affected (Samuels, Bienvenu, Grados, et al., 2008) and others reporting no gender differences (Bulli et al., 2013; Nordsletten et al., 2013; Tortella-Feliu et al., 2006).

Regarding personality characteristics of hoarding, one study has investigated hoarding and personality variables according to Gray’s personality model (Tortella-Feliu et al., 2006). They found that total hoarding scores, measured by the Savings Inventory-Revised (SI-R, Frost, Steketee, & Grisham, 2004) were significantly predicted by sensitivity to reward and sensitivity to punishment when depressive symptoms were controlled for. Further, the SI-R subscales of difficulty discarding and clutter were predicted by sensitivity to punishment while acquisition was predicted by sensitivity to reward (Tortella-Feliu et al., 2006). Another study (Fullana et al., 2004) also found that, in OCD patients with hoarding symptoms, high scores on a hoarding symptom scale were positively correlated with sensitivity to punishment and negatively correlated to Eysenck’s Psychoticism scale. Research using the five factor model of personality has found that hoarding is associated with lower scores on conscientiousness, higher neuroticism scores (Hezel & Hooley, 2014; LaSalle-Ricci et al., 2006) and that hoarding severity is predicted by conscientiousness and extraversion (LaSalle-Ricci et al., 2006). Low levels of self-control have been strongly associated with hoarding behaviour in clinical and non-clinical samples (Timpano & Schmidt, 2013) and the authors concluded that low self-control may be the cause of, and may help maintain, hoarding behaviour.

Several studies (Alonso et al., 2008; Kim, Kang, & Kim, 2009; Kusunoki et al., 2000; Lyoo, Yoon, Kang, & Kwon, 2003) have described the TCI characteristics associated with OCD. Two of these papers (Alonso et al., 2008; Kim et al., 2009) have reported TCI associations with hoarding as a symptom of OCD. Using a small sample Alonso et al. (2008) found a correlation between
scores on a hoarding dimension and high harm avoidance scores. However the low numbers reporting hoarding symptoms in this study may have limited the detection of significant relationships between variables. Another study (Kim et al., 2009) found that lower self-directedness scores and higher persistence scores predicted a higher hoarding score but this study was restricted by the measure they used to assess hoarding which asks only two questions; one question each about hoarding obsessions and compulsions. To date, there are not any studies that describe the associations between hoarding behaviours and TCI personality traits.

From the evidence above, it is clear that pathological hoarding is a debilitating illness and causes significant distress. However, the majority of research into personality and hoarding has been in clinical OCD samples and the assessment of hoarding has been limited to two brief questions. It is important to understand personality variables associated with hoarding because identification of personality traits specific to pathological hoarding may help with understanding the nature of hoarding and may give insight for targets of therapy for a disorder that is hard to treat. Therefore, the aim of this paper is to describe the associations of TCI personality traits, demographic features and physical and mental health with hoarding behaviours.

8.3 Aims

Aim 1: To describe the distribution of hoarding behaviours, assessed by the Savings Inventory-Revised (SI-R) in the CHALICE sample, and the sociodemographic features of variously defined hoarding groups.

Aim 2: To describe the physical and mental health associations of hoarding behaviour.

Aim 3: To describe associations of TCI personality traits with hoarding behaviour.
8.4 Methods

8.4.1 Overview

Data from the CHALICE study, a study of health and well-being of 50 year olds, were used in the analyses. See Chapter 4 for a description of the study.

8.4.2 Participants

Although there were 404 participants in the CHALICE study, only 396 completed a valid short TCI-R and this was the sample size used for the analyses. Four individuals did not complete the short TCI-R and a further four completed the short TCI-R but did not accurately complete 50% or more of the validity items.

8.4.3 Procedure

8.4.3.1 Assessment

As described previously in Chapter 4, in the week previous to their appointment participants were asked to complete some questionnaires at home, including the short TCI-R (Cloninger, 1999) and the SF-36v2 (Ware & Sherbourne, 1992). At the assessment a dedicated interviewer collected demographic data from the participants, assessed their depression status using the Mini International Neuropsychiatric Interview (MINI, Amorim et al., 1998) and the SI-R (Frost et al., 2004) was completed (see Appendix R).

Savings Inventory – Revised (SI-R)

The SI-R is the most widely used questionnaire about hoarding. It has 23 items that measure hoarding behaviours in three areas; difficulty discarding, clutter and excessive acquisition. The DSM-5 criteria for hoarding disorder (American Psychiatric Association, 2013) is difficulty and distress with throwing things away, clutter that prevents using parts of the house for their
intended purpose and distress or impairment because of the hoarding behaviours. The SI-R captures these criteria and also provides further information with the excessive acquisition scale. Excessive acquisition is one of the specifiers for hoarding disorder in the DSM-5 (American Psychiatric Association, 2013). Each item has a five item Likert scale response format with scores ranging from 0-4. A higher score indicates more hoarding behaviours and possible scores range from 0-92. A total score is derived by adding up the three subscale scores. A score of over 41 indicates hoarding disorder (Frost & Hristova, 2011). The SI-R has been shown to have good internal consistency and test-retest reliability with a correlation of .86 for SI-R total score (Frost et al., 2004). In the CHALICE sample Cronbach’s alpha for the SI-R was .89. The construct validity of the SI-R is good (Frost et al., 2004). The total SI-R score and the subscales of difficulty discarding and clutter had significant and strong correlations to the Savings Cognition Inventory (Steketee, Frost, & Kyrios, 2003) with correlations ranging from .54 to .75. The excessive acquisition correlations were significant but not as strong (r’s ranged from .38 to .55) and the authors concluded that excessive acquisition may be a less consistent aspect of hoarding behaviour (Frost et al., 2004). In studies comparing self-identified hoarders, OCD participants without hoarding and a community control group, the SI-R was able to clearly differentiate between these groups indicating criterion validity for the SI-R (Frost et al., 2004). The inventory is suitable for use in both clinical and non-clinical populations (Frost et al., 2004).

For the CHALICE study a time frame was included, participants were asked about hoarding behaviour over the last month. To save time participants were screened for hoarding behaviour. The screen consisted of four questions from the SI-R; “to what extent do you have difficulties throwing things away”, “to what extent do you have so many things that your house is cluttered”, “how often do you avoid trying to discard possessions because it is too stressful or time consuming” and “how distressed or uncomfortable have you been if you could not acquire something you wanted”. If the participant scored two or more for any of the
four items (indicating moderate, considerable or severe problems) then they went on to complete the remaining 19 items of the questionnaire.

Measurement of hoarding

For the analyses the highly skewed, nonlinear hoarding scores were grouped and treated as an ordinal factor. This approach was chosen because of the expected small sample sizes that had hoarding disorder or subclinical hoarding disorder. Rather than using a dichotomous definition of hoarding, the groups allowed exploration of the subclinical features of hoarding behaviour and the dimensional nature of hoarding. Participants were split into the four groups by SI-R total score:

1) No hoarding (group one), had a score of 0-4, most in this group screened negative for hoarding behaviours.
2) Slight hoarding (group two) achieved a score of 5-30 and reported some hoarding behaviours that were unlikely to be of clinical significance.
3) Subclinical hoarding (group three) scored 31-41 which was one standard deviation or less than the hoarding disorder cut off score of 41.
4) Hoarding disorder (group four) were defined as those who scored over 41.

8.4.3.2 Statistical analyses

For analyses the data were transferred to R 2.4.1 (R Development Core Team, 2006) and the coin package (Zeileis et al., 2008). For graphing the data was transferred to SPSS version 22 (IBM, Released 2013). For the demographic data, participants were split into three groups by ELSI$_{SF}$ score; 0-16 (low standard of living, hardship), 17-24 (medium standard of living, comfortable) and scores of 25 or above (socio-economically good or very good). Likewise, for household income participants were grouped as follows: low (less than NZ$ 5,000-50,000), medium (NZ$ 50,001-100,000) and high (NZ$ 100,001-150,001 or more). Participants were
categorised as receiving income support if they currently received any government benefits including in work payments and tax credits. For employment status, full and part time workers, students and those not looking for work were considered employed. Those looking for work or too ill to work were considered unemployed. The first question of the SF-36v2 is a global rating of health and participants were divided into those that described their overall health as poor, fair or good as opposed to rating it as very good or excellent.

The categorical demographic variables were tested for independence with permutation tests (Hothorn, Hornik, Van De Wiel, & Zeileis, 2006) which are equivalent to Cochran Armitage tests for the dichotomous variables, and are robust to distributional assumptions. The short TCI-R and SF-36v2 mental and physical summary scores were treated as continuous with trends tested by linear regression of mean values at the median of each hoarding group. Visual inspection of the data showed that, where associations were significant, linear trends were reasonable approximations, hence linear trends were tested in all cases. Mean group differences were calculated using Independent samples t-test for the short TCI-R and SF-36v2 variables showing significant trends across the groups.

### 8.5 Results

#### 8.5.1 Sample characteristics

Most of the sample demographic and clinical characteristics of CHALICE participants were described and discussed in Chapter 6. Additional information in Table 8.1 shows that 5.8% were unemployed and 19.2% were in receipt of government income support. 42.9% described their health as good, fair or poor as opposed to very good or excellent.
8.5.2 SI-R hoarding scores distribution

Of the 396 participants, 259 screened negative for hoarding behaviour and 137 completed all 23 items of the SI-R. There were three participants who screened positive but had a total SI-R score of four or less and they were included in group one for the analysis. The highly skewed distribution of the scores for the total sample are shown in Figure 8.1. Approximately two thirds of the sample reported no or minimal symptoms of hoarding. Among the other third, who completed the full SI-R, the mean score was 21.0 (standard deviation = 10.9). Using predefined cut points, nine (2.3%) scored >41 and 16 (4%) scored 31-41.

![Graph showing distribution of SI-R scores for all CHALICE study participants](image)

*Figure 8.1.* Distribution of SI-R scores for all CHALICE study participants
8.5.3 Demographic features across hoarding groups

CHALICE 50 year olds show that subclinical hoarding and hoarding disorder were strongly associated with demography (Table 8.1). The sparklines show the trends across the groups. Across hoarding groups there were highly significant trends \( (p<.001) \) showing that being single and having low socio-economic status was associated with higher hoarding scores. Additionally, unemployment and receiving government income support was associated with higher hoarding scores \( (p<.01) \). Female gender and having a lower household income showed a weaker but still significant trend with increased hoarding behaviour \( (p<.05) \).

8.5.4 General health, depression and SF-36v2 mental and physical summary score trends across hoarding groups

CHALICE 50 year olds show that subclinical hoarding and hoarding disorder were strongly related to general health and current major depression with highly significant trends \( (p<.001) \) seen across hoarding groups.

The SF-36v2 mental summary score \( (p<.05) \) but not the physical score showed significant trends in the mean scores (Table 8.2). However, for the physical summary score those with hoarding disorder scored on average 7.9 points lower (95% CIs 0.9 to 15.0, \( p<.05 \)) than the subclinical hoarding group (groups three and four).

8.5.5 Mean differences in SF-36v2 mental summary scores between hoarding groups

For the SF-36v2 mental summary scores the significant mean differences were 3.7 (95% CIs 1.7 to 5.7, \( p<.001 \)) between the no hoarding and slight hoarding groups, and 7.4 (95% CIs 2.4 to 12.4, \( p<.01 \)) between the slight hoarding and subclinical hoarding groups. Means for the subclinical and hoarding disorder groups were not significantly different.
8.5.6 TCI personality trends and mean differences across hoarding groups

Hoarding behaviour increased with greater harm avoidance, however no significant mean difference was detected between subclinical and hoarding disorder groups. The mean difference between the no hoarding and slight hoarding groups was -4.7 (95% CIs -7.3 to -2.0, \( p<.01 \)) and for the slight hoarding and subclinical hoarding groups it was -8.1 (95% CIs -14.7 to -1.44, \( p<.05 \)). As hoarding behaviour increased, self-directedness decreased and all groups were significantly different for this variable. The mean change for no hoarding and slight hoarding groups was 6.5 (95% CIs 4.1 to 8.8, \( p<.001 \)), for slight hoarding and subclinical hoarding groups it was 6.0 (95% CIs 0.6 to 11.4, \( p<.05 \)) and for the subclinical group and the hoarding disorder group it was 8.1 (95% CIs 1.3 to 15.0, \( p<.05 \)).

The other TCI variables showed less association with hoarding behaviour. Cooperativeness and persistence trended down marginally (\( p<.05 \)) but the mean differences for these variables were not significant. There was no significant trend for self-transcendence across all groups but the mean scores went up by 9.4 points (95% CIs -15.1 to -3.6, \( p<.01 \)) between the slight hoarding and the subclinical hoarding groups. Other significant mean differences were seen between the non-hoarding and slight hoarding groups for reward dependence where the difference was 3.8 (95% CIs: 1.5 to 6.1, \( p<.01 \)). Mean differences between slight and subclinical hoarding groups were significant for novelty seeking (mean difference: 5.3, 95% CIs: -9.6 to -1.2, \( p<.05 \)).
### Table 8.1

**Demographics and Health Scores for CHALICE Study Participants by Hoarding Score Group**

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Group 1 (0-4) †</th>
<th>Group 2 (5-30) ††</th>
<th>Group 3 (31-41)</th>
<th>Group 4 (&gt;41)</th>
<th>Total</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No Hoarding</strong></td>
<td><strong>Group 1</strong></td>
<td><strong>Group 2</strong></td>
<td><strong>Group 3</strong></td>
<td><strong>Group 4</strong></td>
<td><strong>Total</strong></td>
<td><strong>Trend</strong></td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>143 54.6%</td>
<td>49 45.0%</td>
<td>12 75.0%</td>
<td>7 77.8%</td>
<td>211 53.3%</td>
<td>*</td>
</tr>
<tr>
<td><strong>Single</strong></td>
<td>59 22.5%</td>
<td>17 15.6%</td>
<td>7 43.8%</td>
<td>7 77.8%</td>
<td>90 22.7%</td>
<td>***</td>
</tr>
<tr>
<td><strong>Unemployed</strong></td>
<td>15 5.7%</td>
<td>3 2.8%</td>
<td>2 12.5%</td>
<td>3 33.3%</td>
<td>23 5.8%</td>
<td>**</td>
</tr>
<tr>
<td><strong>Income Support</strong></td>
<td>47 17.9%</td>
<td>20 18.5%</td>
<td>3 18.8%</td>
<td>6 66.7%</td>
<td>76 19.2%</td>
<td>**</td>
</tr>
<tr>
<td><strong>Socio-economic Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>12 4.6%</td>
<td>7 6.4%</td>
<td>3 18.8%</td>
<td>4 44.4%</td>
<td>26 6.6%</td>
<td></td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>79 30.2%</td>
<td>32 29.4%</td>
<td>6 37.5%</td>
<td>4 44.4%</td>
<td>121 30.6%</td>
<td></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td>171 65.3%</td>
<td>70 64.2%</td>
<td>7 43.8%</td>
<td>1 11.1%</td>
<td>249 62.9%</td>
<td></td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>45 17.7%</td>
<td>14 13.3%</td>
<td>4 25.0%</td>
<td>5 55.6%</td>
<td>68 17.7%</td>
<td>*</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>91 35.8%</td>
<td>43 41.0%</td>
<td>7 43.8%</td>
<td>3 33.3%</td>
<td>144 37.5%</td>
<td></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td>118 46.5%</td>
<td>48 45.7%</td>
<td>5 31.3%</td>
<td>1 11.1%</td>
<td>172 44.8%</td>
<td></td>
</tr>
<tr>
<td><strong>Health (SF-36v2)</strong></td>
<td><strong>mean (SD)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Poor - good Health</strong></td>
<td>98 37.4%</td>
<td>53 48.6%</td>
<td>11 68.8%</td>
<td>8 88.9%</td>
<td>170 42.9%</td>
<td>***</td>
</tr>
<tr>
<td><strong>Physical Summary</strong></td>
<td>52.0 (7.2)</td>
<td>51.0 (8.4)</td>
<td>53.5 (7.4)</td>
<td>45.5 (9.5)</td>
<td>51.6 (7.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Mental Summary</strong></td>
<td>51.9 (8.8)</td>
<td>48.2 (9.5)</td>
<td>40.9 (9.0)</td>
<td>30.9 (13.3)</td>
<td>50.0 (9.8)</td>
<td>*</td>
</tr>
<tr>
<td><strong>Current MDE</strong></td>
<td>12 4.6%</td>
<td>13 11.9%</td>
<td>2 12.5%</td>
<td>5 55.6%</td>
<td>32 8.1%</td>
<td>***</td>
</tr>
</tbody>
</table>

Trend shows sparklines by grouped scores with p value from asymptotic general independence tests. p<0.05 *, 0.01 **, 0.001 ***.

† 8 missing records for Household income. †† 1 missing record for Income Support and 4 missing records for Household income.

MDE Current Major Depressive Episode.
<table>
<thead>
<tr>
<th>Personality (TCI)</th>
<th>No Hoarding (0-4)</th>
<th>Slight Hoarding (5-30)</th>
<th>Subthreshold (31-41)</th>
<th>Pathological (&gt;41)</th>
<th>Total</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty Seeking</td>
<td>54.5 (7.8)</td>
<td>53.7 (7.7)</td>
<td>59.0 (9.6)</td>
<td>59.3 (9.3)</td>
<td>54.6  (7.9)</td>
<td></td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td>53.8 (11.4)</td>
<td>58.5 (12.6)</td>
<td>66.6 (12.0)</td>
<td>70.7 (14.2)</td>
<td>56.0  (12.4)</td>
<td></td>
</tr>
<tr>
<td>Reward Dependence</td>
<td>67.3 (10.5)</td>
<td>63.5 (9.6)</td>
<td>66.3 (11.1)</td>
<td>64.1 (9.0)</td>
<td>66.2  (10.4)</td>
<td></td>
</tr>
<tr>
<td>Persistence</td>
<td>69.7 (10.7)</td>
<td>69.4 (10.4)</td>
<td>66.6 (10.1)</td>
<td>63.4 (8.6)</td>
<td>69.4  (10.6)</td>
<td></td>
</tr>
<tr>
<td>Self-Directedness</td>
<td>77.3 (10.6)</td>
<td>70.8 (10.6)</td>
<td>64.8 (6.7)</td>
<td>56.7 (9.8)</td>
<td>74.6  (11.3)</td>
<td></td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>79.0 (8.3)</td>
<td>77.2 (8.9)</td>
<td>76.3 (10.4)</td>
<td>74.1 (6.2)</td>
<td>78.3  (8.6)</td>
<td></td>
</tr>
<tr>
<td>Self-Transcendence</td>
<td>39.9 (11.4)</td>
<td>38.3 (10.9)</td>
<td>47.7 (10.3)</td>
<td>46.9 (13.9)</td>
<td>40.0  (11.4)</td>
<td></td>
</tr>
</tbody>
</table>

Trend shows sparklines by grouped scores with p value from linear regression on group medians. p<0.05 *, 0.01 **, 0.001 ***.
8.6 Discussion

8.6.1 Distribution, demographics and health features of hoarding behaviour

The distribution of scores was highly skewed with most participants reporting no or slight hoarding behaviours. The hoarding scores were grouped and treated as an ordinal factor so that subclinical features of hoarding behaviour could be explored. The cut points defined by Frost & Hristova (2011) using ROC analyses, appear to just be arbitrary rather than revealing a zone of rarity, a common problem in psychiatric diagnoses (Kendell & Jablensky, 2003). Figure 2 shows that there may be a point of rarity at SI-R scores of 4-8, however, this is probably as a result of using four SI-R questions to screen for hoarding behaviours. The results suggest that hoarding behaviour is on a continuum ranging from no or very little hoarding tendencies to pathological hoarding, rather than a dichotomous diagnostic category as defined by DSM-5 (American Psychiatric Association, 2013).

Using a cut point of a score of 41 or more on the continuous variable SI-R total score, the estimated prevalence of hoarding disorder was 2.3%. The prevalence found in this study was higher than the 1.5% prevalence reported in the epidemiological study conducted in the UK (Nordsletten et al., 2013) but lower than other studies (Bulli et al., 2013; Mueller et al., 2009; Samuels, Bienvenu, Grados, et al., 2008). The UK study prevalence for hoarding disorder may be lower than the prevalence of hoarding disorder reported here because it was based on the result of a diagnostic interview for hoarding disorder, a review of self-report questionnaires by experienced researchers and clutter analysis. Bulli et al. (2013) found a prevalence of 3.7% to 6% in their two Italian convenience samples. They also used the SI-R with a cut off score of 41 or above and in one study they excluded those with a psychiatric disorder which may have resulted in an under estimation of the prevalence. Possible explanations by the authors of their relatively high rates are that the cut off score for the SI-R may not be appropriate across
different cultures and further research in Italian samples is needed. Another possibility the authors discuss is that error may have been introduced by using an online version of the SI-R with some of the sample. Mueller et al. (2009) used a revised 19 item version of the SI-R and the prevalence of compulsive hoarding in a random community sample was 4.6% when the SI-R score cut off was 28. They also reported the prevalence using 36 as the cut off score and this estimate was 1.5%. Meaningful comparisons between this and Mueller’s study are difficult because four items of the SI-R were removed and the cut off points for the SI-R were different. However, the prevalence reported here lies between the two prevalence estimates for their study (Mueller et al., 2009). A study in North America (Samuels, Bienvenu, Grados, et al., 2008) found a prevalence of 3.7% using one question about hoarding from the DSM-IV (American Psychiatric Association, 2000) criteria for obsessive compulsive disorder. All of the above study participants were of mixed ages but Samuels et al. (2008) reported a prevalence of 2.9% for the 45-54 age group, very similar to the prevalence reported here.

For the demographic variables, higher hoarding behaviour scores were associated with being single, unemployed, receiving government income support, being in a lower socio-economic group and, to a lesser degree, being female and having a lower household income. These results are very similar to a recent study (Nordsletten et al., 2013) but different to two other studies (Bulli et al., 2013; Mueller et al., 2009) who found no differences between people who hoard and those that do not for a range of socio-demographic variables. These differences may be explained by differing methodologies. One study (Bulli et al., 2013) used a convenience sample and excluded anyone with psychiatric disorder and the other (Mueller et al., 2009) had a large representative sample that included a much wider age range than the sample reported here. Many studies report no gender difference but Samuels et al. (2008) reported that the prevalence of hoarding was higher for men than women whereas these results show the opposite. In this sample 80% in the hoarding disorder group were female. It is possible that
women were more willing to endorse hoarding behaviours for what is often described as an embarrassing and shameful disorder.

It was clear that for those in the hoarding disorder group that economic hardship and impairment of mental and physical functioning was widespread. For example, 70% of people in this group were single and/or received government income support, 40% were unemployed, and 50% had low socio-economic status and/or household income. Only 10% of this group described their health as very good or excellent, 50% were currently depressed and their self-reported mental and physical health scores were comparatively low. For compulsive hoarding, a prevalence rate of 40-50% of comorbid depression is not unusual and has been reported elsewhere (Frost, Steketee, & Tolin, 2011).

For this sample of 50 year olds, those that currently reported subclinical hoarding behaviours (group three) may develop hoarding disorder in future years. Although for many, hoarding behaviours typically start in adolescence (Grisham, Frost, Steketee, Kim, & Hood, 2006), they are known to increase with each decade of life (Ayers, Saxena, Golshan, & Wetherell, 2010; Frost, Steketee, Williams, & Warren, 2000). Additionally, for some, pathological hoarding behaviours have a later onset and are associated with stress or loss (Grisham et al., 2006). Approximately a quarter report onset of hoarding disorder after the age of 40 (Dozier, Porter, & Ayers, 2015). Loss, for example loss of career, through retirement, or loss of a spouse may be more likely to occur as people get older. In the CHALICE study it is possible that loss associated with earthquakes (for example, loss of your home) will have an impact on hoarding behaviours, especially for those in the subclinical group. For the subclinical group intervention strategies used sooner rather than later may be more helpful than waiting for the disorder to become established, which is notoriously hard to treat (Steketee & Frost, 2003; Tolin, Fitch, Frost, & Steketee, 2010).
The assessments were carried out during a considerable earthquake sequence that has been shown to affect the self-reported mental health scores of this cohort (Spittlehouse, Joyce, Vierck, Schluter, & Pearson, 2014) although PTSD rates in this sample were lower than those reported for a similar age group in a national sample (1.8% compared to 3.2%, Oakley Browne et al., 2006). However, the impact of these experiences on hoarding behaviour is not known but more general research on trauma has shown that traumatic incidents increase hoarding behaviours in some people (Cromer, Schmidt, & Murphy, 2007; Grisham et al., 2006; Tolin, Meunier, Frost, & Steketee, 2010).

8.6.2 TCI personality and hoarding behaviour

Lower self-directedness and higher harm avoidance were associated with hoarding behaviour in this cohort of New Zealand 50 year olds. Additionally, higher hoarding behaviour scores were associated with smaller but significant downward trends for persistence and cooperativeness.

High harm avoidance has been associated with hoarding behaviour in other studies (Alonso et al., 2008; Kim et al., 2009; Kusunoki et al., 2000; Lyoo et al., 2003) and many other mental health disorders (Fassino et al., 2013) consistent with the trends seen here. Hoarding behaviour has been linked with higher rates of anxiety (Bulli et al., 2013; Nordsletten et al., 2013) and worry (Reid et al., 2011). Also, people who hoard have strong emotional links to objects which may create anxiety and worry about possessions not seen in people who don’t hoard (Frost & Hartl, 1996).

Research has shown that people who hoard have a problem with routine decision making, inattention, executive function and self-control (Frost & Hartl, 1996; Hall, Tolin, Frost, & Steketee, 2013; Timpano & Schmidt, 2013). These characteristics are aspects of self-directedness, described as behaviour regulation and goal-orientated behaviours, and perhaps
explain why lower self-directedness scores were associated with higher hoarding behaviour scores.

Significant trends in harm avoidance and self-directedness scores were apparent even when hoarding behaviour symptoms were slight. Mean scores varied significantly group by group with the exception of the subclinical and hoarding disorder groups for harm avoidance. These group on group differences indicate that hoarding behaviours are dimensional, rather than categorical, in nature.

In this sample persistence trended down across hoarding groups although mean differences between the groups were not significant. Given associations between persistence and perfectionism, this finding is not consistent with suggestions that hoarding is associated with perfectionism (Frost & Gross, 1993). This finding is also inconsistent with a study using OCD patients (Kim et al., 2009) where hoarding symptoms were positively correlated with higher persistence. However, studies using the five factor model found that hoarding was associated with lower conscientiousness scores (Hezel & Hooley, 2014; LaSalle-Ricci et al., 2006), a personality domain with similarities to persistence. Moreover, hoarding has been associated with lower conscientiousness in women but not men (Samuels, Bienvenu, Pinto, et al., 2008). In this sample the hoarding disorder group was predominantly female.

