Health Satisfaction and Perceived Control: Investigating Subjective Wellbeing Homeostasis

by

Wendy Lynn Kennedy
BBus (Hons), Dip Teach (Early Childhood)

Submitted in fulfilment of the requirements for the award of

Doctor of Philosophy

School of Psychology

Deakin University

July 2011

DEAKIN UNIVERSITY

ACCESS TO THESIS – A

I am the author of the thesis entitled:

Health Satisfaction and Perceived Control: Investigating Subjective Wellbeing Homeostasis

Submitted for the degree of: Doctor of Philosophy

This thesis may be made available for consultation, loan and limited copying in accordance with the Copyright Act 1968.

'*I certify that I am the student named below and the information provided in the form is correct*'

Full Name: Wendy Lynn Kennedy

Signed:

Date: 24th October 2011

DEAKIN UNIVERSITY

CANDIDATE DECLARATION

I certify that the thesis entitled:

Health Satisfaction and Perceived Control: Investigating Subjective Wellbeing Homeostasis

Submitted for the degree of: Doctor of Philosophy

is the result of my own work and that where reference is made to the work of others, due acknowledgement is given.

I also certify that any material in the thesis which has been accepted for a degree or diploma by any university or institution is identified in the text.

'*I certify that I am the student named below and the information provided in the form is correct*'

Full Name: Wendy Lynn Kennedy

Signed:

Date: 24th October 2011

Acknowledgements

When embarking on a PhD candidature, no-one really knows exactly what's in store and whether they will, in fact, complete the process. The completion of this thesis has only been possible through the expert guidance of my supervisor Professor Robert Cummins. Bob, I sincerely thank you for your patience, timely advice, and careful attention to countless drafts. It is comforting to know that in a world of increasingly rapid change and compromise, the traditional values of academic rigour, professionalism, and critical enquiry are alive and well through your example. I feel privileged to have been part of such an academic environment.

Thank you also to my immediate family Neil and Scott. Neil, for a long time now you have undertaken more than your fair share of our domestic and financial responsibilities, and tactfully attended to countless conversations on the intricate machinations of SWB, a topic far removed from your normal field of expertise. And to Scott, who has shared the demands of my candidature with his own life from graduating high school and university, to 21st birthday celebrations without complaint. Through the love and support of both of you, this is as much your thesis as it is mine.

Thank you to Ann and Rosslyn for your enduring friendship. Despite a frequent lack of availability for social events, you have not given up asking me anyway. I'm looking forward to getting re-acquainted and just hanging out together once again. To Michael, you are the master of listening skills, intuitive understanding, and wise counsel. Your contribution is more valued than you know.

To my father Alex, who is always supportive in spirit, and to my mother Val; you are a truly inspiring example of living life with love, dignity, and respect. Thank you for the encouragement to keep going. I also offer many thanks to Dr. Peter Portelli (Chiropractor) and his brothers Victor and Michael Portelli for generously providing access to their chiropractic clinics for the recruitment of survey respondents. Finally, thank you to Ann-Marie James who has been a font of knowledge on all things administrative and a friendly face throughout this candidature.

Health Satisfaction and Perceived Control: Investigating Subjective Wellbeing Homeostasis

Table of Contents

Table of Figures

Table of Tables

Executive Summary

This thesis is embedded within the literature on subjective wellbeing (SWB) and the Theory of Subjective Wellbeing Homeostasis. Through an investigation incorporating SWB, health satisfaction, and perceived control, the thesis attempts to understand how the SWB homeostatic system responds to external challenges, such as the presence of a significant medical condition. While there is a substantial literature on relationships between the symptoms of chronic illness and psychological outcomes, few papers are available on the SWB experienced by people with a back problem. The research presented in this thesis addresses this gap in the literature while also advancing knowledge on the theory of SWB Homeostasis.

The thesis reports three separate but related studies. The aim of Study 1 was to investigate the SWB and health satisfaction of respondents with a self-assessed medical condition. Significantly lower SWB than normal was reported for these people, particularly where pain was also present. Individuals with a back problem (n = 109) were found to have the lowest SWB of seven physical conditions examined (arthritis, asthma, back problem, blood pressure, diabetes, cancer, and heart problems). Additionally, while all medical conditions experienced low health satisfaction, these reductions were offset by compensatory rises in satisfaction with other domains, such as Community Connectedness, for all conditions except back problem. This suggests that the back problem group may be at risk of homeostatic failure and depression.

In order to understand the role of control in SWB homeostasis, the aim of Study 2 was to identify control variables that have a significant relationship to SWB. Using existing data from a non-medical sample, only three control variables out of the five examined were significantly related to SWB; Primary Control, Secondary Control, and perceptions of control over various life domains (Domain Control). In each case, low control was associated with lower SWB. It was concluded that due to their significant relationships to SWB, the three control variables were suitable for the purpose of the next study.

The aim of Study 3 was to investigate health satisfaction, perceived control, and SWB of respondents with a back problem using a larger sample (n = 642) than in Study 1. The result confirmed a significantly lower SWB than normal. However, pain was not included in this analysis because it had a complex, non-linear linear relationship to SWB. It was found that low SWB was associated with low Primary and Secondary Control and also with low control over the domains of Community, Health and Safety. Finally, domain compensation was evident through higher levels of satisfaction in the domains of Personal Relationships and Community Connectedness to offset low satisfaction with Health. However, this differed from Study 1 where back problem was the only condition without domain compensation. The conflicting results between the two studies were attributed to the sensitivity of domain compensation processes to differing levels of SWB.

The major conclusions to be drawn from the three studies are that (1) having a medical condition is generally associated with low SWB, particularly where pain is also present; (2) perceptions of low control are associated with lower SWB; and (3) people with a back problem are at risk of homeostatic failure due to low perceptions of control and consistently below normal SWB. Identifying threats to SWB homeostasis, such as perceptions of low control, provides an opportunity to assist people with chronic back problems to return to their normal level of SWB before the emergence of homeostatic failure and depression.

Chapter 1: Introduction

This thesis is embedded within the literature on subjective wellbeing (SWB) and the Theory of Subjective Wellbeing Homeostasis. Through an investigation of SWB, health satisfaction, and perceived control of respondents with a back problem, this thesis contributes to a greater understanding of the ways in which the SWB homeostatic system responds to external challenges such as the presence of a significant medical condition. While there is a substantial literature on relationships between the symptoms of chronic illness and psychological outcomes, few papers are available on the SWB experienced by people with a back problem. The research presented in this thesis addresses this gap in the literature while also advancing knowledge on the theory of SWB Homeostasis.

The selection of back problem as the main focus of the research is driven by the fact that up to 80% of Australians will experience such a condition at some stage in their lives and of those, 10% will suffer significant physical disability as a result (Walker, Muller & Grant, 2004).

This introductory chapter outlines the aims of the thesis and the theoretical background to the research. Details of the structure of the thesis are provided at the end of the chapter.

1.1 Aims

This research uses three separate but related studies to answer the question, "What is the relationship between subjective wellbeing, health satisfaction and perceived control for individuals with a back problem?"

The aim of Study 1 was to address the first two components of the research question involving SWB and health satisfaction. This is achieved by firstly, comparing the SWB of respondents with a back problem against normative SWB data and against the SWB of eight other medical conditions. The second component, health satisfaction, is investigated in terms of the homeostatic process of domain compensation. Tests of

domain compensation are used to identify whether low health satisfaction is being compensated by higher levels of satisfaction with other life domains. The aim of Study 2 was to address the perceived control component of the research question by identifying suitable control variables for use in Study 3. This is achieved by comparing the SWB means of various levels of control using a non-medical sample. Finally, Study 3 aimed to expand on the findings of the previous two studies by addressing all three aspects of the research question. Investigations of relationships between SWB, health satisfaction, and perceived control for respondents with a back problem are subsequently undertaken.

1.2 Background

Subjective wellbeing (SWB) is generally considered as a broad concept that encompasses people's emotional responses, judgments of satisfaction with various life domains, and satisfaction with life overall (Diener, Suh, Lucas & Smith, 1999). Because it is subjective, SWB refers to an individual's personal and direct experience of their life.

SWB as a field of research has been evolving for over 35 years and has often been referred to as "life satisfaction" as it is commonly measured by a self-report, single item question such as "how satisfied are you with your life as a whole" (Andrews & Withey 1976; Campbell, Converse & Rogers 1976). SWB is also more reliably measured by an average from multiple item scales, such as the Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen & Griffin, 1985; Pavot & Diener, 1993), or the Personal Wellbeing Index (PWI) (International Wellbeing Group, 2006).

During the course of SWB theory development, judgments of SWB have been attributed to a large number of variables including personality (Costa & McCrea, 1980; Steel & Ones, 2002); genetics (Lykken & Tellegen, 1996; Tellegen et al., 1988); cognition (Andrews & Withey, 1976; Michalos, 1985; Pavot & Diener, 1993); mood affect (Davern, Cummins & Stokes, 2007; Russell, 1980, 2003; Schwarz & Clore, 1983); and goal attainment (Carver & Scheier, 1998). Demographic factors that have been found to correlate with SWB are income (Cummins, 2000b; Myers & Diener,

1995), age (Argyle, 1991; Bradburn & Caplovitz, 1965; Cummins et al., 2006a; Okun, Olding, & Cohn, 1990; Ryff, 1989; Shmotkin, 1990; Wilson, 1976), and gender (Cummins et al., 2003; Haring, Stock, & Okun, 1984; Nolen-Hoeksema & Rusting, 1999).

However, it is clear from the literature that none of these variables represent a single cause or determinant of SWB. Rather, SWB judgments are based on complex relationships between many such factors (Diener et al., 1999), at least involving influences from personality, affect, and cognition. The extent to which each of these factors are considered to contribute to SWB judgments will be discussed in the literature review to follow, along with a summary of the major SWB theories of relevance to this thesis.

1.3 Thesis Structure

An historical perspective of the main themes in SWB research is presented in the literature review in Chapters 2 and 3. Subsequently, Chapters, 4, 5, and 6 report and discuss the results from the three studies. Finally, Chapter 7 contains a summary and final synthesis of the thesis, followed by a discussion of the limitations of the research, and opportunities for further research. A review of the SWB literature will now be presented.

Chapter 2: A History of Major SWB Theories

A defining era in the field of SWB research was the publication of two studies on the quality of life and wellbeing of North Americans (Andrews & Withey, 1976; Campbell, Converse & Rogers, 1976). Both provided major contributions to knowledge on people's evaluations and feelings about their life.