Cooperativeness also trended down as hoarding behaviour increased. Other personality research has shown little difference between population means in measures of agreeableness in those with hoarding symptoms (LaSalle-Ricci et al., 2006). The mean difference between the hoarding disorder group and those with no or very little hoarding behaviours was relatively small in comparison to the differences between these two groups for harm avoidance and self-directedness. Reward dependence which is highly correlated with cooperativeness, showed no overall trend.
Subclinical hoarding behaviour was associated with greater novelty seeking and self-transcendence compared to those with slight hoarding behaviour. Furthermore, those with hoarding disorder had similar scores on these two traits compared to those with subclinical behaviours. It is possible that these two traits are revealing subtle differences between those at very little risk of developing problematic hoarding behaviour and those at risk of, or those who have already developed hoarding disorder. Impulsivity, one of the features of novelty seeking, has been found to be increased in those with compulsive hoarding (Grisham, Brown, Savage, Steketee, & Barlow, 2007). Another study looking at OCD symptom dimensions in OCD patients found that hoarding behaviour was inversely related to novelty seeking (Fullana et al., 2004). This suggests that impulsivity may differentiate between those with symptoms of hoarding associated with a primary diagnosis of OCD as opposed to those whose prominent disorder is hoarding. Regarding self-transcendence, higher scores on this scale have been associated with schizotypy and magical thinking, especially when one or both variables of self-directedness and/or cooperativeness are low (Laidlaw, Dwivedi, Naito, & Gruzelier, 2005). In the CHALICE study, both self-directedness and cooperativeness trended down as hoarding behaviour increased, which suggests an immature personality that may be prone to this type of symptom. Furthermore, magical thinking and erroneous beliefs have also been observed in those with hoarding behaviours (Frost & Hartl, 1996; Samuels et al., 2007).

8.6.3 Limitations

There are some limitations with the current study. The restricted age range of the sample may mean that the results are only applicable to this age group. Hoarding groups three and four had low sample numbers meaning findings have been interpreted cautiously and may need validating in an independent cohort. Unequal sample sizes between all of the hoarding groups mean that any conclusions regarding group membership should be treated with caution. All measures were self-report which is open to perceptual bias and the data were cross-sectional
so causation cannot be established. A home visit or independent assessment of clutter was not part of the assessment in this study and this may be the ideal way to conduct clutter analyses. However, the SI-R shows strong correlations to other hoarding measures including observer ratings of clutter (Frost et al., 2004). This sample scored at the lower end of the possible range for SI-R scores and it is unlikely that this type of research would appeal to those with severe hoarding problems. It is possible that the TCI personality profile of people with severe hoarding is somewhat different to those seen here and further study of TCI characteristics using a clinical sample may be revealing. The high rate of depression in the hoarding disorder group may have affected TCI ratings at interview (Spittlehouse et al., 2010). However, it is often the case that people with hoarding disorder present with comorbidities, especially depression, so the results here may be a realistic reflection of the personality of people with hoarding disorder.

The strengths of the study are that it was a random community sample and the participants were not recruited to a study of hoarding which means that bias from self-selection or convenience samples was not an issue. To date, this is the first study to look at the TCI characteristics of hoarding behaviour in a community sample using a specific hoarding questionnaire.

8.7 Conclusions

Hoarding disorder was strongly associated with economic hardship and impairment of mental and physical functioning.

Scores on TCI personality variables of harm avoidance and self-directedness were strongly associated with hoarding behaviour in this sample. Harm avoidance was higher in the hoarding disorder group while self-directedness was lower.
Part 4: Results

Chapter 9: Temperament and Character as Determinants of Well-being

9.1 Overview

In recent years, the focus of psychology and psychiatry has shifted from being almost exclusively interested with mental ill health to an emphasis on mental well-being and positive psychology. The associations of negative effect and personality have been discussed in previous chapters and in this chapter personality and well-being will be examined using a measure of positive affect. Well-being has been shown to be associated with future health (Chida & Steptoe, 2008) and is influenced by personality variables (DeNeve & Cooper, 1998). In this study the well-being of the CHALICE sample was assessed by questionnaire and the factors underlying the questionnaire were analysed. The associations of well-being with socio-demographics and current depression were reported. Then the relationship between personality and well-being were examined, including allowing for sociodemographic and depression associations.

9.2 Introduction

Central to the WHO definition of health, mentioned in Chapter 5, is the concept of well-being (World Health Organization, 1948). Measuring and identifying the factors that influence well-being are important to achieve a better understanding of this concept and may facilitate interventions that aim to improve well-being in the individual. Definitions of well-being are abundant and academic debate about how to define it is ongoing (Dodge, Daly, Huyton, & Sanders, 2012), however, two clear perspectives have emerged in the well-being research,
hedonic and eudaimonic (Ryan & Deci, 2001). Eudaimonic well-being is described as positive psychological functioning, self-realisation, autonomy and positive relations with others. Hedonic well-being is more concerned with the subjective experience of happiness or, increased pleasure and decreased pain. These two perspectives do not describe separate factors of well-being, rather they are a description of the mechanisms by which well-being is achieved.

Many scales and questionnaires have been developed to measure well-being; a recent addition is the Warwick-Edinburgh Mental Well-being Scale (WEMWBS, Tennant et al., 2007). The WEMWBS was developed in the UK because the authors perceived that there was a lack of valid surveys for measuring positive mental health in the general population (Stewart-Brown & Janmohamed, 2008). It is a positively worded 14 item questionnaire that aims to measure both theoretical perspectives of well-being; eudaimonic and hedonic (Ryan & Deci, 2001). The WEMWBS was chosen for use in this study because it was designed to measure positive mental health and it is validated for general population surveys. Notably, it has been shown to have high consistency and reliability across different English speaking cultural groups (Taggart et al., 2013) and in a Spanish sample (Lopez et al., 2013).

Research has indicated that well-being may be influenced by socio-demographic variables, such as sex, age and socio-economic status (DeNeve & Cooper, 1998; Stewart-Brown & Janmohamed, 2008; Weich et al., 2011). It is also influenced by depression (Mhaolain et al., 2012; Stewart-Brown & Janmohamed, 2008) and by personality variables (DeNeve & Cooper, 1998). Some researchers propose that well-being may be a personality variable itself (DeNeve, 1999). According to a meta-analysis of subjective well-being and personality (DeNeve & Cooper, 1998) the personality variables that correlated positively with subjective well-being were extraversion and agreeableness, while negative affect (sometimes called neuroticism) had a negative association with well-being. The possible mechanisms for how personality may
affect well-being are: that the emotional aspect of personality traits (such as positive or negative affect) are strongly related to current emotions and therefore such traits will influence descriptions of subjective well-being, that personality characteristics that facilitate good relationships with others are also important for enhanced well-being and that seeing life positively, which improves well-being, is associated with personality traits such as autonomy (DeNeve, 1999).

TCI scores have been shown to be strongly related to well-being. For example, the Young Finns study (N=1980, age 24-39 years) revealed that TCI character domains explained 65% of the variance in well-being with self-directedness alone explaining 40% of the variance (Josefsson, Cloninger, et al., 2011). An investigation of TCI personality and the General Health Questionnaire (Goldberg, 1978) revealed that health scores were predicted by low harm avoidance and high self-directedness (Yu et al., 2008). In a UK study of a small sample of cardiac patients, satisfaction with life scores were also associated with low harm avoidance and high self-directedness when studying four personality profiles characterised by high or low scores on these two dimensions of personality (Carless, Douglas, Fox, & McKenna, 2006).

Previous research by Cloninger has shown that the character domains have stronger associations with well-being than the temperament domains (Cloninger, 2004). Cloninger proposes that well-being and health are not necessarily linear in their relationship with personality and that multidimensional character profiles may reveal more about the relationship of well-being and personality (Cloninger & Zohar, 2011). Research using TCI character profiles (Cloninger et al., 1994) has confirmed a link to well-being by showing that a combination of high scores on all three of the character dimensions of self-directedness, cooperativeness and self-transcendence (Cloninger & Zohar, 2011; Josefsson, Cloninger, et al., 2011) was associated with better well-being. However, self-transcendence increased negative and positive affect in one of the studies (Josefsson, Cloninger, et al., 2011). Both of these
studies used character profiles that grouped participants depending on their high or low scores for the three character dimensions thereby creating eight specific combinations of character to capture non-linear as well as linear effects. The eight character profiles range from ‘creative’ (mature and frequently feels positive emotion) to ‘depressive’ (immature and frequently feels negative emotion) (Cloninger et al., 1998).

9.3 Aims

**Aim 1:** To describe the well-being of the CHALICE sample using the WEMWBS and to explore the underlying structure of the scale using maximum likelihood analysis.

**Aim 2:** To assess the associations of well-being with socio-demographic variables including depression.

**Aim 3:** To examine the associations of well-being with personality, including controlling for socio-demographic variables and depression.

9.4 Methods

9.4.1 Overview

Participant data from the CHALICE study described in Chapter 4, were used in the analyses.

9.4.2 Participants

Although there were 404 participants in the CHALICE study, only 403 completed the WEMWBS and this was the sample size used for the WEMWBS factor analysis. For TCI personality data, four individuals did not complete the short TCI-R and a further four completed the short TCI-R but did not accurately complete 50% or more of the validity items. Consequently the sample size for analyses using TCI data was 396.
9.4.3 Procedure

9.4.3.1 Assessment

As described previously in Chapter 4, in the week previous to their appointment, participants were asked to complete some questionnaires at home, including the short TCI-R (Cloninger, 1999) and the WEMWBS (Stewart-Brown & Janmohamed, 2008; Stewart-Brown et al., 2009). At the assessment a dedicated interviewer collected demographic data from the participants and assessed their depression status using the Mini International Neuropsychiatric Interview (MINI, Amorim et al., 1998).

Warwick-Edinburgh Mental Well-being Scale (WEMWBS)

The WEMWBS (see Appendix S, Stewart-Brown & Janmohamed, 2008; Stewart-Brown et al., 2009) was developed in Scotland for the Ministry of Health to enable them to assess well-being at the population level. It is based on a previous scale, the affectometer 2, which was developed in New Zealand in the 1980s (Kammann & Flett, 1983). The 14 item WEMWBS scale is a positively worded questionnaire and is described as assessing one factor, positive mental health, that includes both aspects of well-being; eudaimonic and hedonic (Stewart-Brown & Janmohamed, 2008). In population and student samples the questionnaire had Cronbach’s alpha coefficient of .89 (student sample) and .91 (population sample) which suggests very good internal consistency (Tennant et al., 2007). In the CHALICE sample Cronbach’s alpha for the WEMWBS was .94. To address construct validity, the WEMWBS was compared to nine other well-being questionnaires using the student and population samples mentioned above (Stewart-Brown & Janmohamed, 2008). The statistically significant correlations ranged from moderate to low (for example $r=.51$ for the Emotional Intelligence Scale) to moderately high ($r=.77$ for the WHO-Five Well-being Index). Most of the correlations were moderately high. Criterion validity was not undertaken because a ‘gold standard’ measure of well-being does
not exist (Stewart-Brown & Janmohamed, 2008). The WEMWBS has good test-retest reliability (intraclass correlation coefficient of .83 after one week). Stewart-Brown and Janmohamed (2008) report acceptable response bias and face validity (explored through focus group discussion) and determined that the WEMWBS is clear, user-friendly and unambiguous.

### 9.4.3.2 Statistical analyses

Data from the study were transferred to SPSS version 22 (IBM, Released 2013) for statistical analyses and graphing. The underlying structure of the 14 item WEMWBS was explored using maximum likelihood analysis. Other analyses of the WEMWBS were frequencies, median, means and confidence intervals. Pearson correlations were used to assess the relationship between personality and well-being. Independent samples t-test and one-way between groups ANOVA were used to compare WEMWBS scores for different demographic groups. Additionally, for the demographic data participants were split into three groups by ELSIsf score; 0-16 (low standard of living, hardship), 17-24 (medium standard of living, comfortable) and scores of 25 or above (socio-economically good or very good). Multiple hierarchical regression was used for the regression analysis and all the variables in the final model were continuous except for marital status and current major depressive episode.

The TCI character profiles were formed using the method previously described by Cloninger (Cloninger & Zohar, 2011; Josefsson, Cloninger, et al., 2011). Participant’s TCI character scores were divided into high or low (median split) for each of the three character domains. There were 18 participants who scored in the middle third for all three character domains. Previous studies (Cloninger & Zohar, 2011; Josefsson, Cloninger, et al., 2011) have excluded this group, however in this sample the results were not notably different if those participants were excluded so their data were left in the analyses. The participants were then allocated to one of the eight character groups (shown in Table 9.5), depending on the combinations of high or low scores. The order of the character groups was such that those at the top are associated with
more happiness and those at the bottom are associated with less happiness (Cloninger, 2004).

For the character profiles analyses one-way ANOVA with Tukey’s HSD test for post-hoc analyses was used.

9.5 Results

9.5.1 Participants

The participants for WEMWBS were 403 individuals who completed the questionnaire. The sample for personality data was 396 individuals with complete TCI personality data who were participating in the CHALICE study.

9.5.2 Sample characteristics

The sample demographic and clinical characteristics of CHALICE participants are described and discussed in Chapter 7.

9.5.3 Distribution, mean, median scores and factor analysis for the WEMWBS

The CHALICE sample mean total WEMWBS scores were approximately normally distributed with a slight negative skew (skew = -0.337, Figure 9.1). The mean was 52.8 (95% CI 52.0-53.7), the median was 54 and total scores went from 16 to 70, a range of 54. There was one outlier with a low score of 16. However, this low score did not exert an undue influence when the analysis was run without the outlying value. Therefore, this low score was kept in the analysis. There were six participants (1.5%) who scored the maximum possible score of 70.
Figure 9.1. Distribution of WEMWBS scores for the CHALICE study

The underlying structure of the 14 item WEMWBS was explored using maximum likelihood analysis. The analysis revealed one factor that was significant; this factor explained 55.3% of the variance and had an eigenvalue of 7.75. The next three factors, by magnitude of eigenvector, explained; 6.4% of the variance (eigenvalue of 0.89), 5.6% of the variance (eigenvalue of 0.78) and 4.7% of the variance (eigenvalue of 0.65). Item loadings, shown in Table 9.1, ranged from 0.618 (item 12 “feeling loved”) to 0.845 (item 10 “feeling confident”).
### Table 9.1

*Factor loading for the WEMWBS items*

<table>
<thead>
<tr>
<th>WEMWBS Item</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 I've been feeling confident</td>
<td>0.845</td>
</tr>
<tr>
<td>8 I've been feeling good about myself</td>
<td>0.835</td>
</tr>
<tr>
<td>14 I've been feeling cheerful</td>
<td>0.817</td>
</tr>
<tr>
<td>7 I've been thinking clearly</td>
<td>0.743</td>
</tr>
<tr>
<td>1 I've been feeling optimistic about the future</td>
<td>0.739</td>
</tr>
<tr>
<td>9 I've been feeling close to other people</td>
<td>0.729</td>
</tr>
<tr>
<td>6 I've been dealing with problems well</td>
<td>0.723</td>
</tr>
<tr>
<td>2 I've been feeling useful</td>
<td>0.706</td>
</tr>
<tr>
<td>3 I've been feeling relaxed</td>
<td>0.700</td>
</tr>
<tr>
<td>5 I've had energy to spare</td>
<td>0.655</td>
</tr>
<tr>
<td>13 I've been interested in new things</td>
<td>0.653</td>
</tr>
<tr>
<td>11 I've been able to make up my own mind about things</td>
<td>0.642</td>
</tr>
<tr>
<td>4 I've been feeling interested in other people</td>
<td>0.639</td>
</tr>
<tr>
<td>12 I've been feeling loved</td>
<td>0.618</td>
</tr>
</tbody>
</table>

*a WEMWBS: Warwick-Edinburgh Mental Well-being Scale*

#### 9.5.4 Differences in well-being by socio-demographic variables and depression

The WEMWBS mean total scores and 95% confidence intervals for CHALICE participants are shown in Table 9.2. Independent samples *t*-test and one-way between groups ANOVA revealed that there were no significant differences between the mean scores for the socio-demographic groups of sex, ethnicity, home ownership or education level. Significant differences were seen between marital status (*p*<.001), those with current major depression (*p*<.001) and standard of living category (ELSI SF score) of high, medium or low (*p*<.001).
Table 9.2

Demographic characteristics and total WEMWBS scores of CHALICE study participants.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
<th>WEMWBS(^a) Mean (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>396</td>
<td>100</td>
<td>52.8 (52.0 - 53.7)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>185</td>
<td>46.7</td>
<td>52.8 (51.6 - 53.9)</td>
</tr>
<tr>
<td>Female</td>
<td>211</td>
<td>53.3</td>
<td>52.9 (51.6 - 54.2)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non- Māori</td>
<td>337</td>
<td>85.1</td>
<td>53.0 (52.0 - 53.9)</td>
</tr>
<tr>
<td>Māori</td>
<td>59</td>
<td>14.9</td>
<td>52.1 (49.9 - 54.3)</td>
</tr>
<tr>
<td><strong>Marital Status (^*)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married or living together &gt;1 year</td>
<td>306</td>
<td>77.3</td>
<td>53.9 (53.0 - 54.8)</td>
</tr>
<tr>
<td>Single or living together &lt; 1 year</td>
<td>90</td>
<td>22.7</td>
<td>49.3 (47.0 - 51.6)</td>
</tr>
<tr>
<td><strong>Standard of Living (^*)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (ELSI(_{sf}) score 0-16)</td>
<td>26</td>
<td>6.6</td>
<td>43.9 (39.6 - 48.2)</td>
</tr>
<tr>
<td>Medium (ELSI(_{sf}) score 17-24)</td>
<td>121</td>
<td>30.6</td>
<td>51.6 (49.9 - 53.2)</td>
</tr>
<tr>
<td>High (ELSI(_{sf}) score 25-31)</td>
<td>249</td>
<td>62.9</td>
<td>54.4 (53.4 - 55.4)</td>
</tr>
<tr>
<td><strong>Home Ownership</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home owners</td>
<td>326</td>
<td>82.3</td>
<td>53.3 (52.4 - 54.2)</td>
</tr>
<tr>
<td>Renters/ not home owners</td>
<td>70</td>
<td>17.7</td>
<td>50.8 (48.3 - 53.3)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No qualification</td>
<td>51</td>
<td>12.9</td>
<td>51.4 (48.7 - 54.2)</td>
</tr>
<tr>
<td>Secondary school qualification</td>
<td>106</td>
<td>26.8</td>
<td>52.0 (50.3 - 53.8)</td>
</tr>
<tr>
<td>Post-secondary/trade certificate/diploma</td>
<td>167</td>
<td>42.2</td>
<td>52.9 (51.5 - 54.3)</td>
</tr>
<tr>
<td>University degree</td>
<td>72</td>
<td>18.2</td>
<td>54.9 (53.2 - 56.6)</td>
</tr>
<tr>
<td><strong>Current Major Depressive Episode(^*)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>32</td>
<td>8.1</td>
<td>40.4 (37.3 – 43.6)</td>
</tr>
<tr>
<td>No</td>
<td>364</td>
<td>91.9</td>
<td>53.9 (53.1 – 54.8)</td>
</tr>
</tbody>
</table>

\(^a\) WEMWBS: Warwick-Edinburgh Mental Well-being Scale  
\(^b\) ELSI\(_{sf}\): Economic Living Standard Index Short Form  
\(^*\) Scores within the group are significantly different \(p<.001\)
9.5.5 **Associations of well-being and personality variables**

Most of the TCI dimensions were significantly correlated with the WEMWBs (p<.001) except novelty seeking and self-transcendence (Table 9.3). The strongest associations were a negative correlation between well-being score and harm avoidance (-.61) and a positive correlation for self-directedness (.61).

**Table 9.3**

*Univariate correlations of TCI with WEMWBS*

<table>
<thead>
<tr>
<th></th>
<th>WEMWBS*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty Seeking</td>
<td>-.01</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td>-.61***</td>
</tr>
<tr>
<td>Reward Dependence</td>
<td>.20***</td>
</tr>
<tr>
<td>Persistence</td>
<td>.31***</td>
</tr>
<tr>
<td>Self-Directedness</td>
<td>.61***</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>.27***</td>
</tr>
<tr>
<td>Self-Transcendence</td>
<td>.01</td>
</tr>
</tbody>
</table>

*WEMWBS: Warwick-Edinburgh Mental Well-being Scale
Statistical significance: shown in bold ***p<.001*

9.5.6 **Prediction of well-being from socio-demographic and personality variables**

Hierarchical multiple regression was performed to investigate the ability of personality, measured by the TCI, to predict levels of well-being, measured by the WEMWBs. Initial analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity and the correlations of the independent variables with WEMWBs were examined. For the multiple regression, eight outliers were identified (Mahalanobis distance of 38.99 to 29.95, exceeding the critical value of 29.59) and removed before the final model was
run. Seven were female, three of whom were not married or living with someone for a year or more, two identified as Māori and five were currently depressed.

The socio-demographic variables sex, ethnicity, home ownership and education were not significantly correlated with total WEMWBS so were not included in the model. In the first step of hierarchical multiple regression, the three remaining socio-demographic variables were entered; marital status, standard of living (ELSI$_{SF}$ score) and current depression. This model was statistically significant ($F = 34.06; p<.001$) and explained 21% of variance in well-being (Table 9.4).

After entry of the seven TCI personality variables at step 2 (Table 9.4) the total variance explained by the model was 49% ($F = 36.51; p<.001$). At step 2 the $R^2$ change was 0.28 ($F$ change 29.87; $p<.001$). In the final model three out of nine independent variables were statistically significant. TCI self-directedness had the highest Beta value ($β = 0.32, p<.001$), followed by TCI harm avoidance ($β = -0.28, p<.001$), and lastly current depression ($β = -0.19, p<.001$).
Table 9.4
Hierarchical regression model of WEMWBS and TCI, controlling for demographic factors and current major depression

<table>
<thead>
<tr>
<th>Step</th>
<th>$R$</th>
<th>$R^2$</th>
<th>$R^2$ Change</th>
<th>$B$</th>
<th>SE $B$</th>
<th>95% CI for $B$ Lower Limit</th>
<th>95% CI for $B$ Upper Limit</th>
<th>$\beta$</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>0.46</td>
<td>0.21***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td>-2.44</td>
<td>1.01</td>
<td>-4.43</td>
<td>-0.46</td>
<td>-0.12</td>
<td>.016</td>
</tr>
<tr>
<td>ELSI&lt;sub&gt;sf&lt;/sub&gt; Score</td>
<td></td>
<td></td>
<td></td>
<td>0.36</td>
<td>0.10</td>
<td>0.18</td>
<td>0.55</td>
<td>0.19</td>
<td>.000***</td>
</tr>
<tr>
<td>Current MDE</td>
<td></td>
<td></td>
<td></td>
<td>-11.38</td>
<td>1.60</td>
<td>-14.53</td>
<td>-8.23</td>
<td>-0.33</td>
<td>.000***</td>
</tr>
<tr>
<td>Step 2</td>
<td>0.70</td>
<td>0.49***</td>
<td>0.28***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td>-1.94</td>
<td>0.83</td>
<td>-3.57</td>
<td>-0.32</td>
<td>-0.09</td>
<td>.019</td>
</tr>
<tr>
<td>ELSI&lt;sub&gt;sf&lt;/sub&gt; Score</td>
<td></td>
<td></td>
<td></td>
<td>0.03</td>
<td>0.08</td>
<td>-0.13</td>
<td>0.20</td>
<td>0.02</td>
<td>.705</td>
</tr>
<tr>
<td>Current MDE</td>
<td></td>
<td></td>
<td></td>
<td>-6.49</td>
<td>1.37</td>
<td>-9.18</td>
<td>-3.79</td>
<td>-0.19</td>
<td>.000***</td>
</tr>
<tr>
<td>Novelty Seeking</td>
<td></td>
<td></td>
<td></td>
<td>0.04</td>
<td>0.05</td>
<td>-0.06</td>
<td>0.13</td>
<td>0.04</td>
<td>.408</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td></td>
<td></td>
<td></td>
<td>-0.20</td>
<td>0.04</td>
<td>-0.28</td>
<td>-0.12</td>
<td>-0.28</td>
<td>.000***</td>
</tr>
<tr>
<td>Reward Dependence</td>
<td></td>
<td></td>
<td></td>
<td>0.04</td>
<td>0.04</td>
<td>-0.04</td>
<td>0.11</td>
<td>0.04</td>
<td>.353</td>
</tr>
<tr>
<td>Persistence</td>
<td></td>
<td></td>
<td></td>
<td>0.05</td>
<td>0.04</td>
<td>-0.02</td>
<td>0.11</td>
<td>0.05</td>
<td>.196</td>
</tr>
<tr>
<td>Self-Directedness</td>
<td></td>
<td></td>
<td></td>
<td>0.25</td>
<td>0.05</td>
<td>0.16</td>
<td>0.34</td>
<td>0.32</td>
<td>.000***</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td></td>
<td></td>
<td></td>
<td>0.03</td>
<td>0.05</td>
<td>-0.07</td>
<td>0.12</td>
<td>0.03</td>
<td>.616</td>
</tr>
<tr>
<td>Self-Transcendence</td>
<td></td>
<td></td>
<td></td>
<td>0.01</td>
<td>0.03</td>
<td>-0.05</td>
<td>0.08</td>
<td>0.02</td>
<td>.664</td>
</tr>
</tbody>
</table>

ELSI<sub>sf</sub>: Economic Living Standard Index Short Form. MDE: Major Depressive Episode. Statistical significance: ***$p<.001$
9.5.7 TCI character profiles and well-being

The eight TCI character profiles, their description and the distribution of the CHALICE sample within each profile are shown in Table 9.5. Upper case letters indicate a high score for that domain, while lower case indicates a low score.

Table 9.5

<table>
<thead>
<tr>
<th>TCI Character Profile</th>
<th>Description</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCT</td>
<td>Creative Inventive, thoughtful, mature.</td>
<td>14.9</td>
</tr>
<tr>
<td>Sct</td>
<td>Organised Logical, trusting, mature.</td>
<td>16.9</td>
</tr>
<tr>
<td>ScT</td>
<td>Fanatical Persistent, goal-directed, suspicious.</td>
<td>4.5</td>
</tr>
<tr>
<td>Sct</td>
<td>Autocratic Logical, selfish, bullying, goal-directed.</td>
<td>12.4</td>
</tr>
<tr>
<td>sCT</td>
<td>Moody Suggestible, insecurely joyful, moody.</td>
<td>11.1</td>
</tr>
<tr>
<td>sCt</td>
<td>Dependent Submissive, trusting, sensitive to criticism.</td>
<td>5.8</td>
</tr>
<tr>
<td>scT</td>
<td>Disorganised Illogical, suspicious, and immature.</td>
<td>18.4</td>
</tr>
<tr>
<td>scT</td>
<td>Depressive Selfish, immature, emotionally reactive.</td>
<td>15.9</td>
</tr>
</tbody>
</table>

S: high self-directedness  s: low self-directedness
C: high cooperativeness    c: low cooperativeness
T: high self-transcendence t: low self-transcendence

One-way between groups ANOVA revealed a significant difference in the mean WEMWBS scores in the eight different character profile groups ($F = 22.71 \ p < .001$), Figure 9.2. The highest WEMWBS score was seen in the groups SCT and Sct. All character profiles with high self-directedness had higher WEMWBS scores than those with low self-directedness. High self-transcendence in some profiles (ScT versus Sct, sCT versus sCt and scT versus scT) resulted in higher WEMWBS scores than when self-transcendence was low but not all were statistically significant.
The largest mean difference in WEMWBS score was 11.6 points between character groups SCT (mean 58.9) and sCt/sct (mean 47.3), Table 9.6. WEMWBS scores between SCT and SCt (mean difference 0.7) and between sCt and sct (no mean difference) were statistically indistinguishable. Most of the TCI character profile groups that had high self-directedness (SCT, SCt, and ScT) had significantly different WEMWBS scores than those profiles with low self-directedness, with the exception of profile Sct. The Sct profile had a significantly higher mean well-being score than sct but not sCT, sCt or scT.