One of the most enduring contributions has been the use of a single item to measure SWB. The question "how do you feel about your life as a whole?" was found to be the most reliable out of 68 variations on this theme (Andrews & Withey, 1976). An alternative measure was offered by Campbell et al., (1976) which asked people how "satisfied" they were with their life as a whole. The authors maintained that the terms "feelings" or "happiness" which are often used in SWB research, have many interpretations such as joy, elation, and gaiety which only refer to short term temporary states. Satisfaction with life on the other hand, is a more comprehensive and appropriate measure because responses can also reflect stable affective traits or moods, as well as cognitive and other processes involved in judgments of SWB (Campbell et al., 1976). This SWB measure has continued to be regarded as reliable, consistent across a number of countries, and strongly correlated to a range of specific life domains (Cummins, 1995; International Wellbeing Group, 2006).

Besides the measurement of SWB, research has investigated factors that influence SWB judgments (e.g., Costa & McCrae, 1980; Michalos, 1985; Schwarz & Clore 1983), and also adaptation processes that allow individuals to retain positive levels of life satisfaction over the long term (e.g., Brickman, Coates & Janoff-Bulman, 1978; Cummins, Gullone & Lau, 2002; Cummins & Nistico 2002; Headey & Wearing 1988). The literature reviewed in this chapter therefore, is divided into two sections which discuss the historical path taken in SWB research. The first section summarises the literature on factors that contribute to SWB judgments while the second section discusses the major theories on the maintenance of SWB.

2.1 Contributions to SWB Judgments

There is general concensus in the literature that cognition, personality, and affect influence SWB judgments to varying degrees (see Deiner, Suh, Lucas & Smith, 1999 for a review). However, there has been considerable debate over which of these factors is the main influence on SWB judgments. To follow is a summary of each of these perspectives.

2.1.1 Cognition and SWB judgments. The cognitive component of SWB judgments is most commonly characterised as comparisons that an individual makes between their current circumstances and standards that they perceive as representing a good life (Steel & Ones, 2002). Multiple Discrepancies Theory (MDT) (Michalos, 1985), is a popular model of this type and is considered to be one of the most comprehensive and articulate of the comparison theories (Andrews & Robinson, 1991).

MDT (Michalos, 1985) is based on measuring the gap between a person's perception of their current circumstances and a set of seven discrepancy items. Three of these items measure discrepancies between what the current self has and what one wants (self-wants); what one deserves (self-deserves); and what one needs (self-needs). A further three items refer to the current self and temporal aspects such as what one expected to have 3 years ago (self-progress); what one expects to have in 5 years time (self-future); and the best that one has ever had in the past (self-best). Finally, a comparison between the current self and relevant others (self-others) forms the seventh item (Michalos, 1985).

Michalos (1985) found that smaller gaps between the discrepancy items and current circumstances were associated with higher levels of SWB. Of the seven items, aspirations (self-wants) and social comparison (self-others) were most strongly associated with SWB. Aspirations have also been associated with positive mood (Campbell et al., 1976; Emmons, 1986 Emmons & King, 1988), particularly where they are meaningful and the individual is committed to them (Brunstein, Schultheiss & Grassmann, 1998; Emmons 1986). However, other studies have found that social

comparison has a stronger correlation to SWB than aspirations (Emmons & Diener, 1985).

In the SWB literature, social comparisons are often discussed in terms of downward and upward comparisons. For example, downward comparisons with the lives of others who are less well off have been associated with higher life satisfaction, (Diener & Fujita, 1997). Upward comparisons on the other hand, can either motivate people to aspire to the target of their comparison or have a negative effect on life satisfaction when the self is compared in an unfavourable light (see Schwarz & Strack, 1999 for a review). An individual's SWB also appears to influence the choice of comparison used. For example, "happy" people tend to engage in downward comparisons but not upward, whereas "unhappy" people tend to engage in both upward and downward comparisons (Lyubomirsky & Ross, 1997). These authors suggest that happy people tend to avoid unfavourable social comparisons in order to protect their self-esteem and psychological wellbeing.

In summary, these studies show that perceived discrepancies represent some of the cognitive influences on SWB judgments. Other researchers believe that personality has a major role to play in perceptions of SWB (Schimmack, Diener & Oishi, 2002).

2.1.2 Personality and SWB judgments. There is a large literature which suggests that personality is one of the most consistent single predictors of SWB (e.g., DeNeve & Cooper, 1998; Headey & Wearing, 1989; Magnus, Diener, Fujita & Pavot, 1993; Schimmack et al., 2002; Steel & Ones, 2002). Personality is defined as stable patterns of thoughts, attitudes and behavior that, with the exception of minor changes over time, are relatively stable throughout adulthood, particularly after 30 years of age (Costa & McCrae, 1992).

An important finding for personality theorists and SWB researchers was that a large component of personality is determined by genetics. In a study of personality traits in identical (monzygotic - MZ) twins and non-identical (dizygotic - DZ) twins almost 50% of the variance in personality was attributed to genetic diversity with only

35% related to factors such as family environment (Tellegen, et al., 1988). A replication of this study using the same respondents almost 10 years later (Lykken & Tellegen, 1996), confirmed a 44%-52% contribution to SWB variance with demographic factors accounting for only 3% of the variance. In both studies, it was the identical (MZ) twins that made significant contributions to SWB rather than the non-identical (DZ) twins, thus highlighting the genetic component of the relationship between personality and SWB. The authors concluded that the inherent stability of personality traits can therefore be used to predict an individual's SWB judgments over the long term (Lykken & Tellegen, 1996).

Most SWB studies measure personality using the 60 item reduced version of the Neuroticism-Extraversion-Openness Personal Inventory (NEO-PI) (Costa & McCrae, 1992) which identifies the most basic dimensions of personality as Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness (Costa & McCrae, 1992). Correlations between SWB and personality have been frequently reported in the literature. In a meta-analysis of 148 studies, DeNeve and Cooper (1998) found an average correlation of .19 between all five personality factors and SWB. Similarly, a review of 8 studies investigating personality and various psychological outcomes found correlations of .24 on average between the personality factors and SWB (Cummins et al., 2002).

Notably, only Extraversion and Neuroticism have been consistently identified as the strongest predictors of SWB. Neuroticism is characterised by irrational thinking and emotional instability, and is associated with unpleasant emotions such as fear, sadness, guilt, and embarrassment. Extraversion, on the other hand, is associated with sociability, excitement seeking, assertiveness, and pleasant experiences such as optimism and cheerfulness (Costa & McCrae, 1992). It is not surprising therefore, that Extraversion has been found to significantly correlate with positive mood while Neuroticism has been associated with negative mood (Costa & McCrae, 1980; Magnus et al., 1993).

Similar results are found for these two factors where life satisfaction has been used as the dependent variable. Correlations between Extraversion and life satisfaction have ranged between .17 and .26 (DeNeve & Cooper, 1998; Headey & Wearing, 1989), whereas Neuroticism has negative associations ranging from -.22 to -.43 (DeNeve & Cooper, 1998; Headey & Wearing, 1989; Okun & George, 1984). The remaining personality factors are generally found to have no significant relationship to SWB, for example Openness (Headey, 2008; Steel & Ones, 2002), and Conscientiousness (Steel & Ones, 2002).

Notwithstanding the large number of studies on the influence of personality on SWB, Diener (1996) suggests that personality does not offer a complete explanation of the variance in SWB. Indeed, more recent studies on affect have challenged personality as the dominant contributor to SWB judgments (Blore et al., 2011; Davern, 2004; Davern, Cummins, & Stokes, 2007). These studies will be discussed in more detail in the next section but first, an historical perspective of the literature on affect and SWB is presented.

2.1.3 Affect and SWB judgments. The previous sections discussed the influence of cognitive processes and personality in forming judgments of SWB. However, other researchers tend to view affect as the dominant influence (Blore et al., 2011; Cummins, 2010a; Davern et al., 2007; Schwarz & Clore, 1983). For example, Schwarz and Clore (1983) found little evidence that judgments of life satisfaction are based on cognition. Instead, they discovered that people generally consult their momentary affective state when asked about life satisfaction. Nevertheless there are exceptions. People who are in unpleasant affective states at the time of responding are more likely to search for and use other information to explain their state than are people experiencing pleasant affect. Thus, affective states may be used to inform and direct people in their responses (Schwarz & Clore, 1983).

It is important at this point to differentiate between the terms “emotion”, “mood” and “affect” as all have been used in the SWB literature. Emotion can be described as object-directed and cognitively processed. The source of an emotion such

as happy or sad is attributed to specific causes such as passing an exam or getting a speeding ticket (Russell, 2003; Russell & Feldman Barrett, 1999). Mood on the other hand, is not associated with any specific object or cause and therefore has little cognitive content. Mood is also characterized as low in intensity, enduring, and often described as a general feeling of good mood or bad mood. These longer term generalised experiences are also referred to as "affect" (Russell, 2003; Russell & Feldman Barrett, 1999).

A third construct which is considered more fundamental than mood is Core Affect (Russell, 2003; Russell & Feldman Barrett, 1999). This construct refers to a biologically influenced system that is experienced as a mood state that normally operates outside of conscious awareness. However, external events such as negative life circumstances or questions regarding current mood for example, can bring it into conscious awareness (Russell, 2003). Core Affect can be equated to the maintenance of body temperature as it is internally regulated, ongoing, and automatic. However, when accessed, Core Affect shares a similar description to mood as an object-free sense of feeling good or bad (Russell, 2003: Russell & Feldman Barrett, 1999). It is through these generalised feelings that people are able to interpret the world and sense themselves in a personal but abstract way (Cummins, 2010a). Core Affect became an important part of the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) which will be discussed later in this chapter.

Well before Russell's (2003) Core Affect concept however, extensive work on conceptualizing and categorising various descriptors of emotion had been undertaken. An early discovery was that emotions could be classified into two broad factors representing positive emotions such as joy and happiness, and negative emotions such as sadness and fear (Bradburn, 1969; Bradburn & Caplovitz, 1965). Importantly, the two dimensions were found to be independent of each other (Bradburn & Caplovitz, 1965; Diener & Emmons, 1985), which was in contrast to previous assumptions that positive and negative emotion were opposite ends of the same construct (see Diener & Emmons, 1985 for a review). The independence of these variables was confirmed in a re-analysis of nine studies on affect descriptors of self-reported mood (Watson &

Tellegen, 1985). Two orthogonal factors consistently emerged, attesting to the stability and robustness of these dimensions which Watson and Tellegen (1985) termed Positive Affect (PA) and Negative Affect (NA).

Concurrent with the studies on PA and NA, an alternative way of conceptualizing affective experience emerged with the proposal that affect dimensions were interrelated in a systematic way (Russell, 1980). Using 28 emotion-related adjectives that respondents perceived to be similar in meaning, Russell (1980) plotted responses around a spatial model represented by a circle (circumplex). He concluded that any affective experience is a combination of two dimensions at 180 degrees to each other. Across the horizontal axis of the circumplex, the polar ends of the pleasure-misery domain were situated. The vertical axis represented the second dimension as arousal-sleepiness. Thus, Russell's (2003) model implied the existence of two independent neurophysiological systems which, when cognitively interpreted, are experienced as valence and arousal (Posner, Russell, & Peterson, 2005). This was a groundbreaking approach as previous affect research had assumed that there were many such systems, each dedicated to a separate emotion (Posner et al., 2005). Moreover, because of the enduring nature of these systems, it makes intuitive sense that each person has a normal baseline mood state that can be located somewhere on the pleasant-activated dimensions of the circumplex, as Russell (2003) proposed.

The PA/NA constructs and the Circumplex Model of Affect (Russell, 1980) have also been applied to SWB research. For example, a range of significant correlations have been found between life satisfaction and Positive Affect (.42 to .65) and Negative Affect (-.30 to -.58) (Lucas, Diener & Suh, 1999). Additionally, the Circumplex Model of Affect (Russell, 1980) formed the basis for a more recent study on the influence of affect, cognition, and personality on SWB (Davern, 2004). Along similar lines to Russell (1980), Davern (2004) plotted responses to 31 affect descriptors on a circumplex. However, only 6 of the 31 descriptors made significant and unique contributions to satisfaction with life as a whole. These items included content, happy, energized, satisfied, stressed, and pleased. Collectively, these descriptors made substantial contributions (64%) to the variance in SWB. Additionally, as four of the six

descriptors were closely arranged around the pleasant pole of the circumplex, Davern (2004) concluded that SWB judgments are mostly associated with pleasant affect.

Further support for affect as a dominant influence on SWB judgments occurred when Davern (2004) combined these affect items with the seven discrepancies of MDT (Michalos, 1985), and Extraversion and Neuroticism (Costa & McCrae, 1992) in a hierarchical regression. Affect explained 66% of the variance in SWB and MDT contributed an additional 2%. However, the contribution by personality was not significant (Davern, 2004). In a subsequent study, Davern, Cummins, and Stokes (2007), reduced the affect items from six to three (happy, content and excited) and created a more parsimonious measure of affect. Using structural equation modeling in this case, the three affect items and MDT (Michalos, 1985) were found to contribute 90% of the variance in SWB but as occurred previously, personality failed to make a significant contribution. Finally, these findings were replicated using a different sample (Blore et al., 2011) in which three affect items (happy, content, and activated) contributed 62% to SWB. As before, when cognition (MDT), affect, and personality (Extraversion and Emotional Stability) were entered into a structural equation model, affect strongly predicted SWB, with smaller contributions by MDT, and once again, personality was not significant (Blore et al., 2011).

These studies (Blore et al., 2011; Davern, 2004; Davern et al., 2007) consistently show that affect, as represented by content, happy, and excited/activated, make a substantial contribution to SWB variance. Importantly, the studies propose that the affect items collectively represent the enduring mood state Russell (2003) called Core Affect. This approach represents a significant departure from the mainstream literature where personality and cognition are regarded as strongly related to SWB.

It is possible that the relationships previously found between personality, cognition, and SWB in the literature are the product of the large amount of variance that cognition and personality share with Core Affect (Davern, 2004). For example,

each of the three studies discussed here (Blore et al., 2011; Davern, 2004; Davern et al., 2007) found that when Core Affect was controlled, relationships between SWB and cognition, and SWB and personality were substantially reduced. In each case it was concluded that cognition and personality indirectly influence SWB judgments through their affective components.

Given these striking results, it is not surprising that there have been some rigorous discussions regarding the methodology and interpretation of these studies. For example, Moum (2007) suggested that the strong influence of affect on SWB judgments found in Davern et al., (2007) is distorted due to multicollinearity between Core Affect and SWB. However, there are two points in defence of this criticism. Firstly, the highest correlation between SWB and the Core Affect items was .77 which is lower than the .90 correlation that Tabachnick & Fidell (2007) identify as indicative of multicollinearity (Cummins, Stokes, & Davern, 2007). Secondly, the 64% contribution to SWB variance found for the six affect items in Davern et al. (2007) and 62% found for the three Core Affect items in Blore et al. (2011), leaves over 35% of the variance in SWB still to be explained by factors other than affect. This indicates over two separate studies that SWB and Core Affect are distinct, independent constructs and not simply the result of multicollinearity (Blore et al., 2011).

It should be noted however, that the strong relationships found between SWB and Core Affect apply only to SWB as measured by the single question on satisfaction with life as a whole or the multiple item Personal Wellbeing Index (International Wellbeing Group, 2006). Once questions begin to focus on specific aspects of people's lives, cognition is likely to exert more influence (Schwarz & Strack, 1999). For example, when a person is asked to rate their satisfaction with a recent holiday, they are likely draw on personal standards that represent an ideal holiday and will subsequently compare their recent experience with this standard. In these situations, judgments are likely to be a combination of cognition and affect. The various levels of abstraction in SWB measurement are discussed in more detail later.

Finally, it is important to point out that the concept of Core Affect (Russell, 2003) was recently broadened to include not only mood, but transitory emotions as well (Russell, 2009). This latest conceptualisation also maintains that Core Affect can be both object-free or have an object-specific cause (Russell, 2009). This is a significant change from the previous description of a biologically influenced, generalised, and object-free mood (Russell, 2003). Therefore, a new term, Homeostatically Protected Mood (HPMood) (Cummins, 2010a) was developed to more accurately reflect the original Core Affect concept investigated by Blore et al., (2011), Davern (2004), and Davern et al. (2007). The term "homeostatically protected" refers to the role of this construct in the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) where a stable sense of positive activated mood (HPMood) is automatically maintained in a state of equilibrium (homeostasis) by various processes. These processes act to protect HPMood against the negative effects of challenging life circumstances. On that basis, the rest of this thesis will refer to HPMood in lieu of the term Core Affect where possible.

In conclusion, the literature on SWB judgments and the influence of mood, cognition, and personality discussed here have provided an insight into the historical background of various SWB theories such as the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) on which this thesis is based. A review of the literature on this theory and other major SWB theories is presented next.

2.2 Major SWB Theories

A popular belief among researchers is that most people are satisfied with their life most of the time (Diener & Diener, 1996). For example, in studies of SWB in Australia, Britain, Canada, and the USA, the average level of life satisfaction was around 75 on a scale of 0-100 where zero is completely dissatisfied and 100 is completely satisfied (Cummins, 1995).

This positive level of SWB has been found to be remarkably stable over the long term, despite the impact of positive and negative life events (Diener & Diener,

1996; Diener, Scollon, & Lucas, 2003; Suh, Diener, & Fujita, 1996). In population studies in Australia for example, SWB data has been collected over a 10 year period as part of the Australian Unity Wellbeing Index (Cummins, Weinberg, Perera, & Woerner, 2010). The mean SWB scores across these surveys have varied by only 3.1 percentage points (using a 0-100 point range), affirming the stability of SWB at the level of population mean scores (Cummins et al., 2010). This ability to maintain a positive outlook on life has been the subject of numerous theories, chief among which are Adaptation Theory (Helson, 1964), Set-point Theory (Headey & Wearing 1989), and the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a).

2.2.1 Adaptation Theory. Adaptation is succinctly defined as "a response [that] diminishes or remains the same despite constant or increasing stimulus" (Frederick & Loewenstein, 1999, p. 311). Much of the early literature on SWB and adaptation (e.g., Brickman & Campbell, 1971; Brickman, Coates, & Janoff-Bulman, 1978) was based on Helson's (1964) Adaptation Level Theory. This proposes that appraisal and subsequent reactions to new stimuli draw on past experience as a frame of reference with which to compare current events. Reactions to an event are more intense where there is limited or no frame of reference available. Then, as exposure to the same stimuli occurs over time, the intensity of the response reduces and the frame of reference evolves to include these new experiences. By this process, stability of an individual's psychological state can be achieved (Helson, 1964). Helson's theory has provided the basis for subsequent SWB theories as it helps to explain why people living in difficult circumstances are able to psychologically adapt to their environment.

An extension of Adaptation Level Theory is the concept of a Hedonic Treadmill (Brickman & Campbell, 1971) which proposes that people are driven to seek out new pleasurable experiences to replace those that have lost their intensity due to adaptation. The continual evaluative judgments of past and present rewards were regarded as a kind of treadmill where permanent satisfaction with life is unachievable (Brickman & Campbell, 1971). However, the authors focused on positive experiences and did not advance an understanding of why people are able to maintain SWB in the face of challenging adverse circumstances.

Subsequent SWB theories proposed that both positive and negative experiences are under the control of some form of adaptive mechanism that maintains SWB in a positive state over the long term (Brickman et al., 1978; Headey & Wearing, 1988; 1989; Suh, Diener, & Fujita, 1996). An example of this approach is found in a landmark study of lottery winners and people with spinal cord injuries (quadriplegia and paraplegia) who had experienced these extreme events within a 12 month period.

In response to questions on how "happy" respondents were now, in the past, and in the future, Brickman et al. (1978) found no significant difference in happiness ratings between the lottery winners and the control group whereas the spinal cord group was significantly less happy than the control group. Nevertheless, when asked to rate their injury in terms of the worst possible thing (represented by zero) or the best possible thing (represented by five) that could happen to them, most spinal group respondents rated the injury as 1.28 which is higher than the zero rating the authors had expected. They concluded that researchers often fail to take into account the effects of adaptation and therefore tend to overestimate the emotional impact of extreme events on individuals (Brickman et al., 1978). This conclusion led the way for subsequent studies on the effects of external events on adaptation and SWB.

2.2.2 Set-point Theory. After Brickman et al's (1978) study, research focus shifted to finding explanations for this adaptation phenomenon. Arising from this approach was Dynamic Equilibrium Theory (Headey & Wearing, 1989) which maintains that each person has their own level of positive equilibrium, or set-point, to which they will inevitably return despite the effects of unusually positive and negative events. Using longitudinal data from the Victorian Quality of Life Panel Study over an eight year period, Headey and Wearing (1989) found that external events had minimal impact on SWB over this period. They proposed that the influence of genetically inherited personality traits was responsible for returning people to their normal equilibrium (set-point) level.

Indeed, some researchers have speculated that a positive set-point is advantageous to natural selection as happy people are more likely to attract a partner

and subsequently reproduce (Lykken & Tellegen, 1996). This offers a somewhat intuitive explanation for the concept of a fundamental state of positive activated affect that is "hardwired in" for each individual.

The concept of an individual set-point was further developed with the addition of a set-point range within which SWB can vary while still maintaining a normal equilibrium level (Cummins, 1995, 1998, 2010a). Data obtained from the Australian Unity Wellbeing Index have been used to calculate the SWB set-point range for individuals and groups. It has been proposed that an individual's set-point lies somewhere between 55-95 points on a 0-100 point scale (Cummins 2003) where zero is completely dissatisfied and 100 represents completely satisfied. Furthermore, an individual's SWB is free to move up or down from their set-point within a range of about 5-6 points (Cummins, 2010a).