**Figure 9.2. TCI character profiles and mean WEMWBS score**
Table 9.6

Mean differences between WEMWBS scores for the TCI character profiles

<table>
<thead>
<tr>
<th></th>
<th>SCT</th>
<th>ScT</th>
<th>ScT</th>
<th>Sct</th>
<th>sCT</th>
<th>sCt</th>
<th>scT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCT</td>
<td>0.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ScT</td>
<td>1.4</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sct</td>
<td>5.1</td>
<td>5.0</td>
<td>3.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sCT</td>
<td>10.4***</td>
<td>10.3***</td>
<td>9.0**</td>
<td>5.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sCt</td>
<td>11.6***</td>
<td>11.5***</td>
<td>10.2**</td>
<td>6.5</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>scT</td>
<td>9.0***</td>
<td>9.0***</td>
<td>7.7**</td>
<td>3.9</td>
<td>1.4</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>sct</td>
<td>11.6***</td>
<td>11.5***</td>
<td>10.2***</td>
<td>6.5***</td>
<td>1.2</td>
<td>0.0</td>
<td>2.5</td>
</tr>
</tbody>
</table>

S: high self-directedness
C: high cooperativeness
T: high self-transcendence
s: low self-directedness
s: low cooperativeness
t: low self-transcendence

Statistical significance: **p<.01; ***p<.001

9.6 Discussion

9.6.1 Well-being in the CHALICE sample

This chapter presents results for associations between well-being, socio-demographic variables and personality from a random sample of 50 year olds. To my knowledge this was the first time WEMWBS results have been presented for the New Zealand population. Results for the WEMWBS are very consistent with those from other countries (Lloyd & Devine, 2012; Lopez et al., 2013; Taggart et al., 2013; Tennant et al., 2007). WEMWBS means were compared across similar socio-demographic groups to those used in the original UK validation paper (N=1749, Tennant et al., 2007). (Tennant et al., 2007) The results were alike but with a few marginal differences. The mean for the New Zealand sample was 52.8 and the median was 54 compared to the mean of 49.5 and median of 50 for a similar age group (45-54 years) in the UK sample. Like the UK study, there were no significant differences between the mean scores for men and women, ethnicity or education level, although females scored slightly higher than
males in New Zealand unlike the UK sample where males mean scores were marginally higher than females. In agreement with the UK sample, those who were married or living together for a year or more scored significantly higher than those who were single, divorced, separated or widowed. Current depression was associated with a lower WEMWBS score, which has also been reported in the UK sample (Tennant et al., 2007). In this sample the correlation between well-being and depression wasn’t as strong as in the UK sample ($r = -0.39$ as opposed to $r = -0.53$). The weaker correlation may reflect differences in the assessment procedures used to measure depression. In this study interviewer ratings and a categorical diagnosis were used rather than a self-report continuous measure used in the UK sample. Standard of living also revealed significantly different levels of well-being; all three groups of those scoring low, medium or high on the ELSiSF were significantly different from each other in terms of well-being, with higher well-being scores recorded for higher standard of living scores. The ELSiSF was developed in New Zealand and there is no comparable measure reported in the UK study. A point of difference to the UK validation study was that home owners as opposed to non-home owners in the CHALICE study, the majority of which were renters, did not have significantly higher WEMWBS scores. However, renters did score 2.5 points less than home owners and with a larger sample the mean difference may have been significantly different.

The similarity between the New Zealand and UK scores was not surprising. Global research on happiness and life satisfaction put New Zealand and the UK on similar levels of happiness or satisfaction although New Zealand consistently scores above the UK on these measures (Inglehart, Foa, Peterson, & Welzel, 2008; OECD, 2013). However, the current study assessments were carried out during a destructive earthquake sequence that hit the Christchurch area. The original 7.1 magnitude earthquake and approximately 10,000 aftershocks that followed have had a considerable effect on the self-reported mental health of this sample (Spittlehouse et al., 2014). Although there were relatively few fatalities, people in the seismic area have had to cope with secondary stressors such as economic challenges,
stress arising from repairs to the home or rebuild, and the continued lack of infrastructure. It is possible that the mean WEMWBS scores presented in this study have been adversely affected by the on-going stress of living in an active seismic area. Conversely, it may be that well-being can remain even in the presence of mental suffering, as Weich et al., (2011) describe in their English sample (Weich et al., 2011). In a survey of over 7,000 adults they found that well-being was distinct from but correlated to mental disorder symptoms (Weich et al., 2011). Another possibility is that changes in well-being are slower to take effect than changes in mental health. It is possible than levels of well-being may change a few years after the seismic activity.

The maximum likelihood analysis results support one underlying factor and was in line with the original UK study (Tennant et al., 2007) and with loadings that were remarkably similar to a study carried out in Northern Ireland (Lloyd & Devine, 2012). The loadings were all very similar to each other too, with the greatest being only 29% higher than the least. Stewart-Brown et al., (2009) have developed a seven item version of the WEMWBS. However, the highest loadings for WEMWBS items in this study do not correspond to the seven items on the shorter version of the WEMWBS (Stewart-Brown et al., 2009). The WEMWBS has considerable face validity and has performed well in several studies (Lloyd & Devine, 2012; Lopez et al., 2013; Tennant et al., 2007). These findings confirm the usefulness of this scale in a randomly selected sample of 49-51 year old New Zealanders. The WEMWBS is a short, robust scale that is appropriate for measuring well-being at the population level.

9.6.2 Well-being, socio-demographics and personality

In univariate analysis well-being correlated with a range of socio-demographic variables. However, socio-demographic variables and current depression only explained 21% of the variance. The addition of personality, to the regression model, explained 49% of the variance or an $R^2$ increase of 0.28. The key personality variables were self-directedness and harm avoidance. Standard of living (ELSI$_{53}$) and marital status no longer made a significant
contribution when personality was added which is surprising given that social support has long been linked to well-being (Ryan & Deci, 2001).

The non-linear analysis of the influence of personality profiles on WEMWBS scores revealed that, in most circumstances, profiles high in self-directedness produced significantly higher well-being scores than those with low self-directedness. This finding is consistent with previous studies (Cloninger & Zohar, 2011; Josefsson, Cloninger, et al., 2011) and with research that shows that being competent and confident is associated with better well-being (Ryan & Deci, 2001). High cooperativeness paired with high self-directedness produced similar means on the WEMWBS as did having high scores on all three character domains, suggesting that scoring high on the self-transcendence domain is not necessarily going to improve well-being when cooperativeness and self-directedness are high. However when comparing profiles characterised by high self-transcendence as opposed to low self-transcendence, well-being scores consistently trend upwards for the high self-transcendence profiles even though the differences were not significant. For example, the scT profile well-being mean was higher than the sct profile. This upward trend, in the absence of high self-directedness and cooperativeness, indicates that self-transcendence can exert a positive influence on well-being in some people, again consistent with previous research (Cloninger & Zohar, 2011; Josefsson, Cloninger, et al., 2011). This positive influence may suggest that spiritual or religious beliefs or practices contribute to well-being when self-autonomy (self-directedness) and getting along with others (cooperativeness) are not as developed as they could be.

As discussed earlier, there was no evidence in this study that cooperativeness makes a significant contribution to well-being. Of the eight personality profiles scT and sct had the lowest well-being mean scores which suggests that when self-directedness and self-transcendence are low, having high cooperativeness does not contribute to better well-being which was inconsistent with other studies (Cloninger & Zohar, 2011; Josefsson, Cloninger, et
al., 2011). However, the two personality profiles with the combination of high cooperativeness and high self-directedness had the highest means scores on the WEMWBS. Potentially, this combination may be the most important factor for achieving optimum well-being. It is easy to see how the qualities of having high scores on both these measures would be advantageous to well-being. Qualities such as being responsible, having purpose and being self-accepting (self-directedness) combined with helpful, empathic and compassionate behaviour (cooperativeness) is clearly better than characteristics such as being blaming, aimless, insensitive and hostile.

Despite significant univariate correlations, reward dependence, persistence and cooperativeness were not predictive of well-being in multivariate regression. It is likely that this is because persistence correlates with harm avoidance ($r = -0.42$) and cooperativeness correlates with self-directedness ($r = 0.43$). When all the variables were in the regression model together, the strong predictive power of harm avoidance and self-directedness reduced the influence of the other personality dimensions. It is interesting that cooperativeness (how well a person relates to others) did not predict well-being as there is considerable evidence that relations with others has a strong influence on subjective well-being (Ryan & Deci, 2001). In this study marital status did not predict well-being either, however the quality of the marital relationship was not assessed and other forms of social support were not measured, both of which may have more of an influence on well-being (Ryan & Deci, 2001). Josefsson et al. (2011) states that cooperativeness was strongly associated with perceived social support which can increase well-being and reduce negative emotions. However, another study found that cooperativeness made only a small contribution to wellness (Cloninger & Zohar, 2011).

The first step of multiple regression analyses showed that standard of living (ELSI_SF score) and current depression significantly predicted well-being but only accounted for 20% of the variance. The final regression model, where well-being was significantly predicted by self-
directedness, harm avoidance and current depression, explained 49% of the variance and 
standard of living was not a significant predictor. The dominance of the TCI personality 
variables and current depression is perhaps best explained by looking at the WEMWBS items. 
Most, if not all, are related to either harm avoidance (feeling relaxed or good about oneself), 
self-directedness (feeling useful, confident, being able to make decisions and problem solving) 
or depression (feeling pessimistic, lack of interest in people or new things and low energy). A 
meta-analysis of personality traits and well-being (DeNeve & Cooper, 1998) similarly found 
personality to have a strong correlation to well-being; however they also found that socio-
economic status was just as important, a finding that was not replicated here. The difference 
in these two findings may be that for most of the studies reviewed in the meta-analysis, socio-
economic status was a composite variable of education, income and occupation rather than 
using a specific measure of socio-economic status as was done for this study. In this analysis 
cooperativeness did not make a significant contribution, contrary to previous research 
(Cloninger & Zohar, 2011; Josefsson, Cloninger, et al., 2011). Both these studies found that 
cooperativeness was strongly associated with social support but only weakly correlated with 
wellness. The WEMWBS does not measure social support and only two items allude to it (“I 
have been feeling close to other people” and “I’ve been feeling loved”) which may explain why 
cooperativeness was not significantly associated with well-being in this study.

Well-being is known to be associated with both current and future health (Chida & Steptoe, 
2008) and possibly, improving well-being may indirectly reduce health care costs. The 
challenge for therapists is how to increase self-directedness in those with low scores 
notwithstanding high harm avoidance in those that experience high scores on this ‘anxiety’ 
dimension. There are some therapeutic approaches that address this issue directly (Cloninger, 
2006b, 2007).
9.6.3 Limitations

Results of this study may not be generalisable to different age groups, given the limited age range of the participants. Additionally, the data was cross-sectional so causation cannot be determined and self-report data may be influenced by subjective bias. Another limitation was that most of the data collection was carried out during a time of considerable seismic activity which may have affected participant’s well-being.

A strength of the current study was that the cohort was a random sample and the response rate was 62%. With this good recruitment rate and the fact that the CHALICE cohort WEMWBS mean was largely no different from the means described by Tennant et al., (2007), any recruitment bias was likely to be modest.

9.7 Conclusions

The key determinants of well-being, as shown in this study, were not socio-demographic, but personality variables, especially harm avoidance and self-directedness. Contrary to the hypothesis, cooperativeness was not predictive of well-being after adjusting for other factors and, as it was anticipated, neither was self-transcendence. However non-linear analyses of character revealed that personality profiles with a combination of high self-directedness and cooperativeness achieve the uppermost well-being scores suggesting, that this combination of characteristics was ideal for enhanced well-being.
Part 5: Discussion

Chapter 10: Discussion

10.1 Summary of Key Findings

Personality has been researched over many years and with many different measures. A key finding is that the measure variously called neuroticism, negative affect or trait anxiety has a strong relationship with a wide variety of health outcome measures. In this project, which used the Cloninger model of personality, harm avoidance and self-directedness were the equivalent measures of negative affect. Using the TCI, the personality variables most associated with well-being and health were harm avoidance and self-directedness. The three key findings from this project were:

1. Harm avoidance and self-directedness were strongly associated in expected ways with mental health, physical health, mood disorders, hoarding behaviours and well-being.

2. Measures of harm avoidance and self-directedness changed with mood state. In addition, self-directedness was associated with a lifetime diagnosis of a mood disorder.

3. The other TCI variables that were associated with health and well-being in the project were self-transcendence, novelty seeking, persistence and cooperativeness but their influence was much less than for harm avoidance and self-directedness.

In Chapter 5 a randomly selected sample of 50 year olds exposed to earthquakes reported lower mental health but not physical health, when compared to national norms. The personality correlates of poorer physical and mental health were high harm avoidance and low self-directedness. Other weaker personality contributions to poorer health were higher novelty seeking and self-transcendence and lower persistence.
In Chapter 6, using data from two clinical studies of depression, the TCI scales and subscales were examined before and after treatment for depression. After treatment, harm avoidance decreased and self-directedness increased and some of these changes could be explained by changes in mood. The other five TCI traits and corresponding subscales were mostly not related to mood.

In Chapter 7 high harm avoidance and low self-directedness were associated with depression and bipolar disorder in 50 year olds from the general population. Those with lifetime bipolar disorder had significantly higher harm avoidance and lower self-directedness than those with lifetime depression but, after controlling for symptoms, the difference in harm avoidance was no longer significant. High self-transcendence was associated with both disorders and high novelty seeking was seen in those with bipolar disorder. Independent predictors of depression were harm avoidance, self-directedness and self-transcendence. Further analysis revealed that self-directedness was highly related to symptoms and diagnoses suggesting that low self-directedness is a risk factor for mood disorders. Harm avoidance was also highly related to symptoms but not related to having a diagnosis. Novelty seeking and self-transcendence were related to lifetime diagnosis.

Chapter 8 described the associations between hoarding behaviours and personality. The main personality variables associated with hoarding behaviours were high harm avoidance and low self-directedness. As hoarding behaviours increased so did harm avoidance scores and self-directedness scores decreased. Other personality variables associated with hoarding were persistence and cooperativeness; scores on both traits decreased as hoarding behaviour increased.

The final results chapter, Chapter 9, described linear and non-linear associations of personality with well-being. In linear analysis, after controlling for sociodemographic factors and current depression, the only personality predictors of well-being were harm avoidance and self-
directedness. Low harm avoidance and high self-directedness resulted in higher well-being scores. When personality variables were added to the regression model, associations between sociodemographic variables and well-being were no longer significant which indicates the importance of personality for well-being. In non-linear analysis, using profiles of high and low scores on the three TCI character domains, most profiles with high self-directedness had better well-being scores than those with low self-directedness. The character profiles with the highest well-being scores had high self-directedness and cooperativeness. Self-transcendence had a positive effect on well-being scores only when the two other character variables (self-directedness and cooperativeness) were low.

### 10.1.1 Harm avoidance and self-directedness

#### 10.1.1.1 Mood state

All or most mental disorders have associations with personality traits such as high harm avoidance and low self-directedness (Fassino et al., 2013) or, in the five factor model, high neuroticism (Kendler et al., 2006). This may be especially true for internalising disorders such as depression and anxiety (Krueger & Markon, 2006). Whether these traits are predisposing, scars or state characteristics of mental disorder is debateable and the evidence is conflicting. The results for the depression studies in the current project show that both traits are, to some extent, state dependent in agreement with many other studies (Bayon et al., 1996; Brown et al., 1992; Cloninger et al., 1998; Farmer et al., 2003; Hansenne et al., 1999; Naito et al., 2000; Peirson & Heuchert, 2001; Richter et al., 2000a).

In both the CHALICE study and in the clinical trials harm avoidance and self-directedness were influenced by mood. Within the clinical trials the full TCI inventory was used which allowed examination of the subscales, not all of which were equally impacted on by mood. Harm avoidance subscale shyness with strangers (HA3) showed the most change with depression
severity in the antidepressant study and, for the psychotherapy trial the scale that changed most with mood was the fatigability (HA4) subscale. HA4 is consistent with the symptom of lower energy often reported by depressed individuals and the items clearly reflect this (for example, item 16: “I have less energy and get tired more quickly than most people”). Likewise, HA3 may reflect feelings of loss of confidence (for example, item 19: “I often avoid meeting strangers because I lack confidence with people I do not know”) which is often reported in depression. For the self-directedness subscales the results were more consistent across the anti-depressant and psychotherapy trials with purposefulness (SD2) changing most with mood.

As the title suggests this subscale describes purpose in life (e.g. item 6: “Often I feel that my life has little purpose or meaning”). Hopelessness, lack of purpose and suicidal ideation are usually notable features of depressive episodes. Thus, the study shows that the items most strongly affected were the ones that directly related to depressive symptomology.

10.1.1.2 Risk factors

Studies in depression have indicated that high harm avoidance and low self-directedness can predict depression (Cloninger et al., 2006; Elovainio et al., 2004; Farmer et al., 2003; Farmer & Seeley, 2009; Kampman & Poutanen, 2011), suggesting that these aspects of personality are risk factors. In this research harm avoidance was related to symptoms but not to diagnosis of mood disorder. It seems unusual that harm avoidance was not linked to the diagnosis of a mood disorder, particularly as negative affect has been shown to have strong associations with depression (Bayon et al., 1996; Brown et al., 1992; Cloninger et al., 1998; Farmer et al., 2003; Hansenne et al., 1999; Naito et al., 2000; Peirson & Heuchert, 2001; Richter et al., 2000a). This unusual finding maybe as a result of the age of CHALICE participants. As mentioned above, self-directedness increases with age but harm avoidance is stable (Josefsson et al., 2013). Therefore, as people age and self-directedness increases, cognitive strategies for dealing with negative feelings become more important than the emotions themselves. Consequently, at
age 50, low self-directedness scores become dominant as a risk factor for mood disorders rather than negative emotions measured by harm avoidance. There is some evidence for this effect. Studies have shown that those who have recovered from depression have levels of self-directedness seen in the non-depressed population (Agosti & McGrath, 2002; Hirano et al., 2002), whereas harm avoidance scores remain above that of the healthy population (Abrams et al., 2004). This suggests that it is the improvement of self-directedness that facilitates recovery from depression even in the context of higher levels of harm avoidance. Thus, although some people will have an emotional predisposition to depression (high harm avoidance) this can be moderated by improving executive function (self-directedness) which tends to increase with age and is a sign of maturity.

10.1.1.3 Scarring effects

While there is strong evidence of measures of harm avoidance and self-directedness being mood dependent and as possible trait markers for psychopathology, the evidence for scarring is the least consistent. The difficulty with assessing the scarring hypothesis is that studies exploring this possibility may be confounded by partial recovery or incomplete remission of participants from past mood episodes. Longitudinal studies that assess personality and depression status, without intervention, at two time points are the best design to assess scarring effects and none of the three studies reported on in this project were ideal designs to investigate this. It has been shown (Kendler, Neale, Kessler, Heath, & Eaves, 1993) that scarring does occur, however these effects were moderate compared to the substantial effect of current depression (mood state).
10.1.1.4 The correlation of harm avoidance and self-directedness

In the CHALICE sample harm avoidance and self-directedness were highly negatively correlated and the strong association of these two variables has been a criticism of the TCI (Farmer & Goldberg, 2008a, 2008b). One explanation for this is that they are measuring the same underlying construct i.e. neuroticism. Eysenck’s biological theory of personality described personality types in terms of the combination of the stable traits of neuroticism, extraversion and, later, psychoticism (Eysenck, 1968). Gray (1982) disagreed that neuroticism and extraversion were the main factors of personality and instead described two new factors, impulsivity (extroverted neuroticism) and anxiety (introverted neuroticism) by rotating by 45 degrees the dimensions described by Eysenck. Cloninger further developed Gray’s work to describe a single measure of anxiety that he called harm avoidance. Harm avoidance was biologically based; he proposed it was influenced by serotonergic activity and developed through procedural learning. Later, he added self-directedness (and the other ‘character’ dimensions) to the model and suggested that the biological basis of character was different to that of the temperaments. In Cloninger’s model character is associated with semantic learning, is related to cognition and develops through interaction with the environment.

The finding that harm avoidance was related to symptoms of mood disorders but that self-directedness was related to both symptoms and diagnosis (see Chapter 7) suggest that they do measure different constructs. It is reasonable to expect some overlap because emotional disposition is likely to affect perception of the environment and, consequently, cognitive aspects of personality development. Additionally, harm avoidance is stable with age whereas self-directedness increases at least up to age 40, and smaller increases may be seen after 40, indicating again that they measure different constructs (Josefsson et al., 2013). Neuroticism correlates strongly with harm avoidance and self-directedness (De Fruyt et al., 2000). For the subscales of neuroticism, five of the six subscales correlate moderately with harm avoidance.
and self-directedness (De Fruyt et al., 2000). The exception is the neuroticism subscale of impulsiveness which, in the TCI, is more related to novelty seeking (De Fruyt et al., 2000). The strongest correlations are between harm avoidance and the neuroticism subscale anxiety, and between self-directedness and the subscale vulnerability.

10.1.1.5 **Harm avoidance, self-directedness, health and well-being**

Personality variables, especially harm avoidance and self-directedness, were more important for well-being than sociodemographic variables and they were also strongly associated with self-reported physical and mental health. Over the last 30 years well-being research has focussed on the importance of personality and moved away from weaker influences such as situational factors and socio-demographics (Diener, Suh, Lucas, & Smith, 1999). The results here clearly indicate the importance of low harm avoidance and high self-directedness for health and well-being. Similar to the arguments made above about psychopathology, there is potential that health and well-being may be improved with personality development. Self-directedness was strongly associated with health and well-being in linear analyses and also with well-being in non-linear analyses suggesting that improvement in this trait may lead to improved health and a more positive outlook.

10.1.1.6 **Harm avoidance and self-directedness in the context of other TCI variables**

Harm avoidance and self-directedness may well be central to psychopathology. In this research differences in the other scales were able to distinguish between disorders. For example, lifetime depression was associated with higher scores on self-transcendence, lifetime bipolar was related to increases in self-transcendence and novelty seeking and hoarding disorder was associated with lower scores on persistence and cooperativeness. However, beyond the influence of harm avoidance and self-directedness in most mental disorder, the influence of the other TCI variables in specific disorders is questionable and the evidence is
conflicting. The problem is with consistency of results, i.e. consistently defining the traits associated with specific disorders across different age groups, cultures and study design. Perhaps this type of consistency is unachievable as so many heterogeneous variables have to be accounted for in a wide variety of settings. However, maybe adopting a different way of classifying mental disorder is the way forward. For example, the disorders that were termed axis I in DSM-IV may benefit from broader classifications such as internalising and externalising disorders, terms that are often used in childhood psychopathology. A factor analyses of comorbidity of 10 common mental disorders in a large random sample confirmed that a two factor model of internalising and externalising disorders, with two subfactors comprising the internalising disorders, was the best fit (Krueger, 1999). If disorders were classified in this way then patterns of TCI personality traits in psychopathology might be clearer. For example, harm avoidance may be associated with the internalising disorders, novelty seeking would possibly be associated with externalising disorders and self-directedness may have associations with both factors.

10.1.2 Novelty seeking

High novelty seeking has consistently been associated with the early onset of externalising disorders such as drug and alcohol abuse (Cloninger, Sigvardsson, Przybeck, & Svrakic, 1995; Mulder, 2002) and with cluster B personality disorders (Cloninger, 2003). Low novelty seeking has been associated with OCD (Kusunoki et al., 2000). In the CHALICE study higher novelty seeking was associated with bipolar disorder in 50 year olds, in agreement with some studies (Nery et al., 2008; Nowakowska et al., 2005; Olvera et al., 2009) but not others (Engström et al., 2004a; Loftus et al., 2008; Sasayama et al., 2011; Sayın et al., 2007). Novelty seeking in adults has been shown to decrease with age (Al-Halabi et al., 2010; Josefsson et al., 2013). This trait appears to be stable between age groups 20 to 24 years but then decreases between the ages of 29 to 44 years (Josefsson et al., 2013) and is possibly stable after about 50 years of age.
(Trouillet & Gana, 2008). Longitudinal studies, such as Josefsson’s et al. (2013) which followed several large cohorts over 27 years, have not been carried out for age groups over 44 years of age. Therefore, the actual rate of decrease for novelty seeking in middle and old age are not known but estimates of the rate of change per decade range from 1.0 point per decade (Cloninger et al., 1991) to 1.7 points per decade (Al-Halabi et al., 2010). Novelty seeking may have emerged as a risk factor in 50 year olds because other studies, that report no differences in novelty seeking in those with bipolar disorder, had a wider age range than the CHALICE sample and the results may have been influenced by age. In younger adult age groups, when novelty seeking is naturally higher in healthy controls, there may be no statistical difference detected between the means. In younger age groups it is plausible that mean levels of novelty seeking are similar regardless of whether they have bipolar disorder or not. As people age and novelty seeking decreases it is possible that those with bipolar disorder do not experience any decrease in novelty seeking, or the mean decrease may be less in those with bipolar disorder compared to controls. Consequently, by age 50 mean novelty seeking may be significantly higher in those with bipolar compared to those without. Not all individuals with high novelty seeking will develop bipolar disorder. Those with high novelty seeking, high self-directedness and, perhaps high cooperativeness, may have an energetic, enthusiastic and curious personality sometimes described as a hyperthymic temperament (Akiskal, Hirschfeld, & Yerevanian, 1983). A hyperthymic temperament may be advantageous in many circumstances and will not necessarily cause the distress and impairment seen in bipolar disorder.

10.1.3 Self-transcendence

Cloninger’s assertion that those with high self-transcendence who also have high self-directedness and cooperativeness will have better well-being (Cloninger, 2004) was not found in 50 year olds in New Zealand. Higher self-transcendence was related to small improvements in well-being only in those with an immature personality i.e. low self-directedness and
cooperativeness. Self-transcendence is particularly prone to cultural influences and varies between countries and ethnic groups (Josefsson et al., 2013). An illustration of this was seen within the CHALICE sample, scores on self-transcendence were significantly higher for Māori compared to non-Māori (see Chapter 7, Table 7.2).

Self-transcendence is an important concept to measure in personality (Garcia-Romeu, 2010; Reed, 2008). Some researchers have suggested a major flaw of the FFM is that it does not measure this trait (Piedmont, 1999). However, the self-transcendence scale may lack face validity in some cultures. Face validity is arguably the least sophisticated measure of validity but it is a necessary part of questionnaire formulation. Cloninger and colleagues have explored the factor structure and construct validity of the self-transcendence scale (Cloninger et al., 1994). Nevertheless, some of the items may be perceived as a measure of religiousness, particularly in the subscale spiritual acceptance versus rational materialism (ST3). For example TCI-R item 118 is overtly religious; “Religious experiences have helped me to understand the real purpose of my life” and other items in this subscale use religious terms such as ‘divine’ (TCI-R item 106) and ‘miracles’ (TCI-R item 32). Furthermore, in the CHALICE sample of 50 year olds the self-transcendence scale correlates at r=.61 with the subjective religion subscale of the Duke Religion Index (Storch et al., 2004), consistent with previous research in older Australians (Kirk et al., 1999) which found that the TCI self-transcendence scale was associated with religious affiliation. New Zealand is a secular country (World Values Survey Association, 2014). Regular church attendance is low (Ward, 2003) and formal religious education is not part of the educational curriculum (Bradstock, 2012). Consequently, religious terms that are used to describe transcendental experiences are unlikely to be endorsed, even if they are describing common transcendental experiences. Therefore, it was not surprising that self-transcendence made only small and not statistically significant differences to well-being in a New Zealand sample. In less secular countries, like Israel and the USA, self-transcendence has
been shown to have more of an influence on well-being (Cloninger et al., 1994; Cloninger & Zohar, 2011).