The wide variation in set-points found here reflects individual differences within the population. On a population basis, most people tend to be grouped around 75 points as mentioned earlier (Cummins & Nistico, 2002; Diener & Diener, 1996). In the Australian context, the normal range of SWB for population groups ranges from 73.7-76.5 points (Cummins et al., 2010). However, these results do not explain the processes by which the set-point is tightly controlled within such a narrow range. The Theory of Subjective Wellbeing (SWB) Homeostasis (Cummins, 1995, 1998, 2010a) on the other hand, offers a coherent model within which adaptation-based processes are proposed to operate.

2.3 The Theory of SWB Homeostasis

The Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) proposes that psychological processes are automatically activated in the presence of challenging life events in order to maintain SWB within an individual's normal set-point range of positive, activated affect (HPMood). As discussed earlier, HPMood is believed to occur automatically and to generally operate outside of conscious awareness (Cummins, 1995, 1998, 2010a). This homeostatic system is activated when the impact of life events are significant enough to threaten normal levels of HPMood. This may be either a reduction or an elevation of feelings of happiness, contentedness, and positive arousal (Cummins, 2010a). When this occurs, people are motivated to use external and internal resources to return to their normal level of HPMood (Cummins, 2010a).

2.3.1 External resources. External resources such as income and supportive personal relationships act as the first line in defence of SWB (Cummins, 2000b, 2010a). For example, money can be used to reduce emotional or physical discomfort by purchasing expertise or services such as health care, child care, and reliable transport that help defend against some of life's challenges. Importantly, relationships between income and SWB are stronger at the lower end of the income categories (Argyle, 1999) as this is where the greatest effect on improving living conditions and satisfying basic needs occurs. However, once these needs are met, the relationship between income and SWB tends to reduce (Diener, 1984). For example, a series of studies of SWB in Australia, found that increasing annual income accompanied increases in SWB up to approximately $91,000-$120,000. At this point, the systematic rise ceases and SWB tends to plateau despite continuing increases in income (Cummins et al., 2009b).

The second external resource is personal relationships. Good quality personal relationships and ongoing emotional support are important in defending SWB during difficult circumstances (Cummins, 2000b, 2010a). The role of perceived social support as a buffer to stressful events is widely supported (Dahlem, Zimet & Walker, 1991; Panzarella, Alloy, & Whitehouse, 2006; Sarason, Sarason, Shearin, & Pierce, 1987).

For a summary of various forms of perceived social support and their relationship to SWB, see Cummins et al. (2005b). Specific circumstances where a lack of personal relationships is negatively related to SWB include widowhood (Stroebe, Stroebe, Abakoumkin, & Schut, 1996) and the presence of difficult medical conditions. For example, the low SWB of young Australians (15-29 years) with a long term health problem or disability was found to be strongly related to social exclusion and financial hardship (Emerson, Honey, Madden & Llewellyn, 2009). However, social exclusion made a higher significant contribution to SWB reductions than income.

Studies of specific medical conditions such as multiple sclerosis, have found that a reduction in social activities was a greater contributor to low SWB than fatigue, mobility limitations, and unemployment (Aronson, 1997). This was also found for back problems where limitations on the ability to engage in social and recreational activities were associated with increased depression (Australian Institute of Health and Welfare, 2006). For people with Parkinson's disease, restrictions in psychosocial domains such as family relationships, social, and leisure activities were significantly related to lower life satisfaction and symptoms of depression (McQuillan, Licht, & Licht, 2003). Finally, in the case of osteoarthritis, social support mediated relationships between SWB and symptoms of the condition (Luger, Cotter, & Sherman, 2009).

Indeed, a comparison of the highest and lowest SWB groups in Australia (Cummins, Walter, & Woerner, 2007), found that income and relationships were the two most powerful demographic factors for SWB. For example, wealthy people with partners had the highest SWB, whereas those on low incomes and either living alone or with children and no partner represented the lowest SWB group. Specifically, this latter group required a minimum annual household income of around $30,000 to reach the lower end of the normal SWB range (Cummins et al., 2009b, 2010a).

While it is still possible to retain normal SWB with either one of these resources available, a lack of both adequate income and supportive personal relationships will severely reduce the homeostatic system's ability to defend against powerful external challenges that can significantly reduce positive, activated affect (Cummins 2010a).

There are situations however, when the emotional impact of negative events is beyond the capacity of external resources to resolve. In this case, internal resources are employed.

2.3.2 Internal resources (cognitive buffers). Internal resources that are integral to the operation of the homeostatic system consist of abstract beliefs about the self such as a sense of self-esteem, an optimistic outlook about the future, and a sense of perceived control over various events in life (Cummins & Nistico 2002; Diener, et al., 1999; Headey & Wearing, 1988; Taylor & Brown, 1988, 1994). All of these beliefs, also collectively known as "cognitive buffers", contribute to the maintenance of a generalised, positive sense of life satisfaction or HPMood (Cummins et al., 2002; Cummins, 2010a). There is a substantial body of research on each of these factors which will be discussed in the sections to follow.

2.3.2.1 Self-esteem cognitive buffer. Self-esteem is defined simply as a favourable or unfavourable attitude toward the self (Rosenberg, 1965, 1989). It is considered as a fundamental human motive which incorporates a desire to enhance feelings of self worth (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). When this is not possible, psychological distress can ensue. For example, self-esteem has been found to have an inverse relationship to depression, stress, and anxiety (Pearlin, Menaghan, Lieberman, & Mullan, 1981; Rosenberg, Schooler, & Schoenbach, 1989).

In terms of the current discussion, self-esteem is well acknowledged in the literature as having strong associations to SWB, with correlations ranging from .45 (Diener & Diener, 1995) to .77 (Cummins & Nistico, 2002). Indeed, "happy" people have been found to report higher self-esteem than "unhappy" people (Diener, Lucas, Oishi, & Suh, 2002). In essence, self-esteem allows people to maintain an abstract sense of self worth during instances of misfortune or incompetence that may otherwise negatively affect SWB, but this also depends on the magnitude of such events. For example, the impact of unemployment can be severe enough to overpower feelings of self-worth over the long term (Pearlin et al., 1981). Notwithstanding these

circumstances, self-esteem is considered as an effective means of maintaining SWB. Along similar lines, Optimism also acts as a buffer against the harsh realities of life.

2.3.2.2 Optimism cognitive buffer. Optimism is defined as an individual's expectation that the future will be advantageous or beneficial, and a belief that contingencies in life can be successfully dealt with (Peterson, 2000). There are links between optimism and happiness, perseverance, achievement, and health (Peterson 2000; Scheier & Carver, 1993) with correlations to SWB of around .40 to .77 (Cummins & Nistico, 2002; Diener et al., 1999; Lucas, Diener & Suh, 1996). Conversely, optimism has an inverse relationship to depression (Scheier & Carver, 1985; Scheier, Carver & Bridges, 1994). Moreover, people who are optimistic tend to be more focused in their efforts to cope with difficult circumstances (Scheier & Carver, 1993). This coping process can include reframing adverse circumstances so that the future looks more positive (Cummins & Nistico, 2002). In this way, SWB is protected from dropping below normal levels. Nevertheless, while optimism is an important buffer against difficult circumstances, it does not operate in isolation. Rather, it is considered as part of the integrated SWB homeostasis system which also includes the cognitive buffers of self-esteem, and perceived control (Cummins, 1995, 1998, 2010a).

2.3.2.3 Perceived control cognitive buffer. Control can be defined as an individual's general belief that they can influence important outcomes in their life (Folkman 1984; Peterson, 1999; Thompson et al., 1998; Wallston, 2005). A diverse range of literature proposes that an individual's perceptions of control over their environment is associated with experiencing less anxiety, coping better with illness, tolerating more pain, and living more happily (Diener, 1996; Peterson, 1999; Thompson, 1981; Thompson & Spacapan, 1991). Correlations of around .57 have been noted between perceived control and SWB in some cases (Cummins & Nistico, 2002), lending further support to the contention that a strong sense of control is important to psychological adaptation and SWB. Conversely a lack of perceived control in situations that appear threatening to one's ongoing physical and psychological wellbeing, has been linked to decreased positive affect (Folkman, 1984; Folkman & Maskowitz, 2000), passivity (Peterson, 1999), hopelessness, and depression (Bandura, 1997;

Folkman, 1984; Peterson, 1999). In terms of medical conditions, various studies have found correlations ranging from .35 to .57 between life satisfaction and control for people with a spinal cord injury for example (see Cummins & Nistico, 2002, for a review).

In essence, control is a multidimensional construct with at least 25 theories found in the literature (Peterson, 1999), and numerous terms representing the construct such as personal control (Folkman, 1984; Folkman & Maskowitz, 2000), and perceived control (Rothbaum, Weisz & Snyder, 1982). Therefore, it is important to clearly identify which aspects of control are under consideration. There are four main approaches to personal control identified by Folkman (1984); (1) as a form of behavioural control, (2) as an appraisal tool; (3) as an adaptive function; and (4) as a moderating variable.

The behavioural approach is more common in physical health research where outcomes such as exercise, diet, and appropriate use of medication rely on personal control to manage symptoms. Control models commonly used in relation to behavioural control are self-efficacy (Deci & Ryan, 1998, 2000) and mastery (Pearlin et al., 1981).

When control is used as part of an appraisal process, an individual assesses their resources and likely success in controlling the problem at hand, and a coping strategy is subsequently selected to suit the circumstances (Folkman, 1984). An example of this approach can be found in the Multidimensional Health Locus of Control scale (MHLC; Wallston, 2005; Wallston, Stein & Smith, 1994) where respondents attribute control over their health to themselves (internal locus of control) or to powerful others, to chance, or to god (external locus of control). In a study of various medical conditions, Wallston (2005) found that people high on internal locus of control are less likely to experience helplessness and depression compared to those who associate their condition with powerful others or to chance. This is particularly notable for people in chronic pain where attributing locus of control to chance has been associated with depression and feelings of helplessness in dealing with their pain (Crisson & Keefe, 1988).

The third approach focuses on the adaptive function of control when combined with other variables such as self-esteem (Folkman 1984; Taylor & Brown 1988, 1994); and optimism (Peterson, 2000; Scheier & Carver, 1985, 1993). Finally, when control acts as a moderating variable, its purpose is to buffer the emotional effects of negative events (Cummins, 2003; Folkman 1984). The most relevant aspect of control in this thesis is the adaptive/buffering role of perceptions of control and subsequent relationships to SWB.