Self-transcendence is variable with age (Josefsson et al., 2013) and, unlike some other TCI scales that clearly decline with age (novelty seeking) or increase with age (self-directedness), middle age may be when it is at its lowest. Previous research suggests a U shaped curve for self-transcendence and age with younger people reporting higher levels which decline towards middle-age and then rise again in old age (Cloninger, 2003; Josefsson et al., 2013). The age differences seen for self-transcendence may be linked with opportunities for personal growth (Reed, 2008; Staudinger & Kunzmann, 2005). For people in their fifties the multiple demands of work, children and elderly parents may mean that there is less potential for personal growth even if it is desired. It may be that as this cohort ages their self-transcendence may increase and be more important for well-being in later life.

10.1.4 Reward dependence, persistence and cooperativeness

The other personality variables of reward dependence, persistence and cooperativeness were seldom found to have significant associations with the outcome variables of this research. Cooperativeness had weak associations with hoarding behaviour (lower scores) and, as expected, with well-being (higher scores). However, there were no associations found between cooperativeness and mood in all three studies in this project, consistent with some (Celikel et al., 2009; De Winter et al., 2007; Halvorsen et al., 2009; Loftus et al., 2008) but not all of the research (Hansenne et al., 1999; Hirano et al., 2002; Tanaka et al., 1998). Research utilising personality profiles of temperament and character may reveal more subtle associations of cooperativeness and mood, especially for those with mild depressive symptoms (Josefsson, Merjonen, Jokela, Pulkki-Råback, & Keltikangas-Järvinen, 2011) but that was not possible in the CHALICE study because the small numbers would make the analysis unfeasible.
Low persistence was weakly associated with lower self-reported health and higher scores on a hoarding behaviour inventory. Previous research has shown that those with high persistence coupled with high harm avoidance and low self-directedness are more likely to have anxiety disorders rather than mood disorders (Cloninger, Zohar, Hirschmann, & Dahan, 2012), which were not studied in this research. Similarly, reward dependence was not significantly associated with any of the analyses reported in this thesis. Reward dependence has been associated with specific subtypes of disorder that were not assessed or not present in the samples used for this project. For example, high reward dependence has previously been associated with dependent and histrionic personality disorders (Svrakic et al., 1993), and, in depression it is associated with psychotic features (Goekoop & De Winter, 2011) which is present in a small percentage of those experiencing depression and is generally associated with severe depression. Low reward dependence is associated with schizoid personality disorder (Cloninger, 2003) and with autistic spectrum disorders (Insel, O’Brien, & Leckman, 1999) which were not studied in this research.

It is possible that reward dependence, persistence and cooperativeness have little to do with health, mood, hoarding or well-being. It is also possible that cooperativeness and persistence, did not make unique contributions to this research because of covariance with other TCI variables. In the CHALICE sample cooperativeness was moderately correlated with self-directedness as were persistence and harm avoidance, self-directedness and persistence were also weakly correlated.

10.2 Methodological strengths and limitations

10.2.1 Depression studies samples

The key strength of the depression studies was that the data was longitudinal which allowed analysis that showed that some changes in personality could be attributed to change in mood.
Additionally, the samples were relatively large and efforts were made to recruit participants with the full range of depressive symptomology. Mood disorders were assessed according to DSM criteria by experienced clinicians.

The limitations were that in the depression studies the age groups were relatively young and, in the psychotherapy study, participants were experiencing mild to moderate levels of depression so results may be limited to these groups.

10.2.2 CHALICE study

The CHALICE cohort was randomly selected from electoral rolls and closely matched the census population statistics except that they had a higher level of education and income than those of a similar age group living in the same area. The response rate of 62% was reasonable in normal circumstances but may be considered a good response considering the extraordinary difficulties experienced by the residents of Canterbury during the prolonged earthquake sequence. The age of CHALICE participants means that personality was likely to be more stable as compared to younger age groups (Klein et al., 2011), and it was likely that, for most participants, the first onset of mood disorders had already occurred (Kessler et al., 2005).

In the CHALICE study mood disorders were assessed according to DSM criteria by trained interviewers. The self-report questionnaires used to assess personality (TCI), hoarding (SI-R) and self-reported health (SF-36v2) all have robust psychometric properties and are widely used which allows for direct comparisons with other studies. The well-being measure (WEMWBS) has not been used in New Zealand before but the analysis showed that, psychometrically, it performed very well in the CHALICE cohort.

In the CHALICE sample participants had a higher level of education and income level compared to the census data for a similar age group in the same geographical area which may introduce bias particularly for self-reported health where those with better education and a higher
income are known to report better health (Furnée, Groot, & van Den Brink, 2008; Woolf et al., 2015). The age range of CHALICE was limited to 49-51 year olds and therefore the results are only applicable to this age group. Likewise, the geographical location in New Zealand may have influenced scales that are culturally sensitive such as the self-transcendence scale of the TCI. For some of the analyses groups were created where the sample sizes were small especially in the pathological and subclinical hoarding groups and in the bipolar disorder group, therefore findings for these smaller groups should be interpreted cautiously. The CHALICE study data was cross-sectional so causation cannot be established.

Many of the measures used in CHALICE were self-report and as such are open to perceptual and cognitive bias. Additionally, some of the questionnaires may be open to socially desirable responses, for example, questionnaires that assess psychological distress or substance abuse (Van de Mortel, 2008).

10.2.3 Earthquakes

During the assessment period of CHALICE participants there was a series of earthquakes, as discussed in Chapter 5. Consequently, many people left the area of Canterbury and some people may not have volunteered for the study because of distress or stress caused by the earthquakes. This may have introduced some bias but the comparison with equivalent census data, which only differed on a couple of aspects, suggesting that any recruitment bias was small. The scores on the mental health subscales of the SF-36v2 scales were lower than national norms and the rates of depression were higher. However, as this project was focused on personality and measures of health and mood it is unlikely that the results would have been any different if there had not been any earthquakes. For example, without the earthquakes there may have been less people in the currently depressed group but the correlates of personality and depression would still be similar and the same applies to the other measures reported on in this thesis.
10.3 Implications of Findings for Personality Research and Suggestions for Future Research

This research has confirmed the importance of personality variables in aspects of health, mood, hoarding and well-being. The link between harm avoidance and self-directedness was already well established in mood and other disorders and this finding is now further extended to hoarding disorder and self-reported health.

The results reported here emphasise the need for caution when assessing the personality of individuals who are currently experiencing symptoms of mood or other disorders because harm avoidance and self-directedness change with mood. Of particular interest are the results which suggest low self-directedness as a risk factor for mood disorder in 50 year olds but not high harm avoidance. It is possible that, as people age, an improved sense of self (higher self-directedness) becomes more influential for mood than trait anxiety and worry associated with high harm avoidance. Likewise, lifetime bipolar disorder was associated with high novelty seeking in 50 year olds and previous research has been inconsistent regarding this association.

Future research could investigate whether risk factors for psychopathology change with age. As discussed above it is plausible that, as people age, cognitive (character traits) rather than emotional factors (temperament traits) are more important for health and well-being as people mature. Two of the questions arising from this research concern which of harm avoidance or self-directedness is the stronger predictor for depression in different age groups and whether self-transcendence is a significant predictor of depression at different stages of life. A prospective study, using a sample of adults aged 25-75 years of age, split into five groups by age (25-34 years, 35-44 years etc.), could investigate which TCI scales and subscales predict depression over five years in those who have never had depression or who are not
depressed at baseline. At approximately 25 years of age the more cognitive aspects of personality (self-directedness and self-transcendence) will have had time to mature.

If self-directedness was shown to be important for predicting depression onset then an intervention study would be justified. The hypothesis would be that if low self-directedness increased with treatment then the likelihood of future depression would decrease. Self-directedness does change over time making it more likely to be a successful target for therapy than harm avoidance which tends to be stable. Those with low self-directedness could be randomised to treatment that enhances self-directedness in comparison to a control group and future rates of depression could be compared. It is important to discover which aspects of personality are most significant for the development of depression and which aspects are responsive to treatment.

In this project personality variables were associated with the newly classified hoarding disorder. Hoarding disorder research is in its infancy and the inclusion of hoarding disorder in DSM-5 may stimulate more research. In the analyses of CHALICE study participants the dimensional nature of hoarding behaviour was clear and of particular interest was the subclinical group. The research indicates that for many, hoarding tendencies start in adolescence, however these behaviours increase with each decade of life and about a quarter of those with the disorder have late onset. Therefore, those in the subclinical hoarding group may go on to develop pathological hoarding over the next decade especially as exposure to loss, which can trigger pathological hoarding, increases as people age. Using the baseline personality data described in this thesis, and a five or 10 year hoarding assessment follow-up, personality variables may be able to predict who develops pathological hoarding. Understanding the underlying personality of people who hoard may help to develop effective treatments for this hard to treat condition. The main disadvantage to follow up is that it would involve a small cohort, a problem which is inherent in hoarding research, however the
longitudinal nature of the data would be valuable as this kind of data are lacking in the research. Additionally, some of the SI-R questions were used as a screen for hoarding symptoms to cut down on time and participant burden. Further evaluation of the effectiveness of the screening questions is warranted.

In this research self-transcendence was associated with lifetime mood disorders and contributed little to well-being. Previous research has also associated the TCI self-transcendence scale with religiousness and psychopathology (Garcia-Romeu, 2010) and as mentioned above, some of the self-transcendence items are overtly religious. An investigation of the face validity of the scale is necessary to distinguish what may be religious views from self-transcendence and personal growth as a state of consciousness. Self-transcendence is not the same as religion although there may be overlap between the two concepts. There are also ambiguities in some of the items. For example item 32 “I think that most things that are called miracles are just chance” could be perceived as a question about biblical miracles or it could be referring to everyday miracles such as the complexity of the human brain. A qualitative assessment of the scale may facilitate the development of items that are relevant to self-transcendence but are not prone to ambiguous interpretations or use of religious terms.

10.4 Conclusions

Harm avoidance and self-directedness are central to mental ill health and also fundamental to health and well-being. Both are, to some extent, state dependent and, in 50 year olds, self-directedness seemed to be more of a risk factor for mood disorder than harm avoidance. This finding may indicate that self-directedness becomes increasingly important with age. The influence of harm avoidance and self-directedness extends to hoarding behaviour, self-reported health and general well-being. Personality variables of novelty seeking and self-transcendence were associated with specific psychopathology while reward dependence,
persistence and cooperativeness had no or weak associations with different aspects of health and well-being.

The findings for the influence of harm avoidance and self-directedness in this project and in the wider literature are very consistent (Fassino et al., 2013). However, the influence of other TCI variables in mental health and well-being are not consistent and may reflect diverse methodology, sample selection and cultural differences. The effect of harm avoidance and self-directedness are so overwhelming it is tempting to conclude that the other TCI variables are superfluous. However, this research has shown that there are significant if subtle personality differences that contribute to health and well-being and personality assessment of the individual may be helpful in determining cognitive and emotional style. Furthermore, this research illustrates that some personality traits (however they are conceptualised) are central to how an individual experiences their world regardless of other factors such as sociodemographic variables. What is encouraging in the Cloninger model of personality is that character is amenable to change and the character trait of self-directedness is one of the two aspects of personality that have a powerful influence on human functioning.
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Appendix A

Ongoing adverse mental health impact of the earthquake sequence in Christchurch, New Zealand:

Removed for copyright reasons.

The article can be accessed at:

https://doi.org/10.1177/0004867414527522
Appendix B

Measures of temperament and character are differentially impacted on by depression severity

Removed for copyright reasons

The article can be accessed at:

http://dx.doi.org/10.1016/j.jad.2010.03.010
Appendix C

Temperament and character as determinants of well-being

Removed for copyright reasons

The article can be accessed at:

http://dx.doi.org/10.1016/j.comppsych.2014.06.011
Appendix D

Canterbury Health, Ageing and Life Course (CHALICE) study: rationale, design and methodology

Removed for copyright reasons

The article can be accessed at:

Appendix E

Ethical approval letters for depression studies.
CANterbury Ethics Committee

9 July 1998

Professor P Joyce
Department of Psychological Medicine
Christchurch School of Medicine
P O Box 4345
CHRISTCHURCH

Dear Professor Joyce

Predictors of response to interpersonal psychotherapy and cognitive behaviour therapy for depression
Investigators: Prof P Joyce, Dr J McKenzie, Dr R Mulder, Dr S Luty, Dr A Rae, Janet Carter, Claire Dowson, Robyn Abbott, Sara Shaughnessy, Isobel Stevens
Protocol Number: 97/12/148

Thank you for the revised information sheet and consent form. I am pleased to advise that, using the delegated authority granted her by the Committee, the Chairperson of the Canterbury Ethics Committee has given final ethical approval for this study to proceed.

The Committee certifies that it is satisfied this trial is not conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is carried out. This certification is given pursuant to Section 5(8) of the Accident Rehabilitation and Insurance Act 1992, as amended.

Approvals granted to protocols are for 12 months. If, after 12 months the study is not completed, it will be necessary to forward to the Committee a request for an extension. A form to assist with this is available from the Administrator. Please quote the above protocol number in all correspondence relating to this study.

It is also a requirement of the Committee that researchers submit a report upon completion of their studies. I look forward to receiving your report in due course.

Yours sincerely

Sally Cook
Ethics Committee Administrator
9 March 1993

Professor P. Joyce
University Department of Psychological Medicine
CHRISTCHURCH SCHOOL OF MEDICINE

Dear Professor Joyce,

**STUDY: PREDICTORS OF OUTCOME IN DEPRESSIVE DISORDERS**

Thank you for the application to the Ethics Committee for consideration of the above study. The Committee has discussed the study at its meeting held on 15 February 1993 and approved the study subject to the following conditions:

a. Compensation should be in terms of ABPI guidelines and this should be stated as such.

b. The Committee was of the opinion the study was a therapeutic study not non-therapeutic as indicated.

c. That the general practitioner be informed of participants involvement in the study.

d. That paragraph 2 on the consent form be reworked to indicate the comment being made by the researchers and that paragraph 5 on the consent form should also be included in the application form.

e. That the researchers forward to the Secretary of the Committee a copy of the questionnaire associated with this study so that a copy is on file for record purposes.

f. That participants be given the opportunity to consider and, if necessary, discuss with others their involvement in the study prior to signing the consent form.

It would be appreciated if you could comment on the above and report back to the Secretary for record purposes.
The study may proceed when the factors mentioned above have been finalised.

Could you please forward a report on conclusion of the study.

Yours sincerely,

[Signature]

W.J. Perrott
SECRETARY
ETHICS COMMITTEE
5 May 1993

Professor P. Joyce,
University Department of Psychological Medicine,
CHRISTCHURCH SCHOOL OF MEDICINE.

Dear Professor Joyce,

STUDY : PREDICTORS OF OUTCOME IN DEPRESSIVE DISORDERS

Further to my letter dated 19 April 1993 and in the light of our telephone conversation the question of compensation has now been satisfactorily resolved.

As the study is investigator initiated and funding only had been sought from the named drug company the compensation provisions set in place by the Minister of Health through the Department of Health apply.

The study may now proceed and it would be appreciated if a report could be forwarded on its conclusion.

Yours sincerely,

W.J. Perrott
SECRETARY
ETHICS COMMITTEE
Appendix F

Information sheets for depression studies
Psychotherapy for Depression

Information Sheet

Introduction

You are invited to take part in a clinical treatment trial of psychotherapies for people who have major depression, being conducted by Professor Peter Joyce, Dr Roger Mulder, Dr Sue Luty, Dr Alma Rae, Janet Carter, Jenny Wilson, Robyn Abbott, Dr Jan McKenzie, Gini McIntosh, Eileen Britt and Isobel Stevens.

The major research questions which we are interested in are to better understand who benefits from a short term psychotherapy, and whether different individuals do better with different types of psychotherapy.

There are a number of well established and effective treatments for depression. These include psychotherapy (or talking therapies) and medication (antidepressants). Two different types of psychotherapy are to be investigated in this study; these are called Cognitive Therapy and Interpersonal Psychotherapy. Cognitive Therapy focuses on how a person’s thinking, feelings and behaviours are associated with the depression. Interpersonal Psychotherapy focuses on a person’s current interpersonal relationships and how they affect his or her well-being. Both of these psychotherapies have been well established as effective treatments for depression.

Each of these therapies is short term and will be 8-19 sessions over 13 weeks with monthly booster sessions for 6 months. We would like to follow participants after the end of treatment to obtain a clear picture about the extent of the improvement and whether or not this is maintained. This will involve being interviewed and completing questionnaires at regular follow-up intervals.

Your participation in this study is completely voluntary. If you agree to take part you may withdraw at any time, for any reason and this will in no way affect your future health care.

More about this study

What are the aims of this study? We hope to determine the factors which would help a therapist choose the best type of psychotherapy for an individual who suffers from depression.

Who can participate in this study? If you are suffering from a major depressive episode, are medically well, 18 years or over and are not taking antidepressant drugs or receiving other treatments for depression, you may participate in this study.

What is a major depressive episode? This is when you experience a number of the following symptoms: loss of interest and enjoyment, sadness, hopelessness, worthlessness, guilt, disturbed sleep and appetite, weight change, loss of energy, fatigue, indecisiveness, and recurring thoughts of death or suicide. These symptoms may have been present for weeks, months or even years. Depressive disorders are relatively common. About one person in ten will suffer from a depressive disorder some time in their lives. Of those who have one episode of depression over half will have more than one episode. Without treatment it is possible that a person will make a full recovery from an episode of depression, however, it is more likely that the depression may persist.
How will participants be selected for this study and who will select them? If you meet the inclusion criteria discussed above, then you will have been referred to this study by your general practitioner, psychiatric emergency service or other mental health services. You may also contact the Clinical Research Unit yourself if you think you are suffering from a major depressive episode.

How many participants will be involved? We hope to study at least 120 people.

Where will the study be held? All assessments and psychotherapy will take place in Terrace House, near Christchurch Hospital.

What is the time span for the study? Your psychotherapy will take 13 weeks, followed by monthly booster sessions for 6 months. We would also like to follow your progress after completion of treatment when you will be contacted by our research nurse at intervals for up to five years.

What will happen during the study? Your participation in this study first involves an assessment by a psychiatrist, psychiatric registrar, or clinical psychologist. At this time the researcher will explain the study in more detail and answer any questions you have.

If you feel that you may benefit from our treatment and there is no reason why our treatment would not be appropriate, the researcher will obtain your consent to participate in the study and organise a time for you to attend the clinical research unit for a more detailed assessment. This will involve an afternoon during which we will take blood samples from you and an assessment of your depression and relevant factors. You will be asked to complete a booklet containing questions about your depressive symptoms, current relationships, and aspects of your childhood and personality. This takes approximately an hour to complete. While some of these questions will be asked once, other questions (eg. symptoms and functioning) will be asked before each session of therapy and during follow-up in order to obtain details of any changes. These questionnaires take only about 5 to 10 minutes of your time.

We will also obtain your permission to talk with a friend or family member of your choosing. We wish to ask them questions about you and how they see your depression and related difficulties. We will provide them with information about depression. The extent of their involvement, the details we tell them about your depression, and whether we see them alone or with you can vary depending upon your wishes.

Following the assessment you will be randomly allocated to receive one of the two psychotherapies and begin treatment with your therapist. Randomly allocated means that neither you nor the therapist choose which psychotherapy you will receive, but that it is chosen “by the flip of a coin”. All therapists in this study are clinical psychologists, senior psychiatric registrars or consultant psychiatrists. You will have 13 weeks of psychotherapy, followed by monthly booster sessions for 6 months. All treatment is free of charge. At the end of the psychotherapy sessions a number of options will be discussed with you depending upon your progress to date.

You will be asked if you consent to having therapy sessions audiotaped. This is to ensure a high quality of treatment. Some audiotapes may be heard by other members of the research team. You have the option of stopping the taping or having the tapes destroyed at any time. Clinical notes are the property of the CHE and are subject to their regulations.
There is no obligation for you to take part in this study. If you choose not to participate we will refer you back to your general practitioner or other appropriate health professional which may be at your own expense.

**Will my GP know I am in the study?** We prefer to advise your GP that you are involved with this treatment programme, however, this is your decision.

**Why blood tests?** The blood tests are for two purposes; some are to check that you are currently physically healthy (e.g. blood count, thyroid tests), while others are for research purposes. The tests for research purposes are mainly hormones and related chemicals which may provide us with information about your depression.

We also extract and store DNA (genetic material). Each person has a DNA make-up (their genes) which is different from that of everybody else – except in the case of identical twins. This genetic make-up is a mixture of the genes of our mother and father. The precise way they are mixed varies from child to child within the same family, so having the same parents does not mean that two children will have exactly the same genes. We already know that some health conditions and disorders are definitely inherited through the genes (hereditary conditions), but we do not know how many conditions are explained by genetic inheritance. Inherited genes may explain why some people are more resistant and some people are more prone to disorders which have not yet been identified as hereditary. The research you are invited to participate in will investigate how genes that code for neurotransmitters such as serotonin, dopamine and noradrenaline are related to a diagnosis of depression, to specific depressive symptoms and behaviours such as suicide attempts, and to personality traits, particularly the temperament traits of novelty-seeking, harm avoidance, reward dependence and persistence.

DNA samples will be identified only with a code and as with all other material gathered in this research will be confidential and will not be disclosed or used in any way without your informed consent. In particular the researchers will not claim any right, ownership or property in your individual genetic information or that of your kinship group, hapu or iwi, without your having first sought or obtained informed consent to the transfer of any such right, ownership or property. Your consenting to participate in DNA sampling for the proposed study will not be construed as creating any right or claim on the part of the researchers to your genetic information.

DNA samples will be retained for a maximum of 5 years. If you decide to withdraw your consent to the storage of your DNA samples during this storage period, you may do so by contacting the Clinical Research Unit, ph 372 0400, or by writing to the address at the end of this Information Sheet.

The initial blood tests will require about three hours during which time you will be resting comfortably with a needle inserted in a vein from which we will draw a series of blood samples. Towards the end of this time a hormone (thyroid releasing hormone) will be infused; this may cause short lived (1-2 minutes) side effects such as flushing, nausea or fullness of the bladder.

**Risks and Benefits**

**What are the risks of participation?** There may be some discomfort associated with talking about personal issues in psychotherapy. We will take all precautions to maintain confidentiality. All forms and computer files will be marked with numbers only, not names.
No names will be used when the results of this study are published. Participants in this study will not receive any payment or reimbursement of expenses.

What are the benefits of participation? This is a therapeutic study using treatments which have been proven to be effective in treating depression. Without treatment it is possible that your depression may persist for months or even longer. There is no charge for any of the assessments or psychotherapy you receive in this study.

Participation

- Your participation in this study is entirely voluntary (your choice).
- If you agree to take part, you are free to withdraw from this study at any time, for any reason.
- If you choose not to take part or to withdraw, this will not affect any of your future care or treatment. We will refer you back to your general practitioner or other health professionals as appropriate.
- While we anticipate that most people participating in this study will be treated as outpatients, if the nature of your depression indicated the need for inpatient care or alternative treatments then these would be organised.

If you have any queries or concerns about your rights as a participant in this study you are free to contact a Health and Disability Services Consumer Advocate, ph. (03) 377 7501.

Confidentiality

No material which could personally identify you will be used in any reports based on this study. The data from this study will be available only to the study investigators. All data will be stored in secure areas.

You do not have to answer all the interview questions and you may stop the interview at any time.

Results

How can I get results of this research? When this study is over you may have a summary of the key results. Detailed results will be published in international scientific journals.

Compensation

There may be compensation available to you in the unlikely event that you are injured taking part in this research. If you suffer physical injury as a result of your participation in this clinical trial, you may be covered by ACC. You should note, however, that eligibility for cover is not automatic. You would be in the same position as a claimant who has suffered physical injury as a result of medical error or negligence, or as a result of medical mishap, ie. an adverse consequence of treatment which is both rare and severe.

If your claim for cover is accepted by ACC, your entitlement to compensation would depend on a number of factors, such as whether you are an earner or non-earner. You should note that in most cases ACC provides only partial reimbursement of costs and expenses and there is no lump sum compensation payable under current ACC legislation. You should also be aware that if you have cover under the ACC legislation, your risk to sue the researcher(s) or anyone else involved in the clinical trial is extremely limited. If you have any questions about
cover or entitlements under the ACC scheme, you should contact your nearest ACC branch office for further information before you consent to participate in this trial.

This study has received ethical approval from the Canterbury Ethics Committee.

Where can I get more information about the study? Janet Carter may be contacted by telephone or by letter: ‘Depression Research’, Clinical Research Unit, University Department of Psychological Medicine, Terrace House, 4 Oxford Terrace, Christchurch, Ph 372 0400.

Once people are referred we will make every effort to see them within the week, or sooner.
Information Sheet

Individual Differences and Antidepressants

Background
Individuals differ greatly in the ways in which they their bodies metabolize or get rid of antidepressants. If two people are given an equal amount of the same antidepressant, they might differ by as much as 20 times in how quickly or slowly they metabolize the medicine. These differences can be important. People who metabolize antidepressants very slowly may be more likely to develop side effects. People who metabolize antidepressants very quickly may be less likely to experience their beneficial effects.

Some of these differences from one person to the next may have a genetic basis. The techniques by which to look for such genetic differences have recently become available.

Outline of this Project
You have been asked to participate in this study because you are being treated with an antidepressant (nortriptyline or fluoxetine) in the "Outcome of Depression Study" OR because your doctor thinks that you have had side effects or beneficial effects of unusually small or large doses of antidepressants.

People who decide to participate in our study will be asked to give a small blood sample (5 mls or one teaspoon drawn from a vein in your arm) that will be used for genetic analyses. In addition, we ask that we could discuss your medications with your doctor and to talk to you briefly about the problems you may have had.

Risks to Subjects
There may be some discomfort or bruising associated with collecting the blood sample. There is a small risk of loss of confidentiality of information which we will take all reasonable precautions to minimize.

Benefits to Subjects
There are few direct benefits to participation. We hope that these studies will help us to understand more about the individual differences in metabolism and antidepressants.

For more information, please contact:

Dr Patrick Sullivan
372-0400
(At the Department of Psychological Medicine, Christchurch School of Medicine)
Patient Information Sheet

Genes, Behaviour, Personality, and Depression

Principal Investigator
Dr Patrick Sullivan, Department of Psychological Medicine, Christchurch School of Medicine, Private Bag 4345, Christchurch. Telephone: 03-372-0400. FAX: 03-372-0407.

Introduction.

Some months ago, as part of the Outcome of Depression Study, you gave a blood sample so that we could investigate the genes that get rid of antidepressant medications. We are now inviting you to allow us to analyse that blood sample for a number of other genes that may be important to certain types of behaviour and to personality. For example, it has recently been shown that one particular gene is associated with the personality trait of "novelty seeking". This trait reflects the degree to which a person seeks new sensations.

We are interested in using these stored blood samples to see whether a number of genes are associated with (for example) certain personality traits and even with depression itself.

Your participation in this study will take no time. There is no obligation for you to agree to take part in this research.

About the Study.

What are the aims of the study? We hope to identify some of the genes that are related to certain behavioural and personality traits and to depression itself.

Why was I selected for this study? Because you had previously given a blood sample as a part of the outcome of depression study.

How many participants will be involved? About 100.

Where will the study be held? Not applicable.

What is the time span for the study? Your participation will take no time.

What are the benefits of the study? There are few direct benefits to participation.

This is a "non-therapeutic" study in that no treatment is offered.

Will taking part cost me anything? No.

Will I receive any payment? No.
Patient Information Sheet

Participation.
Your participation is entirely voluntary (your choice).
You do not have to take part in this study.
You are free to withdraw from this study at any time, for any reason.

Where can I get more information about the study?
Contact Dr Patrick Sullivan at 03-372-0400. If you have any queries about your rights as a participant in this study you may wish to contact the Patient Advocacy Service (03:364-0581).

Confidentiality.
You identity will not be revealed in any reports based on this study. The data from this study will be available only to the study investigators. All data will be stored in secure areas.