Importantly, control does not need to be exercised for it to be effective; merely the belief or perception (perceived control) that one can influence the outcome of a negative event can lead to positive psychological outcomes (Thompson, 1981; Thompson et al., 1998; Thompson & Spacapan, 1991). A popular model of perceived control in the SWB literature is Primary and Secondary Control (Rothbaum, Weisz and Snyder, 1982).

2.3.2.3.1 Primary and Secondary Control. Primary and Secondary Control have been reported to make a unique contribution to SWB of 14.3% and 7.2% respectively (Heeps, 2000). Primary Control refers to a belief that one can change the external environment to meet personal needs (Rothbaum, et al., 1982). People with high levels of Primary Control believe problems can be solved by asking others for help or advice, developing new skills to deal with the situation, and looking for new ways to solve the problem (Cousins, 2001; Heeps, 2000). Secondary Control, on the other hand, involves cognitive processes that accommodate existing environmental forces rather than attempting to initiate external change (Rothbaum et al., 1982). Secondary Control beliefs can include remembering one is better off than others (downwards social comparisons); believing that something good will come from the experience (finding meaning); and that the situation will improve over time (positive re-framing) (Cousins, 2001; Heeps, 2000).

There are psychological benefits in the use of Secondary Control as it protects emotional well-being and self-esteem (Heckhausen & Schulz, 1995). For example, in

situations where actual control is low, perceptions of Primary Control may lead to disappointment if persistent efforts to change a difficult situation continue to fail. In these circumstances it is more supportive to self-esteem and SWB if efforts are focused on adapting to the situation using Secondary Control strategies (Thompson et al., 1998)

Some researchers maintain that Secondary Control only operates when Primary Control has failed or is impossible to achieve (Heckhausen & Schulz, 1995; Heckhausen, Wrosch, & Schulz, 2010). An alternative view is that Secondary Control has adaptive value in its own right (Heeps, 2000), and that people tend to alternate between the two forms of control depending on the circumstances (Cummins, 2005; Rothbaum et al., 1982; Thompson, 1981; Thompson et al., 1998). In a study of perceived control and SWB, Heeps (2000) found that high Primary Control and high Secondary Control are both required to maintain normal levels of SWB.

There is also evidence that age and stage of life influence the balance of control perceptions. The Life Span Theory of Primary and Secondary Control (Heckhausen & Schulz, 1995; Heckhausen et al., 2010), maintains that Secondary Control beliefs during childhood are adaptive as they buffer the effects of failure, so that Primary Control can be confidently exercised in the future. With advancing years, Secondary Control is used more often than Primary Control as opportunities to exercise the latter are perceived as diminishing (Heckhausen & Schulz, 1995; Heckhausen et al., 2010), particularly with the physical effects of aging (Thompson et al., 1998). Age effects have also been found for perceptions of control over individual life domains where perceived control over health was lower for older people than young or middle aged respondents (Thompson & Spacapan, 1991).

Overall, Primary and Secondary Control are best understood as agents of influence. For example, Primary Control beliefs will dominate when people see themselves as a more powerful agent of influence than their external environment. Alternatively, when external influences are seen as more powerful than the self, Secondary Control beliefs are more likely to be operating (Heckhausen & Schulz, 1995).

It is important to note that there is a third control construct that Rothbaum et al., (1982) refer to as Relinquished Control. Earlier literature proposed that when people relinquish efforts to maintain Primary Control, they resort to maladaptive behaviour such as withdrawal (spending time alone), passiveness (doing nothing) and learned helplessness (Abramson, Seligman & Teasdale, 1978). An alternative approach favoured by Rothbaum et al., (1982) is that people who give up attempts to change their environment (Primary Control) do so in order to allocate greater effort to managing the psychological impact of negative events through Secondary Control. Therefore, Relinquished Control is seen as adaptive and more reflective of Secondary Control strategies than the maladaptive behaviour identified by Seligman and colleagues. Despite conflicting interpretations of Relinquished Control, there is clearly a need for people who are experiencing challenging circumstances to avoid feelings of helplessness and depression, and to use whatever means of control is most adaptive at the time.

Perceptions of control are particularly important for vulnerable groups such as people who are unemployed, people on low incomes (Creed & Bartrum 2008), and those with a chronic illness (Thompson & Spacapan, 1991). Due to their difficult circumstances, these individuals generally lack a sense of control over their life. Therefore, any additional stressful events can exacerbate feelings of helplessness (Thompson & Spacapan, 1991). Indeed, for life satisfaction to be comparable to a normal population, people with chronic health problems for example, need to have higher perceptions of general control over their lives than those without such challenges (Lachman & Weaver, 1998).

2.3.2.3.2 Control and medical conditions. In the medical literature, control is often viewed in the context of coping, which can be defined as efforts to manage stressful demands regardless of the likelihood of controlling those demands (Folkman 1984). Coping processes are activated after an individual appraises a situation as threatening, particularly where personal resources are perceived as being taxed or exceeded. This is generally a cognitive process, but it is also accompanied by affective responses such as decreased positive affect (Folkman 1984; Folkman & Maskowitz

2000). Depending on the appraisal outcomes, various coping strategies are activated to either deal directly with the problem through behavioural means (Problem-focused Coping), or through cognitive strategies such as positive self talk and distraction to mitigate the negative emotional effects of difficult circumstances (Emotion-focused Coping) (Folkman 1984; Folkman & Maskowitz 2000).

Some coping strategies are more successful than others. For example, in a study of low back pain patients, diverting attention and praying were found to have little effect on adjustment to back pain (Rosenstiel & Keefe, 1983). In other cases, coping strategies related to helplessness and catastrophizing were associated with depression (Geisser, Robinson, Keefe, & Weiner, 1994), and were found to contribute up to 46% to the variance in depression (Keefe, Crisson, Urban, & Williams, 1990). Conversely, an individual's enhanced belief in their ability to exercise control over pain (measured as self-efficacy) has been associated with reductions in negative mood and increased positive mood (Lefebvre et al., 1999).

More recently, research on pain has investigated strategies that focus on acknowledging and accepting pain (Barez, Blasco, Fernandez-Castro, & Viladich, 2007; Esteve, Ramirez-Maestre, & Lopez-Martinez, 2007; McCracken, Vowles, & Gaunlett-Gilbert, 2007). In giving up the struggle to control pain and emotionally detaching from it, people are free to refocus on factors that are more readily controllable such as social, occupational, and community aspects of life. In this way, chronic pain patients may experience a stronger sense of general self-control which can benefit satisfaction with life overall (Bandura, 1997; Esteve, et al., 2007). It is possible that acceptance of limited control over pain shares similar characteristics to Rothabaum et al's (1982) description of Relinquished Control but this has yet to be established in the literature.

By the same token, Problem-focused Coping and Emotion-focused Coping also appear to be similar to Rothbaum et al's (1982) concept of Primary and Secondary Control. However, the perceived control and coping constructs are measured quite differently. For example, the Ways of Coping Questionnaire (Folkman & Lazarus,

1985) is a frequently used scale which focuses on a specific stressful experience and subsequent responses to that experience. The scale does not measure general coping styles or broad perceptions of control (Folkman & Lazarus, 1985). In contrast, the more general perceived control measures such as Primary and Secondary Control, ask respondents about perceptions of control when "something bad happens" (Heeps, 2000). This is conceptually and statistically more compatible with the abstract 'life as a whole' measures used in SWB research as both approaches take a broad view of non-specific perceptions of life and control respectively.

2.3.2.3.3 Summary of control models. In summary, perceived control refers to a variety of control-related beliefs that can be used as a buffer in coping with negative circumstances including difficult symptoms of a medical condition (Folkman, 1984). Coping strategies in the medical literature are commonly characterised as Problem-focused Coping and Emotion-focused Coping (Folkman, 1984; Folkman & Maskowitz, 2000). However, these strategies focus on specific instances of stressful events rather than the broader constructs of Primary and Secondary Control that have been used in SWB Research (e.g., Heeps, 2000).

From this perspective, there is limited attention to relationships between general control beliefs, SWB, and medical conditions such as back problems in the literature. For example, a meta-analysis of 19 back problem studies found only eight that included some form of control or coping scale (Pincus, Burton, Vogel, & Field, 2002), and none of these included SWB measures. In this thesis, relationships between SWB and perceived control for people with a back problem are investigated using the variables Primary Control, Secondary Control, and Relinquished Control (Rothbaum et al., 1982). In addition, acceptance of limited control is also included due to its association with the pain literature (Esteve et al., 2007; McCracken, 2007). Finally, control over various life domains (Domain Control) is investigated to obtain a greater range of data on perceived control (Thompson & Spacapan, 1991).

In conclusion, perceived control is regarded as an important component of the SWB Homeostatic system (Cummins, 1995, 1998, 2010a). Under normal

circumstances, the cognitive buffers of self-esteem, optimism, and perceived control interact with the environment to maintain homeostasis within an individual's set-point range, as represented by HPMood (Cummins, 2010a). Nevertheless, sufficiently demanding and ongoing negative events can challenge these personal beliefs and overwhelm the SWB homeostatic system. The threshold at which SWB homeostasis is most at risk of defeat is discussed next.

2.3.3 SWB threshold and homeostatic failure. Normally, SWB is maintained within a narrow set-point range that is experienced as positive, activated mood (HPMood) (Cummins, 2010a). However, in conditions of sustained and aversive threat, adaptation becomes more difficult, belief systems can become compromised, and the challenge can potentially defeat homeostasis. Under these circumstances, the homeostatic system will begin to forfeit control to the external threat resulting in significant reductions in SWB. As this process continues, SWB is increasingly dominated by negative affect generated by the challenging agent, and will subsequently fall below the normal set-point range. The final outcome can be complete homeostatic failure and depression (Cummins, Tomyn, Gibson, Woerner, & Lai, 2007; Cummins & Nistico, 2002).

As discussed earlier, the normal SWB range for the Australian population is around 73.7-76.5 percentage points (Cummins, et al., 2009b). When including data from other Western countries, where most of the SWB data is derived, the set-point range is broadened to 70-80 points (Cummins, 1995). According to SWB Homeostasis theory, an SWB of less than 70 points is indicative of people experiencing some form of external challenge to homeostasis (Cummins, 2003). The proposed response of the homeostatic system to increasing external challenges is illustrated in Figure 1.