How can I get results of this research?
When the study is over, we would like to send you a summary of the key results. Detailed results will be published in international scientific journals.

Compensation.
In the unlikely event that you are injured taking part in this study, any compensation would be determined by ACC.

This study has received ethical approval from the Southern Regional Health Authority Ethics Committee (Canterbury).

Please feel free to contact the researcher if you have any questions about this study.
Appendix G

Consent forms for depression studies
Psychotherapy for Depression

Consent Form

I have been invited to take part in a study of psychotherapies for people with major depression being conducted by Professor Peter Joyce, Dr Roger Mulder, Dr Sue Luty, Dr Alma Rae, Janet Carter, Jenny Wilson, Robyn Abbott, Dr Jan McKenzie, Gini McIntosh, Eileen Britt and Isobel Stevens.

I have heard and understand an explanation of this study. I have been given an opportunity to discuss the study and ask questions about it. I am satisfied with the answers I have been given.

I have had enough time to consider whether to take part and to discuss my decision with a person of my choice and the researcher. I know who to contact if I have any questions about the study.

I understand that:

* My taking part in this study is voluntary (my choice).
* I am free to withdraw from the study at any time and for any reason, without adversely affecting my present or future treatment.
* I have read and understand the compensation statements on the Information Sheet.
* I will be interviewed, complete questionnaires and have blood tests in order to obtain a detailed assessment of my depression and related issues.
* I am free to stop the interview at any time and to refuse to answer any questions I don’t want to answer.
* I will be asked to nominate a family member or close friend to discuss with the researchers how they see my depressive illness and related difficulties.
* There may be times when psychotherapy is challenging.
* The taping of therapy sessions is for research purposes and some tapes may be heard by other members of the research team. The purpose of this is to ensure that the therapy is of a high quality.
* I have the option of stopping the taping or having the tapes destroyed.
* I understand that the treatment being provided is not experimental, but that it is consistent with current knowledge about optimal treatments for depression.
* My participation in this study is confidential and no information that could identify me will be used in any reports on this study.

I have read and understand the Information Sheet given to volunteers in this study. I will be given a copy of this consent form.

I understand that this study has received ethical approval from the Canterbury Ethics Committee.
Consent Form

I consent to take part in this study.

Participant’s signature: ____________________________

Date: ____________________________

I AGREE / DISAGREE to have my therapy sessions taped.

Participant’s signature: ____________________________

Date: ____________________________

I AGREE / DISAGREE to have my General Practitioner contacted regarding my participation in this study and my progress.

Participant’s signature: ____________________________

Date: ____________________________

I am aware that the proposed study will involve analyses of genetic links with a diagnosis of major depression, specific behaviours and personality traits associated with major depression. I understand that if I consent to such analyses, I am not giving up any rights and no rights will be created for the researchers to my genetic information. I understand that I may withdraw the right to storage of such material at any point of the 5-year storage period.

I DO / DO NOT consent to such analysis being performed.

Participant’s signature: ____________________________

Date: ____________________________

I wish to receive a copy of the results of this study: YES NO

In my opinion, consent was freely given and the participant understands what is involved in this study.

Witness’ signature: ____________________________

Date: ____________________________
The Christchurch School of Medicine
University Department Of Psychological Medicine

OUTCOME OF DEPRESSION STUDY

CONSENT FORM

I have been asked to participate in a research project being conducted by Drs P. Joyce, R. Mulder, P. Sullivan, J. McKenzie, S. Luty, N. Carney, Mrs R. Abbott and I. Stevens of the University Department of Psychological Medicine, Christchurch School of Medicine and the Clinical Research Unit, Canterbury Mental Health Services.

The purpose of the research is to improve the understanding of why some people with depression make a full and lasting recovery, while for other people the outcome involves varying degrees of ongoing depressive and related symptoms.

My participation will involve the following:
1. A detailed assessment of my current depression and of factors relevant to it. This will involve being interviewed, completing questionnaires and having blood tests.
2. After the initial assessment I understand I will be randomly allocated to receive either fluoxetine or nortriptyline, both of which are widely used antidepressant drugs. Although which drug I receive will be determined randomly, both I and my doctor will at all times know which drug I am receiving, and the likely effectiveness and side effects will be described to me.
3. Following the initial treatment with either fluoxetine or nortriptyline, which will be for about six weeks, my doctor and I will discuss ongoing treatment options for me. These options will include ongoing treatment with the research team for up to two years, referral to other mental health services or to my general practitioner.
4. I understand that regardless of the ongoing nature of my treatment, the research team will see me and reassess my situation six weeks, six months, twelve months and two years after my initial assessment. During these two years the research team will be willing to resume my treatment regardless of any earlier decisions on treatment that I make.
5. Between the time of my initial assessment and six weeks, and at intervals during the next two years the research team will also see a family member or friend, of my choosing, who will be asked for information about me and who will be provided with information about my depression. However, I understand that the research team will not release personal information to my chosen family member or friend, if so requested.

I understand that the blood tests will involve my attendance at the clinical research unit for an afternoon, during which time I will have a needle resting in a vein. I understand that occasionally there may be slight discomfort in giving blood samples, and that there is a small chance of bruising. These blood tests include receiving an injection of a hormone called thyroid releasing hormone which may cause transient flushing, nausea, or fullness in the bladder, but which has no known long-term effects.

I understand that the research team will provide treatment for my depression for up to two years, and that this will be free to me, apart from normal prescription charges.

I understand that the treatment being provided is not experimental but consistent with current knowledge about optimal treatment of depression. I understand that the research aspects involve the extensive and thoroughness of assessments before, during and after treatment, and the use of this information to understand why some people treated for depression make full and sustained recoveries, while for other people depression and related difficulties are ongoing problems.

I understand that if I am dissatisfied with my treatment or with the research assessments I have recourse to the usual options including the patient advocacy service.

I understand that this research project has been approved by the Canterbury Ethics Committee and that I may withdraw at any time. I understand that if I withdraw or refuse to participate this will not adversely affect my continuing medical care.

I understand that the investigators will take all reasonable measures to protect the confidentiality of my records and that the investigators are willing to answer any enquiries I may have about this research.

I have read this consent form and have had the opportunity for discussion. I hereby consent to participate in this research project, examining the outcome of treatment for depression.

_____________________________  ______________________________
Participant's signature   Date

_____________________________
Witness' signature

_____________________________
Investigator's signature
Appendix H

238 item version of the TCI with scoring key
**T.C.I.**

Read each statement carefully, but don't spend too much time deciding on the answer.

Please answer every statement by circling either "T" or "F" after each question, even if you are not completely sure of the answer.

Remember there are no right or wrong answers - just describe your own personal opinions and feelings.

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I often try new things just for fun and thrills, even if most people think it is a waste of time</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>2.</td>
<td>I usually am confident that everything will go well even in situations that worry most people</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>3.</td>
<td>I am often moved deeply by a fine speech or poetry</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>4.</td>
<td>I often feel that I am the victim of circumstances</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>5.</td>
<td>I can usually accept other people as they are, even when they are very different from me</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>6.</td>
<td>I believe that miracles happen</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>7.</td>
<td>I enjoy getting revenge on people who hurt me</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>8.</td>
<td>Often when I am concentrating on something, I lose awareness of the passage of time</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>9.</td>
<td>Often I feel that my life has little purpose or meaning</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>10.</td>
<td>I like to help find a solution to problems so that everyone comes out ahead</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>11.</td>
<td>I could probably accomplish more than I do, but I don't see the point in pushing myself harder than is necessary to get by</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>12.</td>
<td>I often feel tense and worried in unfamiliar situations, even when others feel there is little to worry about</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>13.</td>
<td>I often do things based on how I feel at the moment without thinking about how they were done in the past</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>14.</td>
<td>I usually do things my own way, rather than giving in to the wishes of other people</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>15.</td>
<td>I often feel so connected to the people around me that it is like there is no separation between us</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>16.</td>
<td>I generally don't like people who have different ideas from me</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>17.</td>
<td>In most situations my natural responses are based on good habits that I have developed</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>18.</td>
<td>I would do almost anything legal in order to become rich and famous, even if I would lose the trust of many old friends</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>19.</td>
<td>I am much more reserved and controlled than most people</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>20.</td>
<td>I often have to stop what I am doing because I start worrying about what might go wrong</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>21.</td>
<td>I like to discuss my experiences and feelings openly with friends instead of keeping them to myself</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>22.</td>
<td>I have less energy and get tired more quickly than most people</td>
<td>T</td>
<td>F</td>
</tr>
</tbody>
</table>
23. I am often called "absent-minded" because I get so wrapped up in what I am doing that I lose track of everything else .................................................. T F
24. I seldom feel free to choose what I want to do .................................................. T F
25. I often consider another person's feelings as much as my own .......................... T F
26. Most of the time I would prefer to do something a little risky (like riding in a fast automobile over steep hills and sharp turns) rather than having to stay quiet and inactive for a few hours ............ T F
27. I often avoid meeting strangers because I lack confidence with people I do not know .................................................. T F
28. I like to please other people as much as I can .................................................. T F
29. I like old "tried and true" ways of doing things much better than trying "new and improved" ways .................................................. T F
30. Usually I am not able to do things according to their priority of importance to me because of lack of time .................................................. T F
31. I often do things to help protect animals and plants from extinction ................ T F
32. I often wish that I was smarter than everyone else ........................................ T F
33. It gives me pleasure to see my enemies suffer .................................................. T F
34. I like to be very organized and set up rules for people whenever I can ................. T F
35. It is difficult for me to keep the same interests for a long time because my attention often shifts to something else .................................................. T F
36. Repeated practice has given me good habits that are stronger than most momentary impulses or persuasion .................................................. T F
37. I am usually so determined that I continue to work long after other people have given up .................................................. T F
38. I am fascinated by the many things in life that cannot be scientifically explained .................................................. T F
39. I have many bad habits that I wish I could break .................................................. T F
40. I often wait for someone else to provide a solution to my problems .................. T F
41. I often spend money until I run out of cash or get into debt from using too much credit .................................................. T F
42. I think I will have very good luck in the future .................................................. T F
43. I recover more slowly than most people from minor illnesses or stress .............. T F
44. It wouldn't bother me to be alone all the time .................................................. T F
45. Often I have unexpected flashes of insight or understanding while relaxing .... T F
46. I don't care very much whether other people like me or the way I do things ........ T F
47. I usually try to get just what I want for myself because it is not possible to satisfy everyone anyway .................................................. T F
48. I have no patience with people who don't accept my views .......................... T F
49. I don't seem to understand most people very well ........................................ T F
50. You don’t have to be dishonest to succeed in business

51. I sometimes feel so connected to nature that everything seems to be part of one living organism

52. In conversations I am much better as a listener than as a talker

53. I lose my temper more quickly than most people

54. When I have to meet a group of strangers, I am more shy than most people

55. I am more sentimental than most people

56. I seem to have a "sixth sense" that sometimes allows me to know what is going to happen

57. When someone hurts me in any way, I usually try to get even

58. My attitudes are determined largely by influences outside my control

59. Each day I try to take another step toward my goals

60. I often wish I was stronger than everyone else

61. I like to think about things for a long time before I make a decision

62. I am more hard-working than most people

63. I often need naps or extra rest periods because I get tired so easily

64. I like to be of service to others

65. Regardless of any temporary problem that I have to overcome, I always think it will turn out well

66. It is hard for me to enjoy spending money on myself, even when I have saved plenty of money

67. I usually stay calm and secure in situations that most people would find physically dangerous

68. I like to keep my problems to myself

69. I am often troubled by the difficulties I have dealing with others

70. I like to stay at home better than to travel or explore new places

71. I do not think it is smart to help weak people who cannot help themselves

72. I cannot have any peace of mind if I treat other people unfairly, even if they are unfair to me

73. People will usually tell me how they feel

74. I often wish I could stay young forever

75. Sometimes I get upset

76. Sometimes I have felt like I was part of something with no limits or boundaries in time or space

77. I sometimes feel a spiritual connection to other people that I cannot explain in words

78. I try to be considerate of other people's feeling, even when they have been unfair to me in the past
79. I like it when people can do whatever they want without strict rules and regulations..............T  F
80. I would probably stay relaxed and outgoing when meeting a group of strangers, even if
    I were told they are unfriendly............................................................T  F
81. Usually I am more worried than most people that something might go wrong in the future......T  F
82. I usually think about all the facts in detail before I make a decision...................................T  F
83. I feel it is more important to be sympathetic and understanding of other people than to be
    practical and tough-minded...................................................................T  F
84. I often feel a strong sense of unity with all the things around me........................................T  F
85. I often wish I had special powers like Superman...............................................................T  F
86. Other people control me too much.......................................................................................T  F
87. I like to share what I have learned with other people............................................................T  F
88. Religious experiences have helped me to understand the real purpose of my life................T  F
89. I often learn a lot from people..............................................................................................T  F
90. Repeated practice has allowed me to become good at many things that help me
    to be successful.................................................................................................T  F
91. I am usually able to get other people to believe me, even when I know that what I am
    saying is exaggerated or untrue..........................................................................T  F
92. I need much extra rest, support, or reassurance to recover from minor illnesses or stress......T  F
93. I know there are principles for living that no one can violate without suffering in the long run...T  F
94. I don’t want to be richer than everyone else........................................................................T  F
95. I would gladly risk my own life to make the world a better place........................................T  F
96. Even after thinking about something a long time, I have learned to trust my feelings
    more than my logical reasons...................................................................................T  F
97. Sometimes I have felt my life was being directed by a spiritual force
    greater than any human being................................................................................T  F
98. I usually enjoy being mean to anyone who has been mean to me..........................................T  F
99. I have a reputation as someone who is very practical and does not act on emotion............T  F
100. It is easy for me to organise my thoughts while talking to someone....................................T  F
101. I haven’t got as far as I’d like to in life because of the kind of person I am............................T  F
102. I am strongly moved by sentimental appeals (like when asked to help crippled children).....T  F
103. I usually push myself harder than most people do because I want to do as well
    as I possibly can.................................................................................................T  F
104. I have so many faults that I don’t like myself very much.....................................................T  F
105. I have too little time to look for long-term solutions for my problems.................................................T F
106. I often cannot deal with problems because I just don't know what to do.............................................T F
107. I often wish I could stop the passage of time .........................................................................................T F
108. I hate to make decisions based only on my first impressions...............................................................T F
109. I prefer spending money rather than saving it.......................................................................................T F
110. I can usually do a good job of stretching the truth to tell a funnier story or to play a joke on someone.................................................................................................................T F
111. Occasionally I talk about people behind their backs................................................................................T F
112. If I am embarrassed or humiliated, I get over it very quickly.................................................................T F
113. It is extremely difficult for me to adjust to changes in my usual way of doing things because I get so tense, tired, or worried.......................................................................................................T F
114. I usually demand very good practical reasons before I am willing to change my old ways of doing things..................................................................................................................................T F
115. I need a lot of help from other people to train me to have good habits..................................................T F
116. I think that extra-sensory perception (ESP like telepathy or precognition) is really possible..........................T F
117. I would like to have warm and close friends with me most of the time......................................................T F
118. A nuclear war may not be such a bad idea.................................................................................................T F
119. I nearly always stay relaxed and carefree, even when nearly everyone else is fearful............................T F
120. I find sad songs and movies pretty boring................................................................................................T F
121. Circumstances often force me to do things against my will......................................................................T F
122. It is hard for me to tolerate people who are different from me.................................................................T F
123. I think that most things that are called miracles are just chance..................................................................T F
124. I would rather be kind than get revenge when someone hurts me............................................................T F
125. I often become so fascinated with what I'm doing that I get lost in the moment - like I'm detached from time and place.................................................................................................................T F
126. I do not think I have a real sense of purpose for my life............................................................................T F
127. I try to cooperate with others as much as possible.....................................................................................T F
128. I am satisfied with my accomplishments, and have little desire to do better.............................................T F
129. I often feel tense and worried in unfamiliar situations, even when others feel there is no danger at all..................................................................................................................................T F
130. I often follow my instincts, hunches, or intuition without thinking through all the details..........................T F
131. Other people often think that I am too independent because I won’t do what they want........................T F
132. I often feel a strong spiritual or emotional connection with all the people around me. T
133. It is usually easy for me to like those people who have different values from me. T
134. Other people often seem bothered by the things I do or say. T
135. Good habits have become "second nature" to me -- they are automatic and spontaneous actions nearly all the time. T
136. I don't mind the fact that other people often know more than I do about something. T
137. I usually try to imagine myself "in other people's shoes", so I can really understand them. T
138. Principles like fairness and honesty have little role in some aspects of my life. T
139. I am better at saving money than most people. T
140. I have never told a lie. T
141. Even when most people feel it is not important, I often insist on things being done in a strict and orderly way. T
142. I feel very confident and sure of myself in almost all social situations. T
143. My friends find it hard to know my feelings because I seldom tell them about my private thoughts. T
144. I hate to change the way I do things, even if many people tell me there is a new and better way to do it. T
145. I think it is unwise to believe in things that cannot be explained scientifically. T
146. I like to imagine my enemies suffering. T
147. I am more energetic and tire less quickly than most people. T
148. I like to pay close attention to details in everything I do. T
149. I often stop what I am doing because I get worried, even when my friends tell me everything will go well. T
150. I often wish I was more powerful than everyone else. T
151. I usually am free to choose what I will do. T
152. Often I become so involved in what I am doing that I forget where I am for a while. T
153. Members of a team rarely get their fair share. T
154. Most of the time I would prefer to do something risky (like hang-gliding or parachute jumping), rather than having to stay quiet and inactive for a few hours. T
155. Because I so often spend too much money on impulse, it is hard for me to save money, even for special plans like a vacation. T
156. I don't go out of my way to please other people. T
157. I am not shy with strangers at all. T
158. I often give in to the wishes of friends. T
| 159. | I spend most of my time doing things that seem necessary but not really important to me. | F |
| 160. | I don't think that religious or ethical principles about what is right and wrong should have much influence in business decisions. | F |
| 161. | I often try to put aside my own judgments so that I can better understand what other people are experiencing. | F |
| 162. | Many of my habits make it hard for me to accomplish worthwhile goals. | F |
| 163. | I have made real personal sacrifices in order to make the world a better place -- like trying to prevent war, poverty and injustice. | F |
| 164. | I never worry about terrible things that might happen in the future. | F |
| 165. | I almost never get so excited that I lose control of myself. | F |
| 166. | I often give up a job if it takes much longer than I thought it would. | F |
| 167. | I prefer to start conversations, rather than waiting for others to talk to me. | F |
| 168. | Most of the time I quickly forgive anyone who does me wrong. | F |
| 169. | My actions are determined largely by influences outside my control. | F |
| 170. | The way I behave often gets me into trouble on the job, at school or at home. | F |
| 171. | I prefer to wait for someone else to take the lead in getting things done. | F |
| 172. | I usually respect the opinions of others. | F |
| 173. | I have had experiences that made my role in life so clear to me that I felt very excited and happy. | F |
| 174. | It is fun for me to buy things for myself. | F |
| 175. | I believe that I have experienced extra-sensory perception myself. | F |
| 176. | I believe that my brain is not working properly. | F |
| 177. | My behaviour is strongly guided by certain goals that I have set for my life. | F |
| 178. | It is usually foolish to promote the success of other people. | F |
| 179. | I often wish I could live forever. | F |
| 180. | I usually like to stay cool and detached from other people. | F |
| 181. | I am more likely to cry at a sad movie than most people. | F |
| 182. | I recover more quickly than most people from minor illnesses or stress. | F |
| 183. | I often break rules and regulations when I think I can get away with it. | F |
| 184. | I need much more practice in developing good habits before I will be able to trust myself in many tempting situations. | F |
| 185. | I wish other people didn't talk as much as they do. | F |
| 186. | Everyone should be treated with dignity and respect, even if they seem to be unimportant or bad. | F |
187. I like to make quick decisions so I can get on with what has to be done T F
188. I usually have good luck in whatever I try to do T F
189. I am usually confident that I can easily do things that most people would consider dangerous (such as driving an automobile fast on a wet or icy road) T F
190. I am bothered by the kind of person I am T F
191. I like to explore new ways to do things T F
192. I enjoy saving money more than spending it on entertainment or thrills T F
193. Individual rights are more important than the needs of any group T F
194. I have had personal experiences in which I felt in contact with a divine and wonderful spiritual power T F
195. I have had moments of great joy in which I suddenly had a clear, deep feeling of oneness with all that exists T F
196. Good habits make it easier for me to do things the way I want T F
197. Most people seem more resourceful than I am T F
198. Other people and conditions are often to blame for my problems T F
199. It gives me great pleasure to help others, even if they have treated me badly T F
200. I often feel like I am a part of the spiritual force on which all life depends T F
201. Even when I am with friends, I prefer not to "open up" very much T F
202. I usually can stay "on the go" all day without having to push myself T F
203. I nearly always think about all the facts in detail before I make a decision, even when other people demand a quick decision T F
204. I am not very good at talking my way out of trouble when I am caught doing something wrong T F
205. I am more of a perfectionist than most people T F
206. Whether something is right or wrong is just a matter of opinion T F
207. I think my natural responses now are usually consistent with my principles and long-term goals T F
208. I believe that all life depends on some spiritual order or power that cannot be completely explained T F
209. I think I would stay confident and relaxed when meeting strangers, even if I were told they are angry at me T F
210. People find it easy to come to me for help, sympathy, and warm understanding T F
211. I am slower than most people to get excited about new ideas and activities T F
212. I have trouble telling a lie, even when it is meant to spare someone else's feelings T F
213. There are some people I don't like T F
214. I don't want to be more admired than everyone else ................................................. T F
215. Often when I look at an ordinary thing, something wonderful happens -- I get the feeling that I am seeing it fresh for the first time ................................................. T F
216. Most people I know look out only for themselves, no matter who else gets hurt ................. T F
217. I usually feel tense and worried when I have to do something new and unfamiliar .......... T F
218. I often push myself to the point of exhaustion or try to do more than I really can .............. T F
219. Some people think I am too stingy or tight with my money ........................................ T F
220. Reports of mystical experiences are probably just wishful thinking .................................. T F
221. My will power is too weak to overcome very strong temptations, even if I know I will suffer as a consequence ................................................................. T F
222. I hate to see anyone suffer ......................................................................................... T F
223. I know what I want to do in my life ............................................................................. T F
224. I regularly take time to consider whether what I am doing is right or wrong .................. T F
225. Things often go wrong for me unless I am very careful ................................................ T F
226. If I am feeling upset, I usually feel better around friends than when left alone ................ T F
227. I don't think it is possible for one person to share feelings with someone else who hasn't had the same experiences ................................................................. T F
228. It often seems to other people like I am in another world because I am so completely unaware of things going on around me ................................................................. T F
229. I wish I were better looking than everyone else ............................................................. T F
230. I have lied a lot on this questionnaire ........................................................................... T F
231. I usually stay away from social situations where I would have to meet strangers, even if I am assured that they will be friendly ................................................................. T F
232. I love the blooming of flowers in the spring as much as seeing an old friend again ............ T F
233. I usually look at a difficult situation as a challenge or opportunity ................................. T F
234. People involved with me have to learn how to do things my way ....................................... T F
235. Dishonesty only causes problems if you get caught ...................................................... T F
236. I usually feel much more confident and energetic than most people, even after minor illnesses or stress ................................................................. T F
237. I like to read everything when I am asked to sign any papers ........................................... T F
238. When nothing new is happening, I usually start looking for something that is thrilling or exciting ................................................................. T F
**Temperament and Character Inventory (TCI) used in Nortrip/Fluox study**

The TCI is a 238 item true/false questionnaire to describe temperament and character, from which seven major scales, each with sub-scales, are derived. To score, allocate 1 to the items that are “correct”, and 0 to those that are “incorrect”. Total the item scores to achieve sub-scale scores; and total the sub-scale scores to achieve the major scales.

**Sub-scale Composition:**

**Novelty-seeking**

<table>
<thead>
<tr>
<th>NS1</th>
<th>Exploratory excitability v. stoic rigidity (11 items)</th>
<th>True - 1, 167, 191, 238.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>False - 29, 52, 70, 99, 114, 144, 211.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NS2</th>
<th>Impulsiveness v. reflection (10 items)</th>
<th>True - 13, 35, 130, 187.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>NS3</th>
<th>Extravagance v. reserve (9 items)</th>
<th>True - 41, 109, 155, 174.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>False - 19, 66, 139, 192, 219.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>False - 34, 141, 165, 204, 212.</td>
</tr>
</tbody>
</table>

**NS TOTAL: NS1 + NS2 + NS3 + NS4 (40 items)**

**Harm Avoidance**

<table>
<thead>
<tr>
<th>HA1</th>
<th>Anticipatory worry &amp; pessimism v. uninhibited optimism (11 items)</th>
<th>True - 20, 81, 149, 225.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>False- 2, 42, 65, 112, 119, 164, 188.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HA2</th>
<th>Fear of uncertainty (7 items)</th>
<th>True - 12, 129, 217.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>False- 26, 67, 154, 189.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HA3</th>
<th>Shyness with strangers (8 items)</th>
<th>True - 27, 54, 231.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HA4  Fatigability v. asthenia (9 items)

True - 22, 43, 63, 92, 113.
False - 147, 182, 202, 236.

HA TOTAL: HA1 + HA2 + HA3 + HA4  (35 items)

Reward Dependence

RD1  Sentimentality (10 items)

True - 3, 28, 55, 83, 102, 158, 181, 210, 224.
False - 120.

RD3  Attachment (8 items)

True - 21, 117, 226.
False - 44, 68, 143, 180, 201.

RD4  Dependence (6 items)

True -
False - 14, 46, 71, 131, 156, 193.

RD TOTAL: RD1 + RD3 + RD4  (24 items)

Persistence

RD2  Persistence (8 items)

True - 37, 62, 103, 205, 218.
False - 11, 128, 166.

RD2 TOTAL: RD2
Self-Directiveness

S1  Responsibility vs. blaming (8 items)  True - 151.
    False - 4, 24, 58, 86, 121, 169, 198.

S2  Purposefulness vs. lack of goal direction (8 items)  True - 59, 177, 223.
    False - 9, 30, 105, 126, 159.

S3  Resourcefulness (5 items)  True - 233.
    False - 40, 106, 171, 197.

    False - 32, 60, 74, 85, 107, 150, 179, 229.

S5  Enlightened second nature (12 items)  True - 17, 36, 90, 135, 196, 207.
    False - 39, 104, 115, 162, 184, 221.

S Total:  S1 + S2 + S3 + S4 + S5  (44 items)

Cooperativeness

C1  Social acceptance vs. social intolerance (8 items)  True - 5, 89, 133, 172.
    False - 16, 48, 122, 234.

C2  Empathy vs. social disinterest (7 items)  True - 25, 73, 137, 161.
    False - 49, 185, 227.

C3  Helpfulness vs. unhelpfulness (8 items)  True - 10, 64, 87, 127.
    False - 47, 153, 178, 216.

C4  Compassion vs. revengefulness (10 items)  True - 78, 124, 168, 199, 222.
    False - 7, 33, 57, 98, 146.
C5 Pure-hearted conscience vs. self-serving advantage (9 items)  
True - 50, 72, 93, 186.  

C Total: C1 + C2 + C3 + C4 + C5 (42 items)

Self-Tanscendence

ST1 Spiritual acceptance vs. rational materialism (13 items)  
True - 6, 38, 56, 77, 88, 97, 116, 175, 194, 208.  
False - 123, 145, 220.  