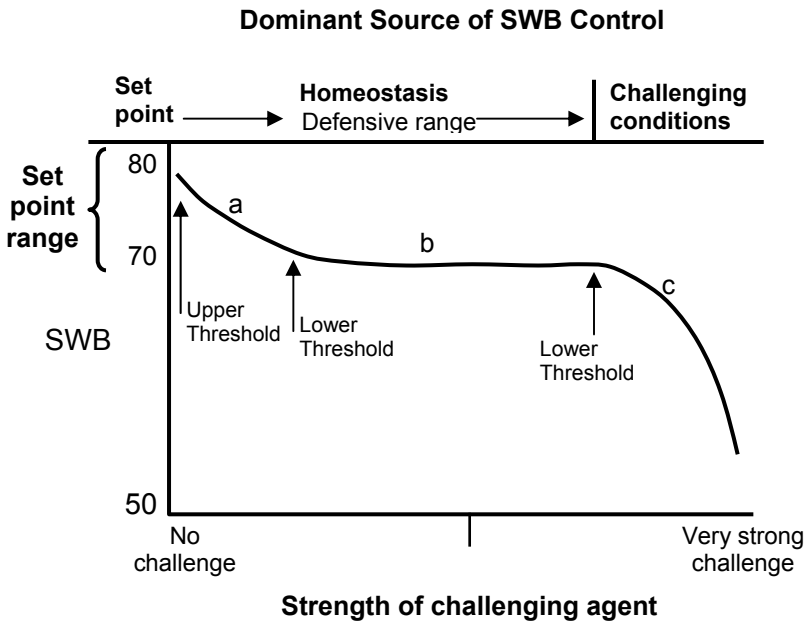


Figure 1. Changing levels of SWB due to external challenges (Cummins, 2010a, p. 5)

To the left of point 'a' is the normal range at which set-point varies when there are no significant challenges being experienced (Cummins, 1995). Subsequently, when challenges of sufficient strength arise, SWB is likely to decrease until it reaches the bottom of the normal range (70 points). Under these circumstances, individuals are starting to lose contact with their normal level of HPMood and negative affect begins to be experienced.

From here, an interesting phenomenon occurs; despite increases in the strength of the challenging agent, SWB begins to plateau and is held at or just below 70 points (point 'b'). It is proposed that this represents a line of resistance or threshold at which SWB is still being maintained by the homeostatic system. If, on the other hand, the intensity of the challenging agent continues to increase, or is experienced over the long term, the homeostatic system will eventually succumb to the influence of negative mood, HPMood will be overwhelmed, and a rapid drop in SWB will occur, as shown at point 'c'. As a consequence, depression is potentially the next likely outcome (Cummins, 2010a).

The point at which homeostatic failure occurs depends on the position of a person's normal set-point, and this will differ between individuals. Those with a low set-point will be the first to experience homeostatic defeat whereas individuals with a high set-point are further away from the 70 point threshold and therefore, may be slower to succumb to external challenges (Cummins, 2002, 2010a). Because of these individual differences in set-points, it is difficult to identify a single cut-off point at which depression is likely to occur. However, it has been proposed that as SWB progressively falls below the 70 point line of resistance and becomes closer to 50 points, it is more likely that SWB scores are identifying people with significant homeostatic challenges rather than simply reflecting those with a naturally low set-point (Cummins, 2002). Moreover, studies of specific population groups have been helpful in understanding relationships between homeostatic failure and SWB scores. For example, a study of 4,000 people caring for a disabled family member at home (Cummins, Tomyn et al., 2007), found that a loss of positive mood occurred at an SWB of around 59 points, suggesting the onset of depression for this particular group.

Another indicator of significant challenges to SWB is a change in the standard deviation of SWB group means. As homeostatic mechanisms normally hold SWB within a narrow range, a low standard deviation shows that homeostasis is operating for the majority of people in a sample group. Conversely, as SWB decreases to 70 points, the standard deviation becomes larger, indicating that some individuals in the sample are no longer under the tight control of the SWB homeostatic system (Cummins, 2003). For these reasons, it is important for SWB researchers to carefully observe the group means and standard deviations in order to understand the current status of homeostatic processes in any given sample.

In conclusion, the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) proposes that when SWB drops below the normal set-point range due to ongoing aversive challenges, homeostatic processes will attempt to prevent further reductions by holding SWB constant for as long as possible at around 70 points. At the same time, various homeostatic mechanisms will be attempting to return SWB to its normal set-point level. These mechanisms include drawing on self beliefs relating to self-esteem,

optimism, and perceived control, and also accessing external resources such as income and supportive personal relationships. In addition, efforts of the homeostatic system to maintain normal SWB can also be observed in satisfaction with individual life domains.

2.3.4 Maintaining SWB through domain satisfaction. Discussions on the SWB literature thus far have focused on responses to the global question "How satisfied are you with your life as a whole?" (Campbell et al., 1976). However, there are two other popular and complementary methods of measuring SWB, each differing in their level of specificity. The first method offsets the lower reliability of the single item scale with the more reliable multi-item Satisfaction With Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985). Here, general life satisfaction is measured by five items which are summed to create a single SWB score. A second, alternative way of measuring SWB is to view the construct as a collection of discrete life domains which contribute to perceptions of satisfaction with life as a whole (Cummins, 1998).

The Personal Wellbeing Index (International Wellbeing Group, 2006), is an 11 point scale that is strongly correlated to the SWLS and contributes approximately 50% to the variance in the life as a whole question (International Wellbeing Group, 2006). Unlike the single item scale and the SWLS (Diener et al., 1985), the PWI provides comprehensive data on satisfaction with eight broad life domains, each contributing unique variance to satisfaction with life as a whole (International Wellbeing Group 2006). The domains include Standard of Living, Health, Achieving in Life, Safety, Community Connectedness, Future Security, Personal Relationships, and Religion/Spirituality. These domains collectively represent SWB by aggregating and averaging the domain results to form a single stable factor, or PWI mean (Cummins et al., 2003b). The PWI is particularly useful in SWB research as it identifies the presence of homeostatic mechanisms that operate at the domain level through the process of domain compensation (Best, Cummins & Lo, 2000).

2.3.4.1 Domain compensation. Domain compensation theory purports that dissatisfaction with one or more life domains will be compensated by a higher level of satisfaction in other life domains in an attempt to maintain SWB within the normal set-

point range (Best, et al., 2000). For example, a person who has low health satisfaction due to problematic medical symptoms may find their satisfaction with personal relationships increases as they gain comfort in the emotional support of others during their illness (Aronson, 1997).

Studies on domain compensation using the PWI have proposed compensatory effects for full-time retirees (Cummins et al., 2009a, 2007b) and volunteers (Cummins et al., 2005a) where low satisfaction with the Health domain was offset by high levels of satisfaction with several other domains. In groups suffering from anxiety, low satisfaction with Safety and Future Security were compensated by high levels of satisfaction with Community Connectedness (Cummins et al., 2005b.). Additionally, households with partners and children have consistently shown compensatory effects where low satisfaction with Standard of Living and Relationships was offset by increased satisfaction with Health (Cummins et al., 2009a, 2009b).

The most frequently cited domain compensation study involves a comparison of the SWB of a group of farmers who had left the land, a group who continued to farm, and a group of city residents (Best et al., 2000). On leaving the land, the ex-farmers' satisfaction with their productivity declined, but their SWB did not differ significantly from the other two groups. This was attributed to compensatory increases in satisfaction with Personal Relationships, thus allowing normal SWB to be maintained.

Domain compensation is generally active around the proposed SWB threshold of 70 points (Cummins, 2002), but the ability of this process to maintain SWB is limited by the number of compensatory domains available, and the extent of the external challenge. An example of this was found for sole parent households where low satisfaction with Personal Relationships did not show evidence of domain compensation. This was believed to be due to the level of SWB being too low, such that all domains were adversely affected (Cummins et al., 2006a).

The presence of domain compensation can be inferred by observing the plotted domain means for a particular population group. When some of the domain scores are

below their normative range and others are within or higher than the normal range, it is possible that domain compensation processes are operating (Cummins et al., 2009a, 2009b). A more statistical approach is to firstly convert each domain score (domain mean) to a percentage of the PWI mean, thus indicating the relative contribution of each domain. The second step is to compare differences in contributions of the group of interest to the normal population (Best et al., 2000). Domain compensation is proposed to be present where domain mean percentage contributions to SWB differ significantly from the general population on one or more domains.

In conclusion, domain compensation tests are useful in identifying specific domains that are being relied upon to prevent SWB from dropping to chronically low levels. However, as compensatory domains are often the last remaining points of resistance against external challenges, a decrease in satisfaction with these domains increases opportunities for the challenging agent to overwhelm any remaining positive mood, resulting in a rapid decline in SWB (Cummins et al., 2009b). On that basis, the ability to identify the current status of domain compensation processes provides SWB researchers with valuable insight into homeostatic strengths and weaknesses of a particular population group.

2.3.5 Summary of the Theory of SWB Homeostasis. In summary, the SWB homeostatic system is believed to be defending ongoing feelings of happiness, contentment and positive arousal, collectively represented as HPMood (Cummins, 2010a). When there is a noticeable drop in HPMood, the homeostatic system attempts to return it to normal levels. The Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) proposes that the ability to retain positive levels of SWB in challenging circumstances depends on a person's genetically determined set-point, the effectiveness of their internal adaptation processes (cognitive buffers of self-esteem, optimism, and perceived control), domain compensation processes, and the availability of external resources such as adequate income and supportive relationships (Cummins 2010a). Thus, the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) provides a coherent model which helps to explain the ongoing stability of SWB.

However, not all circumstances are equal in terms of the extent and speed with which SWB returns to its normal set-point. In a comprehensive review of the literature on adaptation, Frederick and Loewenstein (1999) found that some events such as incarceration, or increases in income were associated with rapid adaptation. In contrast, other events such as the death of a loved one are likely to reflect very slow adaptation. Similar results have been reported in the case of divorce (Lucas, 2005); unemployment (Lucas, Clark, Georgellis, & Diener, 2004); and long-term disability (Lucas, 2007). For some circumstances such as widowhood, there have been suggestions that set-point only partially returns to its previous levels (Lucas, Clark, Georgellis & Diener, 2003), whereas other researchers maintain that a person's normal set-point can change altogether (Diener, Lucas & Scollon, 2006; Headey, 2006, 2008; Headey, Muffels & Wagner, 2010).

Following this line of thought, Headey (2006, 2008) has recanted parts of the Dynamic Equilibrium Theory (Headey & Wearing, 1989) which had previously attributed the stability of SWB over time to the stability of individual set-points. Using longitudinal data from the German Socio-Economic Panel Survey (SOEP) from 1984-2000, individuals' SWB ratings were compared at two time periods; the first five years and last five years of the panel data. Headey (2006) found that the SWB of 18% of panel respondents had either reduced or increased by over two points between the two periods (Headey, 2006). Similarly, in an analysis of additional panel data, Headey (2008) found that the SWB of 13.3% of respondents had declined by 2 or more points and not returned to previous levels. Finally, Headey et al., (2010) reported that for 11% of the panel sample, changes in set-point between the first and second period were up or down by about 50%, thus concluding that these changes were "apparently permanent" (Headey et al., 2010, p. 17925).

An alternative explanation to the change in set-point is that panel respondents may have been influenced by a prevailing negative mood state such as depression, causing them to lose contact with HPMood at the time the survey was completed. It is possible that over time, these individuals will recover and become aware of their set-point once again, providing they have the internal and external resources to do so. It is

also possible therefore, that some of the SOEP respondents did not have the resources available to do this during the period examined. In either case, additional research using a wide variety of longitudinal data is required to verify each of these claims.

While longitudinal research on SWB adaptation is far from definitive at this stage, the stability of SWB found in Australia and other countries (Cummins, 1998) provides compelling evidence for the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a). Nevertheless, there are some circumstances in which SWB is likely to take longer to return to homeostasis than others. For example, the study of long term disability by Lucas (2007) referred to earlier found that people were slow to return to previous levels of SWB. Unfortunately in this study, respondents were asked to compare their current life satisfaction with their former pre-disability levels of satisfaction. This cognitively based comparison may have confounded the affective aspects of SWB judgments. Indeed, relationships between medical conditions and psychological outcomes have often shown conflicting or confusing results in the literature. A discussion on some of the challenges in SWB research involving medical conditions is presented in the next chapter.

Chapter 3: SWB and Medical Conditions

It seems somewhat intuitive that people who experience symptoms of a medical condition such as pain, disturbed sleep, and functional limitations in their daily living, will also experience low health satisfaction and potentially, lower SWB than someone without such conditions. However, this cannot be assumed as there are many factors that influence relationships between SWB and the symptoms of a medical condition, as discussed in this chapter.

3.1 Medical Conditions and Low SWB

Examples of associations between chronic medical conditions and low SWB include multiple sclerosis (McCabe & McKern, 2002); Australian youth with long term disabilities (Emerson et al., 2009); long-term disabilities for North Americans (Lucas, 2007); and various other chronic physical illnesses in the USA (Mehnert, Krauss, Nadler, & Boyd, 1990). Particular research attention has also been paid to conditions involving pain which have been associated with low SWB and depression (Kempen, Ormel, Brilman, & Relyveld, 1997; McCracken et al., 2007; Sarda, Nicholas, Pimenta, & Asghari, 2008). These relationships are likely to be due, in part, to the inherent difficulties in adapting to intractable pain (Lawton, 1984). Moreover, as attempts to control pain can dominate an individual's experience at the expense of other aspects of life such as family, work, and leisure (Keefe et al., 2004), statistical associations between pain, low SWB, and depression are not surprising.

The effect of conditions involving pain is further illustrated in a comparison of 19 medical conditions involving elderly Dutch respondents (n = 5279). The lowest means for mental health (negative mood, depression, and anxiety) were related to conditions involving pain (back problem and arthritis), which collectively contributed 35.5% to the variance for mental health (Kempen et al., 1997). This is consistent with other literature where chronic back pain is associated with anxiety, depressed mood,

and emotional distress (Cohen, Argoff & Carragee, 2009; Henschke et al., 2008; Pincus et al., 2002).

Notably, back pain is a widespread problem globally with a prevalence rate of between 50%-80% in a given population (Cohen et al., 2009). In Australia, it is estimated that 80% of people will experience a back problem at some stage in their lives and about 10% will be disabled by severe pain (Walker, et al., 2004). Nevertheless, caution should be exercised in making assumptions about relationships between pain and SWB as only high intensity/chronic pain is usually related to significant effects on psychological outcomes (e.g., Penny et al., 1999). Indeed, research on medical conditions in general, presents a number of challenges for SWB researchers because most of the literature is derived from data which are not easily adapted to SWB theory and measurement.

3.2 SWB Measurement and Medical Conditions

There are fundamentally different ways in which medical research and the social sciences measure psychological wellbeing (Cummins, 2010a). Most medical studies for example, use Health Related Quality of Life (HRQOL) scales which focus on various symptoms of the condition (Michalos, 2004). While some subjective items such as self-ratings of health and pain intensity are usually included in these scales, most of the data are heavily weighted towards objective information (Cummins, Lau & Stokes, 2004). SWB measures on the other hand, are purely subjective. There are statistical and theoretical challenges with combining measures of objective and subjective information in data analysis (Cummins, 2000a, 2010b; Cummins, Lau et al., 2004; Lepledge & Hunt, 1997), but the main difficulties with interpreting HRQOL based research in a SWB context, are the different assumptions regarding psychological wellbeing between the two disciplines.

In the medical literature, psychological wellbeing is usually conceptualised as quality of life, an indication of which is the absence or low occurrence of symptoms of the condition. Moreover, most studies include some form of depression scale (Pincus et

al., 2002). The underlying assumption here is that the absence of depression can be equated to psychological wellbeing (Cummins, Lau et al., 2004). This is a different concept to SWB research where the absence of negative mood and depression does not imply that a person is subsequently experiencing positive mood (SWB).

Specifically, SWB researchers assume that most individuals are able to maintain a positive sense of wellbeing, even in the presence of challenges such as medical conditions. This approach is based on Adaptation Level Theory (Helson, 1964), Dynamic Equilibrium Theory (Headey & Wearing, 1989), and SWB Homeostasis Theory (Cummins, 1995, 1998, 2010a). Because of these different perspectives, medical studies will often measure depression (see Pincus et al., 2002 for a meta-analysis of measures used), but will rarely include information on positive mood and SWB. On that basis, it is difficult to directly compare these results to SWB research. Nonetheless, challenges that are substantial and ongoing will potentially be reflected in low SWB scores which, in turn, may also indicate the onset of depression.

There are several benefits in using SWB measures to investigate the psychological impact of medical conditions. For example, traditional HRQOL scales often focus on measuring health as a single domain (Hagerty et al., 2001), whereas SWB scales such as the Personal Wellbeing Index (PWI) (International Wellbeing Group, 2006), include a range of other domains that allow an individual's psychological condition to be observed within a broader structure. At the same time, this measure can inform on the current status of various adaptation processes such as domain compensation. For SWB studies involving medical conditions, information on adaptation can be obtained by observing an individual's SWB score in the first instance, followed by their level of health satisfaction.

3.3 Health Satisfaction and Medical Conditions

Since the early years of SWB research, correlations between health and SWB have been found (e.g., Wilson, 1967). In a meta-analysis of 104 studies, Okun, Stock, Haring and Witter (1984), found that self-rated health accounted for 8.5%-12.3% of the

variance in SWB. A more recent study involving medical conditions found a higher contribution to SWB variance of 22% (e.g., Temane & Wissing, 2006). However, it cannot be assumed that good health is the most important life domain for everyone (Michalos, 2004). Other priorities include relationships and financial security (Michalos, 2004), being productive (Cummins, Lau et al., 2004), taking pleasure in life, experiencing love, and enjoying everyday events (Leplege & Hunt, 1997). In the case of chronic medical conditions, however, health is likely to be more highly valued than for a normal population (Lau, Hartman, & Ware 1986).

It is common for people with a medical condition to report low health satisfaction (e.g., Aronson, 1997; Kempen et al., 1997; Tiliouine, 2009), but this is unlikely to impact on SWB unless the symptoms of the condition are particularly worrying to the individual concerned (Borg et al., 2007; Cummins, Lau et al., 2004). The subjective nature of this experience is reflected in a study of 675 people with a disability in North America (Mehnert et al., 1990) which found that life satisfaction is only lower when people perceive their symptoms as limiting. Interestingly, 22% of respondents who reported their condition as severe did not consider themselves to be disabled. The life satisfaction for this group was higher than those who did consider themselves as disabled. Despite this, 68% of the "disabled" group still rated their life satisfaction as somewhat to very satisfied (Mehnert et al., 1990).

These results support the contention that the discomfort caused by symptoms of a medical condition are not always at the extreme levels. This is further illustrated by research on the distress associated with arthritis, low back pain, and osteoarthritis where 52% of respondents experienced low distress, 28% reported medium distress, and only 20% experienced high distress (ABS, 2006).

The extent to which symptoms are disruptive is a very individual process as two people with the same medical condition and identical symptoms can have differing emotional responses to those symptoms. This can be due to differing set-point levels where one person may have a higher set-point and greater resilience to challenging events than the other (Cummins, Lau et al., 2004). In either case, when symptoms are

experienced as disturbing, sufficient internal and external resources are required to maintain a positive outlook on life and to prevent a sense of being emotionally defeated or potentially, becoming depressed (Cummins, 1995; Cummins, Lau et al., 2004).

As well as support from the cognitive buffers, personal relationships, and income, other homeostatic processes such as domain compensation work to maintain SWB at normal levels (Best et al., 2000). Very few studies have examined domain compensation, particularly in relation to medical conditions. In this thesis, it is expected that health satisfaction will be below the normative range (Cummins et al., 2009b) for some of the respondents with a medical condition, and where domain compensation processes are active, SWB will be within or close to the normal range.

In conclusion, there is a complex relationship between medical conditions and SWB, particularly as conditions which are objectively measured as severe, do not necessarily result in low SWB. This may be due, in part, to individual differences in resilience and adaptation processes (Cummins, Lau et al., 2004). It is also important to note that there are other factors that can influence the SWB of people with a medical condition, and these need to be regarded as potentially confounding factors in data analysis.

3.4 Confounding Factors in SWB Research

As is well known in the literature, various demographic factors are associated with SWB. In particular income, gender, and age are identified as potential confounding factors in this thesis. Along similar lines, medical related factors such as pain intensity and functional limitations to daily living have also been reported as having an adverse effect on positive psychological outcomes. A brief discussion on each of these factors and their relationship to SWB follows next.

3.4.1 Income. As mentioned earlier, income is one of the external buffers in the SWB Homeostatic system (Cummins, 1995, 1998, 2010a) but there are also relationships between income, medical conditions, and SWB. In a study of

osteoarthritis patients, income was negatively correlated to pain (-.20, $p<.01$) and pessimism (-.18, $p<.05$) while age, gender, marital status, and education demonstrated no significant relationships (Luger et al., 2009). Generally, as income reduces, reports of health problems tend to increase (Campbell et al., 1976; Cummins, 2000b). This may be due to an inability of low income groups to purchase appropriate medical care, nutritional food, and services to assist with daily living (Cummins, 2000b). For these reasons, it is possible that income may be particularly meaningful to people with a difficult medical condition compared to a normal population, but further research is needed to establish this.

3.4.2 Gender. While some researchers report no significant gender differences on life satisfaction (Myers & Diener, 1995), others report small differences (Andrews & Withey, 1976; Campbell et al., 1976; Haring, Stock, & Okun, 1984; Lykken & Tellegen, 1996). Gender differences in the intensity of positive and negative affect have also been observed with females reporting higher levels of intensity on both constructs (Fujita, Diener & Sandvik, 1991; Nolen-Hoeksema & Rusting, 1999). A consistent finding over 21 Australian Unity Wellbeing Index surveys from 2001 to 2009 is that there are small but significant differences in SWB with females tending to report higher SWB than males (Cummins et al., 2009b).