ST2 Self-forgetful vs. self-conscious experience (11 items)  
173, 195, 215, 228.  
True - 8, 23, 45, 76, 96, 125, 152, 173, 195, 215, 228.  
False -

ST3 Transpersonal identification vs. self-differentiation  
200, 232.  
(9 items)  
False -

ST Total: ST1 + ST2 + ST3 (33 items)

PDQ-R Scale

Impairment/distress (5 items)  
True - 69, 101, 134, 170, 190.  
False -

L Scale (7 items)  
True - 118, 140, 176, 230.  
False - 75, 111, 213.
Appendix I

293 item version of the TCI with scoring key
**T.C.I.**

Read each statement carefully, but don’t spend too much time deciding on the answer.

Please answer every statement by circling either “T” or “F” after each question, even if you are not completely sure of the answer.

Remember there are no right or wrong answers - just describe your own personal opinions and feelings.

<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>TRUE</th>
<th>FALSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I often try new things just for fun and thrills, even if most people think it is a waste of time</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>2.</td>
<td>I usually am confident that everything will go well even in situations that worry most people</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>3.</td>
<td>Whether something is right or wrong is just a matter of opinion</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>4.</td>
<td>I am often moved deeply by a fine speech or poetry</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>5.</td>
<td>I often feel that I am the victim of circumstances</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>6.</td>
<td>I usually look at a difficult situation as a challenge or opportunity</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>7.</td>
<td>I can usually accept other people as they are, even when they are very different from me</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>8.</td>
<td>I believe that all life depends on some spiritual order or power that cannot be completely explained</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>9.</td>
<td>I am quick to volunteer when there is something to be done</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>10.</td>
<td>I enjoy getting revenge on people who hurt me</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>11.</td>
<td>I am slower than most people to get excited about new ideas and activities</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>12.</td>
<td>No job is too hard for me to do my best</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>13.</td>
<td>Often I feel that my life has little purpose or meaning</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>14.</td>
<td>I like to help find a solution to problems so that everyone comes out ahead</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>15.</td>
<td>I am a very ambitious person</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>16.</td>
<td>I could probably accomplish more than I do, but I don’t see the point in pushing myself harder than is necessary to get by</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>17.</td>
<td>I often feel tense and worried in unfamiliar situations, even when others feel there is little to worry about</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>18.</td>
<td>Please circle true, this is a validity item</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>19.</td>
<td>I often do things based on how I feel at the moment without thinking about how they were done in the past</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>20.</td>
<td>I usually do things my own way, rather than giving in to the wishes of other people</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>21.</td>
<td>I usually stay away from social situations where I would have to meet strangers, even if I am assured that they will be friendly</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>22.</td>
<td>I often feel so connected to the people around me that it is like there is no separation between us</td>
<td>T</td>
<td>F</td>
</tr>
</tbody>
</table>
23. I generally don’t like people who have different ideas from me ........................................T F
24. My personal and social activities are more important than prayer or religious activities ........T F
25. In most situations my natural responses are based on good habits that I have developed.........T F
26. I would do almost anything legal in order to become rich and famous, even if I would lose the trust of many old friends .................................................................T F
27. I think I would stay confident and relaxed when meeting strangers, even if I were told they are angry at me .................................................................T F
28. I am much more reserved and controlled than most people..................................................T F
29. I often have to stop what I am doing because I start worrying about what might go wrong ....T F
30. I like to discuss my experiences and feelings openly with friends instead of keeping them to myself .................................................................T F
31. I am usually eager to get going on any job I have to do ..........................................................T F
32. I have less energy and get tired more quickly than most people................................................T F
33. I am often called "absent-minded" because I get so wrapped up in what I am doing that I lose track of everything else .................................................................T F
34. The harder a job is the more I like it .....................................................................................T F
35. I seldom feel free to choose what I want to do .....................................................................T F
36. I often consider another person’s feelings as much as my own ............................................T F
37. I am often described as an underachiever ............................................................................T F
38. Most of the time I would prefer to do something a little risky (like riding in a fast automobile over steep hills and sharp turns) rather than having to stay quiet and inactive for a few hours....T F
39. I often avoid meeting strangers because I lack confidence with people I do not know ........T F
40. Some people think I am too stingy or tight with my money ..................................................T F
41. I like to please other people as much as I can .....................................................................T F
42. I like old "tried and true" ways of doing things much better than trying "new and improved" ways .................................................................T F
43. Usually I am not able to do things according to their priority of importance to me because of lack of time .....................................................................................T F
44. I often do things to help protect animals and plants from extinction .....................................T F
45. I often push myself to the point of exhaustion or try to do more than I really can ...............T F
46. I often wish that I was smarter than everyone else .................................................................T F
47. It gives me pleasure to see my enemies suffer .....................................................................T F
48. I want to be the best at everything I do ...............................................................................T F
49. I like to be very organized and set up rules for people whenever I can .................................T F
50. It is difficult for me to keep the same interests for a long time because my attention often shifts to something else ................................................................. T  F
51. I am not satisfied unless I am working on something ................................................................. T  F
52. Repeated practice has given me good habits that are stronger than most momentary impulses or persuasion ................................................................. T  F
53. I am usually so determined that I continue to work long after other people have given up ........ T  F
54. I like a challenge better than easy jobs .......................................................................................... T  F
55. Often when I look at an ordinary thing, something wonderful happens – I get the feeling that I am seeing it fresh for the first time ........................................ T  F
56. I have many bad habits that I wish I could break ........................................................................ T  F
57. I often wait for someone else to provide a solution to my problems ............................................ T  F
58. I often accomplish more than people expect of me ........................................................................ T  F
59. I often spend money until I run out of cash or get into debt from using too much credit ............ T  F
60. I think I will have very good luck in the future ............................................................................ T  F
61. I open up quickly to other people, even if I don’t know them well ................................................ T  F
62. I recover more slowly than most people from minor illnesses or stress ........................................ T  F
63. It wouldn’t bother me to be alone all the time ................................................................................ T  F
64. When I fail to master something at first, it becomes my personal challenge to succeed ............... T  F
65. Often I have unexpected flashes of insight or understanding while relaxing .............................. T  F
66. I don’t care very much whether other people like me or the way I do things ................................ T  F
67. I receive much comfort and support from my religious beliefs .................................................... T  F
68. I usually try to get just what I want for myself because it is not possible to satisfy everyone anyway ................................................................. T  F
69. I have no patience with people who don’t accept my views ........................................................ T  F
70. I don’t seem to understand most people very well ........................................................................ T  F
71. You don’t have to be dishonest to succeed in business ............................................................... T  F
72. The saying “the early bird catches the worm” describes my attitude ............................................ T  F
73. I sometimes feel so connected to nature that everything seems to be part of one living organism ................................................................. T  F
74. In conversations I am much better as a listener than as a talker .................................................. T  F
75. It is easy for other people to get close to me emotionally ............................................................ T  F
76. I lose my temper more quickly than most people .......................................................................... T  F
77. When I have to meet a group of strangers, I am more shy than most people ............................... T  F
78. I love to excel at everything I do ............................................................ T  F
79. I am more sentimental than most people .............................................. T  F
80. I seem to have a “sixth sense” that sometimes allows me to know what is going to happen ........ T  F
81. I would not be happy in a job where I did not communicate with other people ............ T  F
82. When someone hurts me in any way, I usually try to get even ......................... T  F
83. My attitudes are determined largely by influences outside my control ................... T  F
84. Each day I try to take another step toward my goals .................................. T  F
85. I often wish I was stronger than everyone else ........................................ T  F
86. I like to think about things for a long time before I make a decision ................... T  F
87. I like to be quick to respond to any request for work .................................. T  F
88. I am more hard-working than most people ............................................. T  F
89. I often need naps or extra rest periods because I get tired so easily .................... T  F
90. I have trouble telling a lie, even when it is meant to spare someone else’s feelings .. T  F
91. I like to be of service to others .................................................................. T  F
92. Regardless of any temporary problem that I have to overcome, I always think it will turn out well ................................................................. T  F
93. No matter how hard a job is, I like to get started quickly ................................. T  F
94. It is hard for me to enjoy spending money on myself, even when I have saved plenty of money .... T  F
95. I usually stay calm and secure in situations that most people would find physically dangerous ................................................................. T  F
96. I often do my best work under difficult circumstances ................................ T  F
97. I like to keep my problems to myself ........................................................ T  F
98. I have a vivid imagination .......................................................................... T  F
99. I am grateful for supernatural guidance ..................................................... T  F
100. I like to stay at home better than to travel or explore new places .................... T  F
101. I do not think it is smart to help weak people who cannot help themselves .......... T  F
102. Warm friendships with other people are very important to me ....................... T  F
103. I cannot have any peace of mind if I treat other people unfairly, even if they are unfair to me ...... T  F
104. People will usually tell me how they feel .................................................. T  F
105. I often wish I could stay young forever ..................................................... T  F
106. I like to read everything when I am asked to sign any papers ......................... T  F
107. When nothing new is happening, I usually start looking for something that is thrilling or exciting ................................................................. T F
108. Sometimes I have felt like I was part of something with no limits or boundaries in time and space ................................................................. T F
109. I sometimes feel a spiritual connection to other people that I cannot explain in words .......... T F
110. I try to be considerate of other people’s feeling, even when they have been unfair to me in the past ................................................................. T F
111. I like to do practical things more than praying or thinking about the mysteries of the universe ...... T F
112. I like it when people can do whatever they want without strict rules and regulations .................. T F
113. I would probably stay relaxed and outgoing when meeting a group of strangers, even if I were told they are unfriendly ................................................................. T F
114. If there is any supernatural force in the universe, I don’t think it affects me personally one way or the other ................................................................. T F
115. Usually I am more worried than most people that something might go wrong in the future.......... T F
116. I usually think about all the facts in detail before I make a decision ........................................... T F
117. I feel it is more important to be sympathetic and understanding of other people than to be practical and tough-minded ................................................................. T F
118. I often feel a strong sense of unity with all the things around me .................................................. T F
119. I often quit working if people aren’t nice to me .............................................................................. T F
120. I often wish I had special powers like Superman ........................................................................... T F
121. Other people control me too much ............................................................................................... T F
122. I am often described as an overachiever ....................................................................................... T F
123. I like to share what I have learned with other people ............................................................... T F
124. Religious experiences have helped me to understand the real purpose of my life .................... T F
125. I often learn a lot from people ................................................................................................... T F
126. Repeated practice has allowed me to become good at many things that help me to be successful ............................................................... T F
127. Most people I know look out only for themselves, no matter who else gets hurt .................. T F
128. I am usually able to get other people to believe me, even when I know that what I am saying is exaggerated or untrue ................................................................. T F
129. I need much extra rest, support, or reassurance to recover from minor illnesses or stress ........ T F
130. I feel an ever-increasing awe of the beauty in all things ............................................................. T F
131. I know there are principles for living that no one can violate without suffering in the long run ...... T F
132. I don’t want to be richer than everyone else ............................................................................... T F
133. I like to go slow in starting work, even if it is easy to do ........................................ T F
134. I would gladly risk my own life to make the world a better place ........................................ T F
135. Please circle true, this is a validity item ................................................................. T F
136. Sometimes I have felt my life was being directed by a spiritual force greater than any human being ........................................ T F
137. I am only effective doing work that I like ................................................................. T F
138. I usually enjoy being mean to anyone who has been mean to me ........................................ T F
139. I have a reputation as someone who is very practical and does not act on emotion ........................................ T F
140. Faith provides my greatest sense of fulfilment and contentment ........................................ T F
141. It is easy for me to organise my thoughts while talking to someone ........................................ T F
142. I don’t think it is possible for one person to share feelings with someone else who hasn’t had the same experiences ........................................ T F
143. I usually feel much more confident and energetic than most people, even after minor illnesses or stress ........................................ T F
144. I am strongly moved by sentimental appeals (like when asked to help crippled children) ........................................ T F
145. I usually push myself harder than most people do because I want to do as well as I possibly can ........................................ T F
146. It takes me a long time to warm up to other people .................................................. T F
147. I have so many faults that I don’t like myself very much ........................................ T F
148. I have too little time to look for long-term solutions for my problems ........................................ T F
149. I don’t want to be more admired than everyone else .................................................. T F
150. I often cannot deal with problems because I just don’t know what to do ........................................ T F
151. I often wish I could stop the passage of time ............................................................. T F
152. I try with all of my heart to understand and obey the moral ideals of universal love and harmony ........................................ T F
153. I hate to make decisions based only on my first impressions ........................................ T F
154. I prefer spending money rather than saving it ............................................................. T F
155. I cannot get any comfort from religious preaching because no one really knows what happens after we are dead ........................................ T F
156. I can usually do a good job of stretching the truth to tell a funnier story or to play a joke on someone ........................................ T F
157. I hate to see anyone suffer ...................................................................................... T F
158. I feel it is foolish and impractical to strive for truth and harmony in all things ........................................ T F
159. If I am embarrassed or humiliated, I get over it very quickly ........................................ T F
160. It is extremely difficult for me to adjust to changes in my usual way of doing things because I get so tense, tired, or worried ................................................................. T  F

161. When my work goes unnoticed, I become even more determined to succeed ........................................ T  F

162. I usually demand very good practical reasons before I am willing to change my old ways of doing things ................................................................. T  F

163. I need a lot of help from other people to train me to have good habits ........................................ T  F

164. I think that extra-sensory perception (ESP like telepathy or precognition) is really possible ................................................................. T  F

165. I like to do a job quickly and then volunteer for more ................................................................. T  F

166. I would like to have warm and close friends with me most of the time . ................................................................. T  F

167. I have so much to do most days that I don’t usually have time for contemplation or prayer ........ T  F

168. I nearly always stay relaxed and carefree, even when nearly everyone else is fearful ......... T  F

169. I find sad songs and movies pretty boring ................................................................. T  F

170. I doubt that any supernatural power has ever helped me personally ..................................... T  F

171. Circumstances often force me to do things against my will ................................................................. T  F

172. It is hard for me to tolerate people who are different from me ................................................................. T  F

173. I am often described as a dreamer because I place moral ideals before practical considerations .... T  F

174. I think that most things that are called miracles are just chance ................................................................. T  F

175. I would rather be kind than get revenge when someone hurts me ................................................................. T  F

176. I regularly take time to consider whether what I am doing is right or wrong ................................................................. T  F

177. I often become so fascinated with what I’m doing that I get lost in the moment -- like I’m detached from time and place ................................................................. T  F

178. I do not think I have a real sense of purpose for my life ................................................................. T  F

179. I really enjoy keeping busy ................................................................. T  F

180. I try to cooperate with others as much as possible ................................................................. T  F

181. When I am in deep contemplation or prayer, I sometimes feel warmth and tingling like a powerful current is flowing through my body ................................................................. T  F

182. I cannot work with people who criticise me often ................................................................. T  F

183. I often feel tense and worried in unfamiliar situations, even when others feel there is no danger at all ................................................................. T  F

184. I often follow my instincts, hunches, or intuition without thinking through all the details ................................................................. T  F

185. I am often successful because of my ambition and hard work ................................................................. T  F

186. Other people often think that I am too independent because I won’t do what they want ................................................................. T  F
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>187.</td>
<td>I often feel a strong spiritual or emotional connection with all the people around me</td>
<td>T</td>
</tr>
<tr>
<td>188.</td>
<td>Things often go wrong for me unless I am very careful</td>
<td>T</td>
</tr>
<tr>
<td>189.</td>
<td>It is usually easy for me to like those people who have different values from me</td>
<td>T</td>
</tr>
<tr>
<td>190.</td>
<td>I usually feel tense and worried when I have to do something new and unfamiliar</td>
<td>T</td>
</tr>
<tr>
<td>191.</td>
<td>I am good at communicating my feelings to others</td>
<td>T</td>
</tr>
<tr>
<td>192.</td>
<td>Good habits have become &quot;second nature&quot; to me -- they are automatic and spontaneous actions nearly all the time</td>
<td>T</td>
</tr>
<tr>
<td>193.</td>
<td>I don’t mind the fact that other people often know more than I do about something</td>
<td>T</td>
</tr>
<tr>
<td>194.</td>
<td>I usually try to imagine myself “in other people’s shoes”, so I can really understand them</td>
<td>T</td>
</tr>
<tr>
<td>195.</td>
<td>I think it is foolish to depend on supernatural guidance to understand the mysteries of life</td>
<td>T</td>
</tr>
<tr>
<td>196.</td>
<td>Principles like fairness and honesty have little role in some aspects of my life</td>
<td>T</td>
</tr>
<tr>
<td>197.</td>
<td>I am better at saving money than most people</td>
<td>T</td>
</tr>
<tr>
<td>198.</td>
<td>People involved with me have to learn how to do things my way</td>
<td>T</td>
</tr>
<tr>
<td>199.</td>
<td>The moral ideals within me fill my heart with awe and admiration</td>
<td>T</td>
</tr>
<tr>
<td>200.</td>
<td>Even when most people feel it is not important, I often insist on things being done in a strict and orderly way</td>
<td>T</td>
</tr>
<tr>
<td>201.</td>
<td>I am eager to start work on any assigned duty</td>
<td>T</td>
</tr>
<tr>
<td>202.</td>
<td>I feel very confident and sure of myself in almost all social situations</td>
<td>T</td>
</tr>
<tr>
<td>203.</td>
<td>My friends find it hard to know my feelings because I seldom tell them about my private thoughts</td>
<td>T</td>
</tr>
<tr>
<td>204.</td>
<td>My will power is too weak to overcome very strong temptations, even if I know I will suffer as a consequence</td>
<td>T</td>
</tr>
<tr>
<td>205.</td>
<td>I hate to change the way I do things, even if many people tell me there is a new and better way to do it</td>
<td>T</td>
</tr>
<tr>
<td>206.</td>
<td>I think it is unwise to believe in things that cannot be explained scientifically</td>
<td>T</td>
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<tr>
<td>207.</td>
<td>I am willing to make many sacrifices to be a success</td>
<td>T</td>
</tr>
<tr>
<td>208.</td>
<td>I like to imagine my enemies suffering</td>
<td>T</td>
</tr>
<tr>
<td>209.</td>
<td>I am more energetic and tire less quickly than most people</td>
<td>T</td>
</tr>
<tr>
<td>210.</td>
<td>I like to pay close attention to details in everything I do</td>
<td>T</td>
</tr>
<tr>
<td>211.</td>
<td>I often stop what I am doing because I get worried, even when my friends tell me everything will go well</td>
<td>T</td>
</tr>
<tr>
<td>212.</td>
<td>I am more stubborn than most people</td>
<td>T</td>
</tr>
<tr>
<td>213.</td>
<td>I often wish I was more powerful than everyone else</td>
<td>T</td>
</tr>
</tbody>
</table>
214. I usually am free to choose what I will do ................................................................. T  F
215. I make a warm personal connection with most people ................................................ T  F
216. Often I become so involved in what I am doing that I forget where I am for a while .......... T  F
217. Members of a team rarely get their fair share ........................................................................ T  F
218. It often seems to other people like I am in another world because I am so completely unaware of things going on around me ............................................................. T  F
219. Most of the time I would prefer to do something risky (like hang-gliding or parachute jumping), rather than having to stay quiet and inactive for a few hours............................. T  F
220. Because I so often spend too much money on impulse, it is hard for me to save money, even for special plans like a vacation........................................................ T  F
221. I don’t go out of my way to please other people................................................................. T  F
222. I cannot accept things that are not done exactly right ...................................................... T  F
223. I am not shy with strangers at all ....................................................................................... T  F
224. I often give in to the wishes of friends.............................................................................. T  F
225. I often drag my heels a while before starting any project .................................................. T  F
226. I spend most of my time doing things that seem necessary but not really important to me .... T  F
227. I don’t think that religious or ethical principles about what is right and wrong should have much influence in business decisions ................................................................. T  F
228. Even when I am with friends, I prefer not to "open up" very much ..................................... T  F
229. I often try to put aside my own judgments so that I can better understand what other people are experiencing ................................................................. T  F
230. Many of my habits make it hard for me to accomplish worthwhile goals ............................ T  F
231. I like to strive for bigger and better things......................................................................... T  F
232. I have made real personal sacrifices in order to make the world a better place – like trying to prevent war, poverty and injustice................................................................. T  F
233. I never worry about terrible things that might happen in the future .................................. T  F
234. People find it easy to come to me for help, sympathy, and warm understanding................ T  F
235. I almost never get so excited that I lose control of myself .................................................. T  F
236. I often give up a job if it takes much longer than I thought it would................................. T  F
237. I like other people to know that I really care about them ................................................... T  F
238. I prefer to start conversations, rather than waiting for others to talk to me ...................... T  F
239. Most of the time I quickly forgive anyone who does me wrong........................................ T  F
240. I know what I want to do in my life .................................................................................... T  F
241. My actions are determined largely by influences outside my control........................................T  F
242. I think my natural responses now are usually consistent with my principles and long-term goals ... T  F
243. I prefer to wait for someone else to take the lead in getting things done....................................T  F
244. I usually respect the opinions of others.........................................................................................T  F
245. I often ask for supernatural forgiveness for violating the absolute ideals of truth and harmony in all things.................................................................T  F
246. I have had experiences that made my role in life so clear to me that I felt very excited and happy .................................................................T  F
247. It is fun for me to buy things for myself ..........................................................................................T  F
248. I believe that I have experienced extra-sensory perception myself ..............................................T  F
249. I have often been called an “eager beaver” because of my enthusiasm for hard work ...............T  F
250. When I am in deep contemplation or prayer, I sometimes feel that I am directly connected to a supernatural source of love and peace.................................................................T  F
251. My behaviour is strongly guided by certain goals that I have set for my life ................................T  F
252. It is usually foolish to promote the success of other people ..........................................................T  F
253. I often wish I could live forever......................................................................................................T  F
254. When someone points out my mistakes, I work extra hard to correct them ..................................T  F
255. I usually like to stay cool and detached from other people............................................................T  F
256. I am more likely to cry at a sad movie than most people.................................................................T  F
257. I will not let anything get in the way of my success .......................................................................T  F
258. I recover more quickly than most people from minor illnesses or stress .........................................T  F
259. I often break rules and regulations when I think I can get away with it .........................................T  F
260. I am certain the consciousness within me is a spirit that will never die .......................................T  F
261. I won’t give up what I am doing just because of a long run of unexpected failures .....................T  F
262. I need much more practice in developing good habits before I will be able to trust myself in many tempting situations .................................................................T  F
263. I wish other people didn’t talk as much as they do ......................................................................T  F
264. I would rather read a book than talk about my feelings with another person ..............................T  F
265. Everyone should be treated with dignity and respect, even if they seem to be unimportant or bad .........................................................................................................................T  F
266. I like to make quick decisions so I can get on with what has to be done ......................................T  F
267. If I am feeling upset, I usually feel better around friends than when left alone ................................T  F
268. I usually have good luck in whatever I try to do...........................................................................T  F
269. I am usually confident that I can easily do things that most people would consider dangerous (such as driving an automobile fast on a wet or icy road). ........................................... T  F
270. I feel that there is a supernatural source of love and peace that often helps me in the way that is really needed .......................................................... T  F
271. I wish I were better looking than everyone else .......................................................... T  F
272. I like to explore new ways to do things .......................................................... T  F
273. Reports of mystical experiences are probably just wishful thinking .................................. T  F
274. I enjoy saving money more than spending it on entertainment or thrills .................................. T  F
275. Individual rights are more important than the needs of any group .................................. T  F
276. I have had personal experiences in which I felt in contact with a divine and wonderful spiritual power .......................................................... T  F
277. Dishonesty only causes problems if you get caught .......................................................... T  F
278. I have had moments of great joy in which I suddenly had a clear, deep feeling of oneness with all that exists .......................................................... T  F
279. Good habits make it easier for me to do things the way I want ........................................... T  F
280. Most people seem more resourceful than I am .......................................................... T  F
281. Other people and conditions are often to blame for my problems ........................................... T  F
282. When I fail at something at first, I become even more determined to do a better job .......................................................... T  F
283. It gives me pleasure to help others, even if they have treated me badly .................................. T  F
284. I often feel like I am a part of the spiritual force on which all life depends .................................. T  F
285. I am more strongly guided by practical considerations than by my moral ideals .................................. T  F
286. I have lied a lot on this questionnaire .......................................................... T  F
287. I usually can stay "on the go" all day without having to push myself ........................................... T  F
288. If something doesn’t work as I expected, I am more likely to quit than to keep going for a long time .......................................................... T  F
289. I nearly always think about all the facts in detail before I make a decision, even when other people demand a quick decision .................................. T  F
290. I am not very good at talking my way out of trouble when I am caught doing something wrong .... T  F
291. I am certain that the consciousness within me is the same Consciousness that has been in each and every thing at all times .................................. T  F
292. I would rather be alone than deal with other people’s problems ........................................... T  F
293. I am more of a perfectionist than most people .......................................................... T  F
### Novelty-seeking

**NS1**: Exploratory excitability v. stoic rigidity (11 items)
- **True**: 1, 107, 238, 272
- **False**: 11, 42, 74, 100, 139, 162, 205.

**NS2**: Impulsiveness v. reflection (10 items)
- **True**: 19, 50, 184, 266.
- **False**: 86, 106, 116, 153, 210, 289.

**NS3**: Extravagance v. reserve (9 items)
- **True**: 59, 154, 220, 247.
- **False**: 28, 40, 94, 197, 274.

**NS4**: Disorderliness v. regimentation (10 items)
- **True**: 76, 112, 128, 156, 259.
- **False**: 49, 90, 200, 235, 290.

**NS TOTAL**: NS1 + NS2 + NS3 + NS4 (40 items)

### Harm Avoidance

**HA1**: Anticipatory worry & pessimism v. uninhibited optimism (11 items)
- **True**: 29, 115, 188, 211.
- **False**: 2, 60, 92, 159, 168, 233, 268.

**HA2**: Fear of uncertainty (7 items)
- **True**: 17, 183, 190.
- **False**: 38, 95, 219, 269.

**HA3**: Shyness with strangers (8 items)
- **True**: 21, 39, 77.
- **False**: 27, 113, 141, 202, 223.

**HA4**: Fatigability v. asthenia (9 items)
- **True**: 32, 62, 89, 129, 160.
- **False**: 143, 209, 258, 287.

**HA TOTAL**: HA1 + HA2 + HA3 + HA4 (35 items)

### Reward Dependence

**RD1**: Sentimentality (10 items)
- **True**: 4, 41, 79, 117, 144, 176, 224, 234, 256.
- **False**: 169.

**RD2**: Openness to warm communication vs aloofness (10 items)
- **True**: 61, 75, 81, 102, 191, 215, 237.
- **False**: 146, 264, 292

**RD3**: Attachment (8 items)
- **True**: 30, 166, 267.
- **False**: 63, 97, 203, 228, 255.

**RD4**: Dependence (6 items)
- **True** -
- **False** - 20, 66, 101, 186, 221, 275.

**RD TOTAL**: RD1 + RD2 +RD3 + RD4 (34 items)

### Persistence

**P1**: Eagerness of effort vs laziness (12 items)
- **True**: 9, 31, 51, 72, 87, 93, 165, 179, 201, 249.
- **False**: 133, 225.

**P2**: Work hardened vs spoiled (11 items)
- **True**: 12, 34, 54, 64, 96, 254, 282.
- **False**: 119, 137, 182, 236.

**P3**: Ambitious vs underachieving (11 items)
- **True**: 15, 48, 58, 78, 122, 161, 185, 207, 231, 257.
- **False**: 37.

**P4**: Perfectionist vs pragmatist (10 items)
- **True**: 45, 53, 88, 145, 212, 222, 261, 293.
- **False**: 16, 288.

**P TOTAL**: P1 + P2 + P3 + P4 (44 items)
Self-Directedness

S1 Responsibility vs. blaming (8 items) True - 214.

S2 Purposefulness vs. lack of goal direction (8 items) True - 84, 240, 251.
False - 13, 43, 148, 178, 226.

S3 Resourcefulness (5 items) True - 6.
False - 57, 150, 243, 280.

S4 Self-acceptance vs. self-striving (11 items) True - 132, 149, 193.
False - 46, 85, 105, 120, 151, 213, 253, 271.

S5 Enlightened second nature (12 items) True - 25, 52, 126, 192, 242, 279.
False - 56, 147, 163, 204, 230, 262.

S Total: S1 + S2 + S3 + S4 + S5 (44 items)

Cooperativeness

C1 Social acceptance vs. social intolerance (8 items) True - 7, 125, 189, 244.
False - 23, 69, 172, 198.

C2 Empathy vs. social disinterest (7 items) True - 36, 104, 194, 229.
False - 70, 142, 263.

C3 Helpfulness vs. unhelpfulness (8 items) True - 14, 91, 123, 180.
False - 68, 127, 217, 252.

C4 Compassion vs. revengefulness (10 items) True - 110, 157, 175, 239, 283.
False - 10, 47, 82, 138, 208.

C5 Pure-hearted conscience vs. self-serving advantage (9 items) True - 71, 103, 131, 265.
False - 3, 26, 196, 227, 277.

C Total: C1 + C2 + C3 + C4 + C5 (42 items)

Self-Tanscendence

ST1 Self-forgetful vs. self-conscious experience (10 items) True - 33, 55, 65, 98, 108, 177, 216, 218, 246, 278.
False -

ST2 Transpersonal identification vs. self-differentiation (8 items) True - 22, 44, 73, 118, 134, 187, 232, 284.
False -

ST3 Spiritual acceptance vs. rational materialism (11 items) True - 8, 80, 109, 124, 136, 164, 248, 276.
False - 174, 206, 273.

False - 114, 155, 170, 195.

ST5 Idealistic vs practical (11 items) True - 130, 152, 173, 199, 245, 291.
False - 24, 111, 158, 167, 285.

ST Total: ST1 + ST2 + ST3 + ST4 + ST5 (51 items)

Validity Scale (3 items) True - 18, 135.
False - 286.
Appendix J

Internal consistency of the TCI used in the clinical trials
### Appendix J

**Internal consistency of the TCI versions used in the clinical trials**

<table>
<thead>
<tr>
<th></th>
<th>Antidepressant Baseline</th>
<th>Antidepressant follow-up</th>
<th>Psychotherapy baseline</th>
<th>Psychotherapy follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of items</td>
<td>Cronbach’s Alpha</td>
<td>Mean item r</td>
<td>Cronbach’s Alpha</td>
</tr>
<tr>
<td>NS1: Exploratory excitability</td>
<td>11</td>
<td>.67</td>
<td>.16</td>
<td>.67</td>
</tr>
<tr>
<td>NS2: Impulsiveness</td>
<td>10</td>
<td>.72</td>
<td>.20</td>
<td>.62</td>
</tr>
<tr>
<td>NS3: Extravagance</td>
<td>9</td>
<td>.76</td>
<td>.26</td>
<td>.74</td>
</tr>
<tr>
<td>NS4: Disorderliness</td>
<td>10</td>
<td>.44</td>
<td>.07</td>
<td>.53</td>
</tr>
<tr>
<td>Novelty Seeking Total</td>
<td>40</td>
<td>.81</td>
<td>.10</td>
<td>.77</td>
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Appendix K

Consent form for the CHALICE study
CONSENT FORM

Full Name: __________________________________________   [if known] NHI Number: ______

Participant Number [office use only]: ________________
Birth: ______/____/19

- I have read and understand the information sheet about this study, and I understand what is involved.
- I have been given the opportunity to discuss this study and to ask questions about it. I am satisfied with the answers I have been given.
- I have had enough time to consider whether to take part, and to discuss my decision with a person of my choice.
- I know who to contact if I have questions about the study.

I understand that:

(Please tick)

☐ I will be asked to complete questionnaires about my medical history and lifestyle.
☐ I will be asked to provide blood and urine samples.
☐ I will have an electrocardiograph (ECG).
☐ I will have an ultrasound examination of heart (echocardiograph).
☐ I will have a fundus photograph taken of my retina, using eye drops to dilate my pupil.

(Please read)

- Taking part is voluntary and I am free to withdraw at any time and for any reason.
- I will be contacted by CHALICE staff after my assessment day to organise the return of the CHALICE food and activity diaries and to clarify further details, if necessary.
- I will be re-contacted by CHALICE staff each year and in 4 to 5 years time for another assessment.
- I will be asked to provide contact details for 2 family and/or friends, and I understand that they may be contacted in the event that CHALICE staff are unable to contact me.
- My participation in this study is confidential and no information that could identify me will be used in any reports on this study.
- This study has received ethical approval from the Upper South A Regional Ethics Committee.
I consent to have my General Practitioner notified of my participation in this study ...... YES / NO

I wish to receive a summary of my results including any previously undiagnosed problems or abnormal laboratory results......................................................... YES / NO

I wish for my GP to receive a summary of my results including any previously undiagnosed problems or abnormal laboratory results ........................................... YES / NO

I consent for my medical records to be accessed through the National Health Index (NHI) database ................................................................. YES / NO

I consent to researchers storing my samples for later use;
   Blood and plasma........................................................................................................... YES / NO
   Urine................................................................................................................................. YES / NO
   DNA................................................................................................................................. YES / NO

I consent to being contacted in future to ask about participating in related studies ...... YES / NO

I consent to the non-identifying use of my information in related studies .............. YES / NO

I am aware that the study will collect, store and examine my DNA (genetic make-up) in relation to medically relevant traits and I consent to such analysis being performed YES / NO

I understand that if I consent to such analysis, I am not giving up any rights and no rights will be created for the researcher to my genetic information............... YES / NO

I consent to researchers using my samples and DNA for later use as part of research with other New Zealand research collaborators (subject to approval by a NZ Ethics Committee)................................................................. YES / NO

I consent to researchers storing my samples and DNA for future use as a part of future research with international researcher collaborators........................................ YES / NO

I consent to my samples and DNA being sent overseas ............................................. YES / NO

I understand that I can request to have my samples and DNA destroyed at any time... YES / NO

I elect to have all my samples disposed of with an appropriate karakia. ................. YES / NO

I wish to receive copies of newsletters which will contain general findings of this study YES / NO

I ________________________________ (print full name) hereby consent to take part in this study.

Signature: ______________________  Date: _____________

Consent obtained by:

CHALICE staff signature: ______________________________  Date: ____________________

CHALICE staff name: ______________________________
Appendix L

Ethical approval letter for the CHALICE study
14 June 2010

Professor Peter Joyce
Department of Psychological Medicine
Christchurch School of Medicine & Health Sciences
P O Box 4345
Christchurch

Attn: Janet Spittlehouse

Dear Professor Joyce,

URA/10/03/021      Canterbury Health, Ageing and Life Course Study
Investigators      Prof P Joyce, Mr C Lacey, A/Prof V Cameron, Prof S Chambers,
                   Dr R Gearry, Dr H Jamieson, Prof M Kennedy

This study was given ethical approval by the Upper South A Regional Ethics Committee on 14 June 2010.

Approved Documents
• Protocol version 2.1 dated 18.05.10
• Information sheet and Consent form version 2.1 dated 12.05.10
• CHALICE Yearly health questionnaire version 1.0 dated 02.06.10

This approval is valid until 31 August 2016, provided that Annual Progress Reports are submitted (see below).

Access to ACC
For the purposes of section 32 of the Accident Compensation Act 2001, the Committee is satisfied that this study is not being conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is being carried out. Participants injured as a result of treatment received in this trial will therefore be eligible to be considered for compensation in respect of those injuries under the ACC scheme.

Amendments and Protocol Deviations
All significant amendments to this proposal must receive prior approval from the Committee. Significant amendments include (but are not limited to) changes to:
• the researcher responsible for the conduct of the study at a study site
• the addition of an extra study site
• the design or duration of the study
• the method of recruitment
• information sheets and informed consent procedures.
Significant deviations from the approved protocol must be reported to the Committee as soon as possible.

Annual Progress Reports and Final Reports
The first Annual Progress Report for this study is due to the Committee by 30 June 2011. The Annual Report Form that should be used is available at www.ethicscommittees.health.govt.nz. Please note that if you do not provide a progress report by this date, ethical approval may be withdrawn.

A Final Report is also required at the conclusion of the study. The Final Report Form is also available at www.ethicscommittees.health.govt.nz.

Requirements for the Reporting of Serious Adverse Events (SAEs)
For the purposes of the individual reporting of SAEs occurring in this study, the Committee is satisfied that the study’s monitoring arrangements are appropriate.

SAEs occurring in this study must be individually reported to the Committee within 7-15 days only where they:
• are unexpected because they are not outlined in the investigator’s brochure, and
• are not defined study end-points (e.g. death or hospitalisation), and
• occur in patients located in New Zealand, and
• if the study involves blinding, result in a decision to break the study code.

There is no requirement for the individual reporting to ethics committees of SAEs that do not meet all of these criteria. However, if your study is overseen by a data monitoring committee, copies of its letters of recommendation to the Principal Investigator should be forwarded to the Committee as soon as possible.

Please see www.ethicscommittees.health.govt.nz for more information on the reporting of SAEs, and to download the SAE Report Form.

We wish you all the best with your study.

Yours sincerely

Alieke Dierckx
Administrator
Upper South A Regional Ethics Committee
Email: alieke_dierckx@moh.govt.nz
Appendix M

Information sheet for the CHALICE study
CHALICE; what is it?

CHALICE is a longitudinal study of health, wellbeing and active ageing. Longitudinal studies observe people over time. For CHALICE, we are inviting people from the Canterbury region to an initial assessment when they are about 50 years old. We intend to follow people up for the rest of their lives. This will involve a brief yearly questionnaire which can be answered by post, email or over the phone. In addition there will be a detailed assessment every 5 years.

CHALICE will examine a broad range of factors including diet, lifestyle, attitudes, personality, social factors and genetics which may impact on health. Within this study, we will attempt to better understand health, wellbeing and healthy ageing as well as factors related to diseases associated with ageing, including heart disease, high blood pressure, diabetes, stroke, dementia, eye disease, infections, bowel cancer and depression.

Why is it important?

The population of New Zealand is ageing. New Zealand's population of over 65 year olds is expected to double by 2050. In Canterbury this may happen twenty years earlier than other regions of New Zealand. We need to better understand both the determinants of health, wellbeing and active ageing as well as the risk factors for diseases associated with ageing.

Previous research has shown that Māori have different rates for a variety of diseases and a diminished life expectancy. Within this study we attempt to better understand differences in health, wellbeing and active ageing as well as differences in rates of diseases between Māori and non-Māori.

Who will take part?

We aim to see between one and three thousand people from 2010 and 2014, who are about fifty years of age and live in the Canterbury District Health Board area. People will be selected at random from the electoral rolls. The final numbers are related to our ability to obtain ongoing research funding. We want a fully representative sample of fifty year olds, including people of all ethnicities, cultures, social background, employment and health status. This allows us to better understand the full range of health issues in our population.

Taking part is voluntary and participants are free to withdraw at any time and for any reason. If you choose not to take part or choose to withdraw from the study, this will in no way affect your future health care. If you take part in CHALICE you can be notified of some of your results from the assessment day. We can also send a copy to your GP.
What will taking part involve?

Names of individuals will be obtained from the electoral rolls. Initial contact will be via a letter followed by phone calls. During this communication the study will be outlined, initial consent obtained and arrangements made, for people who agree to participate, to come to our assessment centre.

The assessment is made up of seven modules and will involve physical tests, interviews and questionnaires. Most of the questionnaires are completed with one of the research staff, while some may be completed alone or on a computer (with help if necessary). The seven modules are:

1. **Physical**: When you arrive you will be asked to complete two questionnaires and provide written consent (unless you have posted it to us). Our research nurse will then measure your height, weight, body composition (percentage of body muscle and fat), blood pressure and heart rate. After the physical measurements the nurse will prepare you for taking a photograph of the retina of your eye. Then our nurse will take a sample of blood (100mls) and you will also be asked to provide a urine sample (50mls). We will then take a photograph of the retina of your eye and provide you with breakfast.

2. **Health history**: One of our interviewers will then ask you a series of questions about yourself, your physical health history, your use of health services, and what prescribed and complementary medication (e.g. vitamin supplements) you are taking. Our interviewer will also ask about your alcohol and tobacco use.

3. **Family and social**: Our interviewer will then ask about whether others in your family have particular diseases. If some family members and/or close friends have particular diseases we will ask about how this impacts on you. Then our interviewer will ask you about friendships and relationships, your attitudes to health and ageing, recent life experiences, how you deal with stress, your beliefs and your experience of discrimination.

4. **Heart**: You will be accompanied to a heart health assessment at the hospital. We will take a recording of the electrical activity of the heart, an ECG (or electrocardiogram) and an ultrasound scan of the heart (echocardiography). These are painless, non-invasive tests.

5. **Mental health**: We will ask you about your mental health history, including questions about mood, anxiety, habits and substance use. You will be asked to complete a questionnaire about your personality.

6. **Cognitive**: We will then ask questions about memory and thinking and ask you to complete a brief computer based assessment of related tasks.

7. **Lifestyle**: The last module will be about your lifestyle history, with questions about exercise, diet and digestive health. After the assessment we will ask you to complete a log of the exercise you do over the following week and fill in a diary of the food you eat. We expect that the food and exercise diary may take approximately half an hour each day to complete.

You do not have to do all the physical tests, answer all the interview questions or every question in the questionnaires at one time and you can stop the interview at any time. The assessment will take approximately four hours.

As part of the study we wish, with your consent, to have access to your medical records, via your NHI (National Health Index) number. This will allow us to check on all diagnoses made by your doctors, to check on prescribed medications and number of visits to health services.
The records will only be accessed by researchers involved with the CHALICE study. Other researchers, who may use CHALICE data and samples, will not have access to your medical records and they will not know your personal details. All data and samples will be identified by a number to ensure confidentiality.

We plan to invite all participants to an assessment every 5 years. Additionally, we will contact you each year to complete a questionnaire of about 30 questions, which will take approximately 15 minutes to complete.

**Sample collection**

We would like you to come to the assessment centre fasting (having not eaten or drunk anything overnight). Taking a fasting blood sample is desirable for some measures such as triglycerides (a type of fat present in the blood) and glucose levels (an indication of how well your body handles sugar). We will provide you with breakfast after the blood samples have been taken and morning tea later on. We would also like to take a urine sample for measurement of hormones and kidney function.

Some samples will be sent for immediate testing. Other samples will be frozen for later analysis, so the results will not be immediately available.

Any samples you give (including plasma and DNA extracted from your blood) will be securely stored for the duration of the study which could be as long as 50 years. Medical testing of samples is always advancing and we may be able to learn more about your health by further testing at a later date. Any samples that are still in storage at the end of the study will be disposed of. You have the option of choosing a standard disposal method or disposal with karakia (blessing).

Some samples provided by you may be sent to overseas laboratories and analysed by people who are collaborating with CHALICE. This is because we may need to do tests, relevant to our understanding of the processes involved in aging, which are not available within New Zealand laboratories. All the samples sent away for analysis will be identified by a number and will not have any personal information (for example, your name or date of birth) on it. Any samples or parts of a sample that are sent overseas and are not used will be returned to the CHALICE study for standard disposal or disposal with karakia (blessing).

**Genetic considerations**

Part of the blood sample you provide will be used to obtain samples of you DNA so that we can examine genetic factors. Genes are inherited portions of DNA that make each person an individual. For example, we have genes that may influence our height or hair colour and also the likelihood of developing certain health conditions and diseases that tend to run in families. Some health conditions and diseases have not yet been identified as being hereditary (genetic). CHALICE will investigate genetic make-up to look for any link. Some of your DNA will be collected from the blood sample to look for markers of disease and other traits of medical interest. DNA samples will only be analysed when we have collected samples from many people.

The genetic information gathered by CHALICE will be confidential. Most of the genetic studies proposed will measure minor genetic differences that have small effects. These effects can usually only be detected when comparing large groups of participants, and the
genetic findings provide little or no information about personal risk of disease. Therefore, individual genetic data will not normally be released to research participants. However, in the unlikely event that we discover genetic markers for which there is good evidence of an adverse and treatable impact on health, we will seek advice via a medical geneticist about the need for confirmatory testing and appropriate feedback to you. Our researchers or sponsors will not claim any right, ownership or property of your individual genetic information or that of your kinship group, hapu or iwi.

**Are there any advantages or risks to taking part?**

The main advantage of taking part in this study is to increase understanding of why some people are healthy as they age and others are less so. We are investigating what determines physical and mental wellbeing and what protects some people from developing certain health conditions. This information may help strengthen the health and wellbeing of future generations. The research may allow us to predict the problems people have as they age and allow health care providers to develop appropriate treatments to improve peoples’ wellbeing in the future.

People who take part will be able to have the results of some of the blood tests carried out. Furthermore, the ECG and the ultrasound scan of the heart will be reported on by a cardiologist (a heart specialist) and this report will also be available to you. Copies of your results can be provided to your GP if you wish.

Taking part in CHALICE should not cause you any harm. You may feel some discomfort when blood is taken, although our staff are specially trained to minimise the risk. To take a photograph of your eyes at the start of the visit, we will need to dilate the pupils of both eyes with eye drops. This is likely to lead to blurred vision and sensitivity to light in the eyes for a short time. While this is the case, interviews will continue. The dilating eye drops are used routinely in eye examinations, but in very rare situations, may aggravate pre-existing eye disease. In this unlikely event, we would arrange immediate access to an ophthalmologist.

If, during the course of CHALICE, we find previously undiagnosed health problems, we will inform you and, with your consent, provide a copy to your GP.

**Confidentiality**

This study has received ethical approval from the Upper South A Regional Ethics Committee. All the research data we collect will be anonymous. This means that any samples that are analysed or any data from the study that we report will be identified only by an ID number. No information which could personally identify you will be used in any reports or sample analysis based on this study. All data will be stored securely.

**Can people agree to take part and then change their mind?**

Participation in this study is entirely voluntary. If you choose not to participate, you don’t have to give a reason why. If you do participate, you are free to withdraw from the study at any time without having to give a reason. People who withdraw from the study will have the option of having their stored blood and urine samples destroyed, including the option of a karakia (blessing) before disposal. However, it is not possible for data that has already been collected to be removed from our database.
CHALICE is a long-term research project. It will be very helpful to have participants’ involvement for the longer term, as we are planning to re-assess participants every 5 years. This will help us to understand how people age, what the risk factors might be and what may protect people from illness. This long-term aspect is similar to other valued longitudinal studies in New Zealand.

Each 5 years when we undertake further detailed assessments we will ask for further consent. It is possible that other related research projects will be added to the study. Any such study would require further ethical approval and your consent.

**Compensation**

In the unlikely event of a physical injury as a result of your participation in this study, you may be covered by ACC under the 2002 Injury Prevention, Rehabilitation and Compensation Act. ACC assesses each case individually. Cover and compensation is not automatic. There is no cover for mental injury, unless it is the result of physical injury. If you have ACC cover, this will generally affect your right to sue the research investigators. If you have any questions about ACC, contact your nearest ACC office or the investigator. You are also advised to check whether participation in this study would affect any indemnity cover you have or are considering, such as medical insurance, life insurance and superannuation.

**If an interpreter is requested**

Participants will need to be reasonably fluent in English; however an interpreter may be available.

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**Advocacy**

If you have any questions or concerns about your rights as a participant in this research study you can contact an independent health and disability advocate. This is a free service provided under the Health and Disability Commissioner Act.

Telephone: (NZ wide) 0800 555 050
Free Fax (NZ wide): 0800 2787 7678 (0800 2 SUPPORT)
**Who is planning the research?**

There is a large group of researchers planning the study. They bring together a diverse range of expertise and experience. They have been involved in successful past and present research projects. They are as follows:

**Principal Investigator:** Professor Peter Joyce (psychiatrist)

- Professor Vicky Cameron (molecular geneticist)
- Professor Steve Chambers (infectious diseases)
- Associate Professor Richard Gearry (gastroenterologist)
- Dr Hamish Jamieson (geriatrician/physician)
- Professor Martin Kennedy (molecular geneticist)
- Dr Cameron Lacey (psychiatrist, Māori health)
- Professor David Murdoch (infectious diseases)
- Professor Philip Schluter (biostatistician)
- Dr John Pearson (biostatistician)
- Professor Richard Porter (psychiatrist)
- Professor Mark Richards (cardiologist)
- Ms Janet Spittlehouse (psychology, study coordinator)
- Associate Professor Richard Troughton (cardiologist)

**Who is involved with the research?**

In addition to those involved in the initial planning, a number of staff will be involved in contacting interviewing, assessing of participants and in the analysis of data. These people currently include:

- Robyn Abbott
- Dr Margaret DeAngelis
- Associate Professor Mark Elder
- Bridget Kimber
- Dr Sandy Mandic
- Julia Martin
- Dr Paula Skidmore
- Anna Thorpe
- Dr Esther Vierck
- Catherine Wall

**Who is paying for the research?**

To date the research has been funded by the University of Otago, the University of Otago Christchurch, Lottery Health and Canterbury Community Trust. We will continue to seek funds from a wide variety of other sources.

**Further Questions?**

If you have any questions or would like to know more, please contact:
Janet Spittlehouse  
Chalice Project Research Coordinator  
University of Otago, Christchurch  
10 Oxford Terrace  
PO Box 4345  
Christchurch 8140  

Tel: 03 378 6468  

Email: janet.spittlehouse@otago.ac.nz
Appendix N

Non-Māori invitation letter for the CHALICE study
Dear [insert name]

You are invited to participate in a major new study called CHALICE, which focuses on health, wellbeing, active ageing and disorders associated with ageing such as heart disease, hypertension, diabetes, dementia, bowel disease and depression. CHALICE is a longitudinal study which means that we would like to observe people over a number of years.

Over the next few years we need about three thousand people living in Canterbury who are about fifty years of age to participate in this study. Your name has been selected randomly from the Canterbury Electoral Rolls and we invite you to take part in CHALICE. This study has received ethical approval from the Upper South A Regional Ethics Committee. We are looking for a varied group of people from the Canterbury population and we very much hope that you will be able to take part.

A wide range of factors will be looked at, including lifestyle, diet, attitudes, environmental, social factors and genetics. This will involve donating a sample of blood, urine, photographing your eyes, an echocardiogram (ECG) of your heart, as well as answering a number of questions. Your samples and personal information will be kept strictly confidential. Please find enclosed an information sheet with more details.

Every participant will have the opportunity of being sent the results of some of the tests that are carried out during the assessment.

If you are willing to take part in CHALICE, please complete the response form enclosed, and return it in the Freepost envelope. We will contact you soon.

There is no obligation to participate in the study. If you do not want to take part, please tick the appropriate box and return the response form to us in the enclosed Freepost envelope.

We hope that you will agree to participate in CHALICE, as it is the first study concerned with the ageing of our population in Canterbury. The Canterbury District Health Board supports this study and will allow their employees a day of sick leave to be taken to participate in this study.

Please call us if you have any questions:

[insert full name] CHALICE Interviewer 03 [insert Number]
Professor Peter Joyce CHALICE Principle Investigator 03 378 6411

Yours sincerely

[insert full name – BOLD] CHALICE Interviewer
University of Otago, Christchurch

[insert date]
CHALICE Response Form

Please read the Information Sheet enclosed, and complete the details below. Please return this form in the Freepost envelope.

[please tick one]

I am willing to participate in CHALICE □

I no longer live in Canterbury □

I am unable to help □

Reason unable to help: ____________________________________________________________

______________________________________________________________________________

Please complete the following details if you plan to participate:

First name(s): ___________________________ Surname: ________________________________

Daytime Phone: ___________________________ Evening Phone: ___________________________

Cell phone Number: ________________________

Is there a good time to contact you? Please let us know the most convenient
day _______________ and time: ______:_____am/pm [please circle]

Date of Birth: ______/_____/_________ Gender [circle]: Male / Female

Please will you write down the GP clinic, medical centre or family practice that you usually go to first when you are feeling unwell or are injured?

The name of the clinic/medical centre?

______________________________________________________________________________

The name of your usual doctor there?

______________________________________________________________________________

The address of the clinic/medical centre?

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

We thank you for indicating your response. Please return this form in the envelope provided or post to: The Chalice Study, 10 Oxford Terrace, PO box 4345, Christchurch 8140
Appendix O

Māori invitation letter for the CHALICE study
This is an invitation to be part of a new health research project to look at healthy ageing for Māori. We are trying to find out why Māori have shorter lives and what could help Māori to live healthier, longer lives.

You are being contacted because your name has been chosen from a random selection of the electoral roll. You do not have to take part in this study if you do not want to; it is completely voluntary. You have not been chosen because of your health being good or bad.

We are looking for Māori men or women who are about 50 years old, and who are living within the area of Mana Whenua ki Waitaha - Canterbury. Among the people who are 50 years old, we expect that there will be a full range of health, wellbeing and disease. We would like to be able to study this diversity of health issues.

By taking part in the CHALICE study you may help strengthen the health and wellbeing of future generations. Also, every participant will have the opportunity of receiving individual feedback regarding the results of some of the tests that are carried out during the assessment.

The Canterbury District Health Board supports this study and will allow their employees a day of sick leave to be taken to participate in this study.

If you are willing to take part in CHALICE, please complete the response form enclosed, and return it in the Freepost envelope. We will contact you soon.

If you have any questions about this health research or would prefer to respond to the questions by phone please call:

[insert full name] CHALICE Interviewer 03 [insert Number]

Heoi ano

[insert full name – BOLD] CHALICE Interviewer
Department of Psychological Medicine
University of Otago, Christchurch

Dr Cameron Lacey (Te Atiawa)
Lead Māori Investigator – CHALICE
Māori / Indigenous Health Institute (MIHI)
University of Otago, Christchurch

mihi
Māori / Indigenous Health Institute
CHALICE Response Form

Please read the Information Sheet enclosed, and complete the details below. Please return this form in the Freepost envelope.

[please tick]

I am willing to participate in CHALICE □

I am unable to help □

Reason unable to help: ______________________________________
________________________________________________________________
________________________________________________________________

Please complete the following details if you plan to participate:

First name(s): ___________________________ Surname: ___________________________

Daytime Phone: ______________________ Evening Phone: ______________________

Cell phone Number: ______________________

Is there a good time to contact you? Please let us know the most convenient
day __________ and time: _____:____am/pm [please circle]

Date of Birth: _____/_____/__________ Gender [circle]: Male / Female

Please will you write down the GP clinic, medical centre or family practice that you usually go to first when you are feeling unwell or are injured?

The name of the clinic/medical centre?

________________________________________________________________

The name of your usual doctor there?

________________________________________________________________

The address of the clinic/medical centre?

__________________________________________
__________________________________________
__________________________________________
__________________________________________

We thank you for indicating your response. Please return this form in the envelope provided or post to: The Chalice Study, 10 Oxford Terrace, PO box 4345, Christchurch 8140
Appendix P

Short TCI-R with scoring key
CHALICE Study - T.C.I.-SF

In this questionnaire you will find statements that people might use to describe their attitudes, opinions, interests, and other personal feelings. For each of the following questions, please circle the number that best describes the way you usually or generally act or feel. (Circle only one number for each question).

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Definitely</td>
<td>Mostly or</td>
<td>Neither True</td>
<td>Mostly or</td>
<td>Definitely</td>
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<tr>
<td>False</td>
<td>probably</td>
<td>nor False, or</td>
<td>probably</td>
<td>True</td>
</tr>
</tbody>
</table>

Read each statement carefully, but don’t spend too much time deciding on each answer.

Please answer every statement, even if you are not completely sure of the answer.

Try to describe yourself the way you **usually** or **generally** act and feel, not just how you are feeling right now.

Remember there are no right or wrong answers - just describe your own personal opinions and feelings.

1. I often try new things just for fun or thrills, even if most people think it is a waste of time ................................................................. 1 2 3 4 5

2. I usually am confident that everything will go well even in situations that worry most people ................................................................. 1 2 3 4 5

3. I often feel that I am the victim of circumstances ........................................... 1 2 3 4 5

4. I can usually accept other people as they are, even when they are very different from me ......................................................................................... 1 2 3 4 5

5. I like a challenge better than easy jobs ........................................................................ 1 2 3 4 5

6. Often I feel that my life has little purpose or meaning ........................................ 1 2 3 4 5

7. I like to help find a solution to problems so that everyone comes out ahead ......... 1 2 3 4 5

8. I am usually eager to get going on any job I have to do ........................................ 1 2 3 4 5

9. I often feel tense and worried in unfamiliar situations, even when others feel there is little to worry about ................................................................. 1 2 3 4 5

10. I often do things based on how I feel at the moment without thinking about how they were done in the past ................................................................. 1 2 3 4 5

11. I usually do things my own way, rather than giving in to the wishes of other people ................................................................. 1 2 3 4 5

12. I often feel a strong sense of unity with all the things around me .......................... 1 2 3 4 5

13. I would do almost anything legal in order to become rich and famous, even if I would lose the trust of many old friends ................................................................. 1 2 3 4 5

14. I am much more reserved and controlled than most people .................................. 1 2 3 4 5
<p>| | | | | | |</p>
<table>
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<td>6</td>
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<tr>
<td>15.</td>
<td>I like to discuss my experiences and feelings openly with friends instead of keeping them to myself.</td>
<td></td>
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<tr>
<td>16.</td>
<td>I have less energy and get tired more quickly than most people.</td>
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<tr>
<td>17.</td>
<td>I seldom feel free to choose what I want to do.</td>
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<td>18.</td>
<td>I don’t seem to understand most people very well.</td>
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<td>19.</td>
<td>I often avoid meeting strangers because I lack confidence with people I do not know.</td>
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<td>20.</td>
<td>I like to please other people as much as I can.</td>
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<td>21.</td>
<td>I often wish that I was smarter than everyone else.</td>
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<td>22.</td>
<td>No job is too hard for me to do my best.</td>
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<td>23.</td>
<td>I often wait for someone else to provide a solution to my problems.</td>
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<td>24.</td>
<td>I often spend money until I run out of cash or get into debt from using too much credit.</td>
<td></td>
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<tr>
<td>25.</td>
<td>Often I have unexpected flashes of insight or understanding while relaxing.</td>
<td></td>
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<tr>
<td>26.</td>
<td>I don’t care very much whether other people like me or the way I do things.</td>
<td></td>
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<tr>
<td>27.</td>
<td>I usually try to get just what I want for myself because it is not possible to satisfy everyone anyway.</td>
<td></td>
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<td>28.</td>
<td>I have no patience with people who don’t accept my views.</td>
<td></td>
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<td>29.</td>
<td>I sometimes feel so connected to nature that everything seems to be part of one living process.</td>
<td></td>
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<td>30.</td>
<td>When I have to meet a group of strangers, I am more shy than most people.</td>
<td></td>
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<td>31.</td>
<td>I am more sentimental than most people.</td>
<td></td>
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<tr>
<td>32.</td>
<td>I think that most things that are called miracles are just chance.</td>
<td></td>
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<td>33.</td>
<td>When someone hurts me in any way, I usually try to get even.</td>
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<tr>
<td>34.</td>
<td>My actions are determined largely by influences outside my control.</td>
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<tr>
<td>35.</td>
<td>Each day I try to take another step toward my goals.</td>
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<tr>
<td>36.</td>
<td>Please circle the number four, this is a validity item.</td>
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<td>37.</td>
<td>I am a very ambitious person</td>
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<td>38.</td>
<td>I usually stay calm and secure in situations that most people would find physically dangerous</td>
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<td>39.</td>
<td>I do not think it is smart to help weak people who cannot help themselves</td>
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<td>40.</td>
<td>I cannot have any peace of mind if I treat other people unfairly, even if they are unfair to me</td>
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<td>41.</td>
<td>People will usually tell me how they feel</td>
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<td>42.</td>
<td>Sometimes I have felt like I was part of something with no limits or boundaries in time and space</td>
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<td>43.</td>
<td>I sometimes feel a spiritual connection to other people that I cannot explain in words</td>
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<td>44.</td>
<td>I like it when people can do whatever they want without strict rules and regulations</td>
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<td>45.</td>
<td>When I fail at something, I become even more determined to do a better job</td>
<td>1</td>
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<td>46.</td>
<td>Usually I am more worried than most people that something might go wrong in the future</td>
<td>1</td>
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<td>47.</td>
<td>I usually think about all the facts in detail before I make a decision</td>
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<td>48.</td>
<td>I have many bad habits that I wish I could break</td>
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<td>49.</td>
<td>Other people control me too much</td>
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<td>50.</td>
<td>I like to be of service to others</td>
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<td>51.</td>
<td>I am usually able to get other people to believe me, even when I know that what I am saying is exaggerated or untrue</td>
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<td>52.</td>
<td>Sometimes I have felt my life was being directed by a spiritual force greater than any human being</td>
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<td>53.</td>
<td>I have a reputation as someone who is very practical and does not act on emotion</td>
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<td>54.</td>
<td>I am strongly moved by sentimental appeals (like when asked to help crippled children)</td>
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<td>2</td>
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<tr>
<td>55.</td>
<td>I am usually so determined that I continue to work long after other people have given up</td>
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<td>56.</td>
<td>I have had moments of great joy in which I suddenly had a clear, deep feeling of oneness with all that exists</td>
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<td>Definitely</td>
<td>Mostly or</td>
<td>Neither True</td>
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<td>False</td>
<td>probably</td>
<td>nor False, or</td>
<td>probably</td>
<td>True</td>
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</table>

57. I know what I want to do in my life ................................................................. 1 2 3 4 5
58. I often cannot deal with problems because I just don’t know what to do .......... 1 2 3 4 5
59. I prefer spending money rather than saving it .................................................. 1 2 3 4 5
60. I have often been called an “eager beaver” because of my enthusiasm for hard work .................................................................................................................. 1 2 3 4 5
61. If I am embarrassed or humiliated, I get over it very quickly ......................... 1 2 3 4 5
62. I like to strive for bigger and better things ....................................................... 1 2 3 4 5
63. I usually demand very good practical reasons before I am willing to change my old ways of doing things ......................................................................................... 1 2 3 4 5
64. I nearly always stay relaxed and carefree, even when nearly everyone else is fearful ........................................................................................................................................ 1 2 3 4 5
65. I find sad songs and movies pretty boring ......................................................... 1 2 3 4 5
66. Circumstances often force me to do things against my will ............................. 1 2 3 4 5
67. I usually enjoy being mean to anyone who has been mean to me ............... 1 2 3 4 5
68. I often become so fascinated with what I’m doing that I get lost in the moment – like I’m detached from time and place ........................................................................ 1 2 3 4 5
69. I do not think I have a real sense of purpose for my life ..................................... 1 2 3 4 5
70. I often feel tense and worried in unfamiliar situations, even when others feel there is no danger at all ........................................................................................................... 1 2 3 4 5
71. I often follow my instincts, hunches, or intuition without thinking through all the details ................................................................................................................................ 1 2 3 4 5
72. I love to excel at everything I do ........................................................................... 1 2 3 4 5
73. I often feel a strong spiritual or emotional connection with all the people around me .................................................................................................................................. 1 2 3 4 5
74. I usually try to imagine myself “in other people’s shoes”, so I can really understand them ................................................................................................................................. 1 2 3 4 5
75. Principles like fairness and honesty have little role in some aspects of my life ................................. 1 2 3 4 5
76. I am more hard-working than most people ....................................................... 1 2 3 4 5
77. Even when most people feel it is not important, I often insist on things being done in a strict and orderly way .................................................................................. 1 2 3 4 5
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<tbody>
<tr>
<td>78</td>
<td>I feel very confident and sure of myself in almost all social situations</td>
<td>1 2 3 4 5</td>
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<td>79</td>
<td>My friends find it hard to know my feelings because I seldom tell them about my private thoughts</td>
<td>1 2 3 4 5</td>
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<tr>
<td>80</td>
<td>I am good at communicating my feelings to others</td>
<td>1 2 3 4 5</td>
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</tr>
<tr>
<td>81</td>
<td>I am more energetic and tire less quickly than most people</td>
<td>1 2 3 4 5</td>
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</tr>
<tr>
<td>82</td>
<td>I often stop what I am doing because I get worried, even when my friends tell me everything will go well</td>
<td>1 2 3 4 5</td>
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<tr>
<td>83</td>
<td>I often wish I was more powerful than everyone else</td>
<td>1 2 3 4 5</td>
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<tr>
<td>84</td>
<td>Members of a team rarely get their fair share</td>
<td>1 2 3 4 5</td>
<td></td>
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<tr>
<td>85</td>
<td>I don’t go out of my way to please other people</td>
<td>1 2 3 4 5</td>
<td></td>
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<tr>
<td>86</td>
<td>I am not shy with strangers at all</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
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<tr>
<td>87</td>
<td>I spend most of my time doing things that seem necessary but not really important to me</td>
<td>1 2 3 4 5</td>
<td></td>
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<tr>
<td>88</td>
<td>I don’t think that religious or ethical principles about what is right and wrong should have much influence in business decisions</td>
<td>1 2 3 4 5</td>
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<tr>
<td>89</td>
<td>I often try to put aside my own judgments so that I can better understand what other people are experiencing</td>
<td>1 2 3 4 5</td>
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<td>90</td>
<td>Many of my habits make it hard for me to accomplish worthwhile goals</td>
<td>1 2 3 4 5</td>
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<tr>
<td>91</td>
<td>I have made real personal sacrifices in order to make the world a better place—like trying to prevent war, poverty and injustice</td>
<td>1 2 3 4 5</td>
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<td>92</td>
<td>It takes me a long time to warm up to other people</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
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<tr>
<td>93</td>
<td>It gives me pleasure to see my enemies suffer</td>
<td>1 2 3 4 5</td>
<td></td>
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<tr>
<td>94</td>
<td>No matter how hard a job is, I like to get started quickly</td>
<td>1 2 3 4 5</td>
<td></td>
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</tr>
<tr>
<td>95</td>
<td>It often seems to other people like I am in another world because I am so completely unaware of things going on around me</td>
<td>1 2 3 4 5</td>
<td></td>
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</tr>
<tr>
<td>96</td>
<td>I usually like to stay cool and detached from other people</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>I am more likely to cry at a sad movie than most people</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>I recover more quickly than most people from minor illnesses or stress</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>I often feel like I am a part of the spiritual force on which all life depends</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
100. I need much more practice in developing good habits before I will be able to trust myself in many tempting situations ................................................................. 1 2 3 4 5

101. Please circle the number one; this is a validity item ................................................................. 1 2 3 4 5

102. I like to make quick decisions so I can get on with what has to be done ............ 1 2 3 4 5

103. I am usually confident that I can easily do things that most people would consider dangerous (such as driving an automobile fast on a wet or icy road)............... 1 2 3 4 5

104. I like to explore new ways to do things .................................................................................. 1 2 3 4 5

105. I enjoy saving money more than spending it on entertainment or thrills ....... 1 2 3 4 5

106. I have had personal experiences in which I felt in contact with a divine and wonderful spiritual power ................................................................. 1 2 3 4 5

107. I have so many faults that I don’t like myself very much ................................................................. 1 2 3 4 5

108. Most people seem more resourceful than I am ................................................................. 1 2 3 4 5

109. I often break rules and regulations when I think I can get away with it .............. 1 2 3 4 5

110. Even when I am with friends, I prefer not to “open up” very much ....................... 1 2 3 4 5

111. The harder a job is the more I like it .................................................................................. 1 2 3 4 5

112. Often when I look at an ordinary thing, something wonderful happens – I get the feeling that I am seeing it fresh for the first time ................................................................. 1 2 3 4 5

113. I usually feel tense and worried when I have to do something new and unfamiliar ................................................................................................................................. 1 2 3 4 5

114. I am eager to start work on any assigned duty ........................................................................ 1 2 3 4 5

115. My will power is too weak to overcome very strong temptations, even if I know I will suffer as a consequence ................................................................................................. 1 2 3 4 5

116. If I am feeling upset, I usually feel better around friends than when left alone .. 1 2 3 4 5

117. I often accomplish more than people expect of me ................................................................. 1 2 3 4 5

118. Religious experiences have helped me to understand the real purpose of my life ................................................................................................................................. 1 2 3 4 5

119. I usually push myself harder than most people do because I want to do as well as I possibly can ................................................................................................................................. 1 2 3 4 5

120. Please circle five, this is a validity item ........................................................................ 1 2 3 4 5
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Definitely</td>
<td>Mostly or</td>
<td>Neither</td>
<td>Mostly or</td>
<td>Definitely</td>
<td></td>
</tr>
<tr>
<td>False</td>
<td>probably</td>
<td>nor False, or</td>
<td>probably</td>
<td>True</td>
<td></td>
</tr>
</tbody>
</table>

121. I usually feel much more confident and energetic than most people, even after minor illnesses or stress .......................................................... 1 2 3 4 5

122. When nothing new is happening, I usually start looking for something that is thrilling or exciting .......................................................... 1 2 3 4 5

123. I like to think about things for a long time before I make a decision ................. 1 2 3 4 5

124. People involved with me have to learn how to do things my way......................... 1 2 3 4 5

125. I make a warm personal connection with most people ................................. 1 2 3 4 5

126. I am often described as an overachiever .................................................. 1 2 3 4 5

127. I would rather read a book than talk about my feelings with another person .... 1 2 3 4 5

128. I enjoy getting revenge on people who hurt me...................................... 1 2 3 4 5

129. If something doesn’t work as I expected, I am more likely to quit than to keep going for a long time.......................................................... 1 2 3 4 5

130. It is easy for other people to get close to me emotionally.......................... 1 2 3 4 5

131. I would probably stay relaxed and outgoing when meeting a group of strangers, even if I were told they are unfriendly ........................................... 1 2 3 4 5

132. Please circle the number two; this is a validity item................................. 1 2 3 4 5

133. I generally don’t like people who have different ideas from me ...................... 1 2 3 4 5

134. I often drag my heels a while before starting any project.......................... 1 2 3 4 5

135. I can usually do a good job of stretching the truth to tell a funnier story or to play a joke on someone............................................................. 1 2 3 4 5

136. It is extremely difficult for me to adjust to changes in my usual way of doing things because I get so tense, tired, or worried........................................ 1 2 3 4 5

137. I am more of a perfectionist than most people......................................... 1 2 3 4 5

138. Other people often think that I am too independent because I won’t do what they want.......................................................... 1 2 3 4 5

139. I am better at saving money than most people......................................... 1 2 3 4 5

140. I often give up a job if it takes much longer than I thought it would ............ 1 2 3 4 5
Short TCI-R Scoring Protocol *(Reverse Codes underlined)*

**Novelty Seeking**

**NS1**  Exploratory excitability vs stoic rigidity  
1, 104, 122, 53, 63

**NS2**  Impulsiveness vs reflection  
10, 71, 102, 47, 123

**NS3**  Extravagance vs reserve  
24, 59, 14, 105, 139

**NS4**  Disorderliness vs regimentation  
44, 51, 109, 135, 77

**NS TOTAL:**  NS1 + NS2 + NS3 + NS4

**Harm Avoidance**

**HA1**  Anticipatory worry & pessimism vs uninhibited optimism  
46, 82, 2, 61, 64

**HA2**  Fear of uncertainty  
9, 70, 113, 38, 103

**HA3**  Shyness with strangers  
19, 30, 78, 86, 131

**HA4**  Fatigability vs asthenia  
16, 136, 81, 98, 121

**HA TOTAL:**  HA1 + HA2 + HA3 + HA4

**Reward Dependence**

**RD1**  Sentimentality  
20, 31, 54, 97, 65

**RD2**  Openness to warm communication vs aloofness  
80, 125, 130, 92, 127

**RD3**  Attachment  
15, 116, 79, 96, 110

**RD4**  Dependence  
11, 26, 39, 85, 138

**RD TOTAL:**  RD1 + RD2 + RD3 + RD4

**Persistence**

**P1**  Eagerness of effort vs laziness  
8, 60, 94, 114, 134
Work hardened vs spoiled
5, 22, 45, 111, 140

Ambitious vs underachieving
37, 62, 72, 117, 126

Perfectionist vs pragmatist
55, 76, 119, 137, 129

Self-Directedness

Responsibility vs blaming
3, 17, 34, 49, 66

Purposefulness vs lack of goal direction
35, 57, 6, 69, 87

Resourcefulness
23, 58, 108

Self-acceptance vs self-striving
21, 83

Enlightened second nature
48, 90, 100, 107, 115

Cooperativeness

Social acceptance vs. social intolerance
4, 28, 124, 133

Empathy vs. social disinterest
41, 74, 89, 18

Helpfulness vs. unhelpfulness
7, 50, 27, 84

Compassion vs. revengefulness
33, 67, 93, 128

Pure-hearted conscience vs. self-serving advantage
40, 13, 75, 88

Self-Transcendence

Self-forgetful vs. self-conscious experience
25, 42, 56, 68, 95, 112
ST2  Transpersonal identification vs. self-differentiation
   12, 29, 73, 91, 99

ST3  Spiritual acceptance vs. rational materialism
   43, 52, 106, 118, 32

ST TOTAL:  ST1 + ST2 + ST3

Validity Scale:  36=4; 101=1; 120=5; 132=2
Appendix Q

Short Form 36 Version 2
Thank you for agreeing to take part in the Chalice study. We really appreciate you giving up your time to help complete this important research project. Please will you take a few minutes to read over and answer the following questions?

**HEALTH STATUS (SF-36v2)**

For each of the following questions, please select the one response that best describes your answer. Please enter the date that you are completing this questionnaire: ____/____/____

1. In general, would you say that your health is:
   1. Excellent
   2. Very good
   3. Good
   4. Fair
   5. Poor

2. **Compared to one year ago**, how would you rate your health in general now?
   1. Much better now than one year ago
   2. Somewhat better now than one year ago
   3. About the same as one year ago
   4. Somewhat worse now than one year ago
   5. Much worse now than one year ago

3. The following questions are about activities you might do during a typical day. Does **your health now limit** you in these activities? If so, how much?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes, limited a lot</th>
<th>Yes, limited a little</th>
<th>No, not limited at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Vigorous activities, such as running, lifting heavy objects,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>participating in strenuous sports.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Moderate activities, such as moving a table, pushing a vacuum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cleaner, bowling or playing golf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Lifting or carrying groceries.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) Climbing several flights of stairs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e) Climbing one flight of stairs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(f) Bending, kneeling or stooping.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(g) Walking more than a kilometre.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(h) Walking half a kilometre.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) Walking 100 metres.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(j) Bathing, showering or dressing yourself</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities, **as a result of your physical health**?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Cut down on the <strong>amount of time</strong> you spent on work or other activities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Accomplished less than you would like.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Were limited in the <strong>kind of work or other activities</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) Had <strong>difficulty</strong> performing the work or other activities (for example, it took extra effort).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Cut down on the <strong>amount of time</strong> you spent on work or other activities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Accomplished less than you would like.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Did work or activities <strong>less carefully than usual</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

1. Not at all
2. A little bit
3. Moderately
4. Quite a bit
5. Extremely

7. How much **bodily** pain have you had during the **past 4 weeks**?

1. No bodily pain
2. Very mild
3. Mild
4. Moderate
5. Severe
6. Very severe

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

1. Not at all
2. A little bit
3. Moderately
4. Quite a bit
5. Extremely
9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks..........

<table>
<thead>
<tr>
<th>(a) Did you feel full of life?</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) Have you been very nervous?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(c) Have you felt so down in the dumps that nothing could cheer you up?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(d) Have you felt calm and peaceful?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(e) Did you have a lot of energy?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(f) Have you felt downhearted and depressed?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(g) Did you feel worn out?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(h) Have you been happy?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(i) Did you feel tired?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc)?

1. All of the time
2. Most of the time
3. Some of the time
4. A little of the time
5. None of the time

11. How TRUE or FALSE is each of the following statements for you?

<table>
<thead>
<tr>
<th>(a) I seem to get sick a little easier than other people</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) I am as healthy as anybody I know</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(c) I expect my health to get worse</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(d) My health is excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix R

Savings Inventory – Revised
I. CURRENT HOARDING (SI-R)

Hoarding

Over the past month:

Ia. 1 To what extent have you had difficulties throwing things away?
   1 = Not at all
   2 = To a mild extent
   3 = To a moderate extent
   4 = To a considerable extent
   5 = Very much so

Ia. 2 To what extent do you have so many things that your room(s)/house is cluttered?
   1 = Not at all
   2 = To a mild extent
   3 = To a moderate extent
   4 = To a considerable extent
   5 = Very much so

Ia. 3 How often do you avoid trying to discard possessions because it is too stressful or time-consuming?
   1 = Not at all
   2 = To a mild extent
   3 = To a moderate extent
   4 = To a considerable extent
   5 = Very much so

Ia. 4 How distressed or uncomfortable have you been if you could not acquire something you wanted?
   1 = Not at all
   2 = To a mild extent
   3 = To a moderate extent
   4 = To a considerable extent
   5 = Very much so

IF QUESTIONS Ia. 1 - Ia. 4 ARE ALL CODED 1 or 2, SKIP TO Ib. 1 OBSESSIONS (PAGE 21); OTHERWISE CONTINUE WITH QUESTIONS Ia. 5 - Ia. 23.

Ia. 5 How often do you decide to keep things you do not need and have little space for?
   1 = Never keep such things
   2 = Rarely
   3 = Occasionally
   4 = Frequently
   5 = Almost always keep such possessions

Ia. 6 How strong is your urge to save something you know you may never use?
   1 = Not at all strong
2 = Mild urge
3 = Moderate urge
4 = Strong urge
5 = Very strong urge

Ia. 7 How much control do you have over your urges to save possessions?

1 = Complete control
2 = Much control, usually able to control urges to save
3 = Some control, can control urges to save only with difficulty
4 = Little control, can only stop urges with great difficulty
5 = No control, unable to stop urges to save possessions

Ia. 8 How often are you unable to discard a possession you would like to get rid of?

1 = Never have a problem discarding possessions
2 = Rarely
3 = Occasionally
4 = Frequently
5 = Almost always unable to discard possessions

Ia. 9 How distressing have you found the task of throwing things away?

1 = Not at all
2 = To a mild extent
3 = To a moderate extent
4 = To a considerable extent
5 = Very much so

Ia. 10 How much of the living area in your home is cluttered with possessions? (Consider the amount of clutter in your kitchen, living room, dining room, hallways, bedrooms, bathrooms or other rooms.)

1 = None of the living area is cluttered
2 = Some of the living area is cluttered
3 = Much of the living area is cluttered
4 = Most of the living area is cluttered
5 = All or almost all of the living area is cluttered

Ia. 11 To what extent does clutter prevent you from using parts of your home?

1 = All parts of the home are usable
2 = A few parts of the home are not usable
3 = Some parts of the home are not usable
4 = Many parts of the home are not usable
5 = Nearly all parts of the home are not usable

Ia. 12 To what extent does the clutter in your home prevent you from using parts of your home for their intended purpose? For example, cooking, using furniture, washing dishes, cleaning, etc.?
1 = Never  
2 = Rarely  
3 = Sometimes  
4 = Frequently  
5 = Very frequently or almost all the time

Ia. 13 How **much** of your home is **difficult to walk through** because of clutter?

1 = None of it is difficult to walk through  
2 = Some of it is difficult to walk through  
3 = Much of it is difficult to walk through  
4 = Most of it is difficult to walk through  
5 = All or nearly all of it is difficult to walk through

Ia. 14 How frequently does the clutter in your home **prevent** you from inviting people to visit?

1 = Not at all  
2 = Rarely  
3 = Sometimes  
4 = Often  
5 = Very often or nearly always

Ia. 15 How much does the clutter in your home **interfere** with your social, work or everyday functioning? Think about things that you don’t do because of clutter.

1 = Not at all  
2 = Mild, slight interference, but overall functioning not impaired  
3 = Moderate, definite interference, but still manageable  
4 = Severe, causes substantial interference  
5 = Extreme, incapacitating

Ia. 16 To what extent do you feel unable to **control** the clutter in your home?

1 = Not at all  
2 = To a mild extent  
3 = To a moderate extent  
4 = To a considerable extent  
5 = Very much so

Ia. 17 To what extent does the clutter in your home cause you **distress**?

1 = No feelings of distress or discomfort  
2 = Mild feelings of distress or discomfort  
3 = Moderate feelings of distress or discomfort  
4 = Severe feeling of distress or discomfort  
5 = Extreme feelings of distress or discomfort
Ia. 18 How strong is your **urge to buy** or acquire free things for which you have no immediate use?

1 = Urge is not at all strong  
2 = Mild urge  
3 = Moderate urge  
4 = Strong urge  
5 = Very strong urge  

Ia. 19 How often do you feel **compelled to acquire** something you see (e.g., when shopping or offered free things)?

1 = Never feel compelled  
2 = Rarely feel compelled  
3 = Sometimes feel compelled  
4 = Frequently feel compelled  
5 = Almost always feel compelled  

Ia. 20 How often do you actually **buy** (or acquire for free) things for which you have no immediate use or need.

1 = Never  
2 = Rarely  
3 = Sometimes  
4 = Frequently  
5 = Almost always  

Ia. 21 How much **control** do you have over your urges to acquire possessions?

1 = Complete control  
2 = Much control, usually able to control urges to acquire  
3 = Some control, can control urges to acquire only with difficulty  
4 = Little control, can only delay urges to acquire only with great difficulty  
5 = No control, unable to stop urges to acquire possessions  

Ia. 22 To what extent has your saving or compulsive buying resulted in **financial difficulties** for you?

1 = Not at all  
2 = A little financial difficulty  
3 = Some financial difficulty  
4 = Quite a lot of financial difficulty  
5 = An extreme amount of financial difficulty  

Ia. 23 How upset or **distressed** do you feel about your acquiring habits?

1 = Not at all upset  
2 = Mildly upset  
3 = Moderately upset  
4 = Severely upset  
5 = Extremely upset
Appendix S

Warwick-Edinburgh Mental Well-being Scale
The Warwick-Edinburgh Mental Well-being Scale (WEMWBS)

Below are some statements about feeling and thoughts. Please tick the box that best describes your experience of each over the last 2 weeks.

<table>
<thead>
<tr>
<th>STATEMENTS</th>
<th>1 None of the time</th>
<th>2 Rarely</th>
<th>3 Some of the time</th>
<th>4 Often</th>
<th>5 All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>I've been feeling optimistic about the future</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>I've been feeling useful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I've been feeling relaxed</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I've been feeling interested in other people</td>
<td></td>
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<tr>
<td>I've had energy to spare</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I've been dealing with problems well</td>
<td></td>
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<tr>
<td>I've been thinking clearly</td>
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<tr>
<td>I've been feeling good about myself</td>
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<tr>
<td>I've been feeling close to other people</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>I've been feeling confident</td>
<td></td>
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<tr>
<td>I've been able to make up my own mind about things</td>
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<tr>
<td>I've been feeling loved</td>
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<tr>
<td>I've been interested in new things</td>
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<tr>
<td>I've been feeling cheerful</td>
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</tbody>
</table>