3.4.3 Age. Early SWB research claimed that youth are happier than older people (Wilson, 1967; Bradburn & Caplovitz, 1965), and that SWB declines with age (Shmotkin, 1990). Other studies propose that SWB fluctuates between 20 and 30 years (Lykken & Tellegen, 1996), and that ultimately, SWB increases with advancing age (Argyle, 1999; Bradburn, 1969; Cummins, 2003a, 2006a). Notably, after 75 years, SWB tends to be significantly higher than all other age groups (Cummins et al., 2009a; 2009b).

This is believed to be partly due to the life experience of older people compared to their younger counterparts (Horley & Lavery, 1994). For example, older people are proposed to have a more developed ability to regulate emotions (Scheibe & Carstensen,

2010), and have a closer congruence between goals and age-related expectations with advancing years (Campbell et al., 1976; Rapkin & Fisher, 1992; Ryff, 1991).

Age effects are also noted for health satisfaction where higher correlations with SWB have been found for people over 60 years, suggesting that health becomes more salient with advancing age (George & Landerman, 1984; George, Okun, & Landerman, 1985). Furthermore, it has been argued that, as the likelihood of experiencing health problems increases dramatically in older age (Campbell et al., 1976; Cummins et al., 2008a, 2008b), health satisfaction will subsequently reduce (Campbell et al., 1976). In contrast, Andersen, Christensen, and Frederiksen (2007) propose that health satisfaction increases with age. This has been attributed to lower health expectations (Anderson et al., 2007; Thompson & Spacapan, 1991). Another possibility is that comparison to the health of others from the same age cohort is likely to find individuals who are physically disabled in some way, or even deceased (Anderson et al., 2007; Mossey & Shapiro 2006). Hence, a heightened level of satisfaction with one's own health ensues.

Finally, there are associations between age and adaptation to pain. For Australians with low back problems, pain severity and interference with functioning appears to increase with age and is the most severe and disabling after 70 years (Walker et al., 2004). Despite these difficulties, older people appear better able to accommodate pain and to disassociate the emotional component of this experience from the pain itself (Cummins, et al., 2005a; 2007a). By the same token, a study of older respondents with rheumatoid arthritis found that this group used a greater variety of pain coping strategies than younger people (Watkins, Shifren, Park, & Morell, 1999).

Overall, the contribution of demographic factors to SWB has generally been regarded as relatively minor (e.g., Andrews & Withey, 1976; Campbell et al., 1976; Diener et al., 1999). However, specific circumstances such as the presence of a severe medical condition may change these relationships. Notwithstanding the mixed results discussed here, there is potential for demographic variables to act as confounding factors in relationships between SWB and medical conditions, as are the medical-

specific variables of pain intensity, back problem frequency, and functional limitations to daily living discussed next.

3.4.4 Pain intensity. Relationships between pain and SWB were discussed earlier, but there are other aspects of pain that can influence the interpretation of research results. One factor is the frequent occurrence of low grade pain which is a common theme in the literature. In a study of pain experienced from various medical conditions in the USA, Stewart, Hays, & Ware (1988) found that 31.4% of the respondents with various medical conditions experienced low levels of pain, whereas only 9% experienced severe pain. Similarly in a study of lower back problems in Australia, 42% of respondents reported low intensity pain compared to only 10.5% experiencing high intensity pain (Walker et al., 2004). Therefore, as low grade pain will have a weaker influence on SWB than high levels of pain, it is important to use a scale that adequately captures pain intensity.

There are numerous methods of assessing pain ranging from comprehensive observation of a patients' behaviour when experiencing pain (Keefe, Bradley & Crisson, 1990) to daily diaries over a period of time (Lefebvre & Keefe, 2002), and single-item self-reports. A popular and parsimonious measure is a single item 11 point (0-10) self-rated pain intensity scale (e.g., Esteve et al., 2007; McCracken, Eccleston & Bell, 2005; Meenan et al., 1992; Sarda et al., 2008). Other measures include self-reports of immediate pain, most severe pain in the past week, and least severe pain in the past week, which are summed to a total score (Wallston et al., 1994). However, one of the difficulties with reports of past events is that memory can often be inaccurate and distorted (Korait, Goldsmith, & Pansky, 2000). Accessibility to memories of levels of pain experienced also tends to reduce over time (Brodie & Niven, 2000). Some researchers agree that the accuracy of pain recall is modest at best (Erskine, Morley, & Pearce, 1990; Morley, 2007; Niven & Brodie, 1995), while others report a more diverse range of opinions on the accuracy of pain memory (e.g., Lefebvre & Keefe, 2002).

In any case, pain is an important and potentially confounding factor that needs to be controlled for in data analysis (Keefe, Salley, & Lefebvre, 1992). In this thesis,

two types of pain intensity questions were used. In Study 1, respondents were asked "on a scale from 0 to 10, how much physical pain do you experience each day?" In Study 3, the items were changed to minimise pain memory bias by asking, "On a scale of 0 to 10, how much physical pain is your back problem giving you now?"

3.4.5 Back problem frequency. Generally, most studies involving frequency of symptoms have not found significant relationships to SWB or other psychological outcomes. However, there are associations between frequency of pain experienced and how well it is remembered. For example, chronic pain experienced on a frequent basis is less well remembered than acute pain (Erskine et al., 1990). For the reasons outlined here, it is useful to include a measure of back problem frequency in SWB research as this provides additional information that may assist in interpreting pain reports.

3.4.6 Functional limitations to daily living. In a study of chronic illness and disability, Mehnert et al. (1990) found that the lowest life satisfaction occurred for people needing personal assistance with bathing, dressing, and household chores. These items also appear in the back problem literature where they are referred to broadly as functional limitations, or variously as an inability to perform daily tasks (ABS, 2009; Henschke et al., 2008), limitations to mobility (Riddle, 1998), and limitations in self care (ABS, 2006). It has been argued however, that it is only perceived limitations and the extent to which they are personally bothersome that are significantly related to SWB, rather than objective measures of functioning (Borg et al., 2008; Cummins, Lau et al., 2004; Mehnert et al., 1990). In either case, limitations to daily living warrant further investigation as covariates in this thesis.

3.4.7 HPMood. Finally, a recent publication suggests that Homeostatically Protected Mood (HPMood) is the main driver of SWB judgements and that homeostatic mechanisms are activated by a perceived reduction in HPMood in order to return to normal set-point levels (Cummins, 2010a). The implications are that inferences made from SWB data may be attributed to the wrong variables if the shared variance with HPMood is not taken into account. However, as a relatively new variable in SWB research, HPMood warrants a detailed exploratory treatment rather than being included

in analyses with other potential covariates. On that basis, HPMood and its relationship to SWB for people with a back problem, is addressed as a hypothesis in Study 3.

In conclusion, income, gender, age, pain intensity, back problem frequency, and limitations to daily living have the potential to act as confounding factors in relationships between SWB and medical conditions. Therefore, adjustments for covariance will be made where possible in this thesis, commencing with Study 1, the results of which are presented next.

Chapter 4: Study 1 - SWB and Medical Conditions

The aims of this study were to investigate whether SWB is reduced by the presence of a medical condition, and whether the homeostatic process of domain compensation is operating for any of the medical conditions examined. As discussed in the literature review, domain compensation occurs where dissatisfaction with one life domain is offset by increases in other domains to maintain normal levels of SWB. It is expected that some medical conditions will have low satisfaction on domains such as health. The following hypotheses are therefore proposed:

Hypothesis 1: That SWB is decreased in the presence of a medical condition.

Hypothesis 2: That the challenges imposed by specific medical conditions engages domain compensation.

4.1 Method

The categorical variable "medical condition" is used as the basis for most statistical analyses in this study. It denotes respondents who report that they currently have some form of medical condition (n = 3271) in answer to the nominal (yes/no) response question "do you have a medical or psychological condition that makes you visit a doctor on a regular basis?" Respondents who do not report a medical condition (n = 8204) will be used for comparative purposes. Independent variables include, age, income, gender, and pain intensity experienced daily. The dependent variable is the total PWI score in the first instance, and the various PWI domains in subsequent analyses. The total PWI score is derived from the domain satisfaction scores of the Personal Wellbeing Index (International Wellbeing Group, 2006) which are summed and averaged to create a single score representing SWB.

After examining frequency distributions for normality, removing extreme and missing values and preparing the data for use in parametric tests, the hypotheses were addressed by firstly obtaining the means and standard deviations for all relevant

variables. One way, between groups Analysis of Variance (ANOVA) was subsequently used to identify significant differences in PWI means between the medical condition group (MC) and the no medical condition group (NMC) to address Hypothesis 1. Analysis of Covariance (ANCOVA) was also used to control for independent variables that potentially influence the dependent variable (PWI means) (Pallant, 2007). A similar set of analyses were conducted for Hypothesis 2 with the addition of Multivariate Analysis of Variance (MANOVA) to identify domain compensation processes.

4.2 Data Collection

This exploratory study uses existing cross-sectional data from the Australian Unity Wellbeing Index (Cummins et al., 2004b, 2005a, 2005b, 2006a, 2006b, 2007a). This project has collected data on the subjective wellbeing of the Australian population since 2001. Surveys 12-17 have been selected for this study as they contain appropriate variables with a sufficiently large sample size to address the research questions (Babyak, 2004; Peduzzi et al., 1996; Wilson Van Hooris & Morgan, 2007). The wording and scaling of items have been consistent throughout the surveys with the combined data providing a sample size of 11509 respondents. An example of the wording for the PWI is shown in the questionnaire in Appendix H (see Section A).

4.3 Data Preparation

All subjective variables in this study have been converted to Percentage of Scale Maximum scores (%SM) to provide a common unit of analysis on a 0-100 point scale. When a scale is scored 0-X, %SM is calculated as [(score) x 100/(number of scale points - 1)] (Cummins, 1995). This process has been applied to all PWI and life satisfaction variables and to the pain experienced daily variable (how much pain do you experience each day?) where 0 represents no pain and 10 represents the highest level of pain intensity. Table 1 shows the number of categories for each independent variable.

Table 1

Frequency distributions for independent variables

Variable	Category	Freq %	N	Variable	Category	Freq %	N
Age	18-25	9.5	1075	Income	<$15,000	10.2	1003
(Mean 43.8 yrs)	26-35	14.4	1635	(Mean $62,210)	$15,000-$30,000	17.2	1698
	36-45	20.9	2373		$31,000-$60,000	27.5	2719
	46-55	21.3	2424		$61,000-$90,000	21.6	2137
	56-65	17.4	1977		$91,000-$120,000	13.1	1291
	66-75	10.9	1234		$121,000-$150,000	5.3	528
	76+	5.7	651		>$150,000	5.1	504
		Total	11369			Total	9880
Gender	Male	50.0	5749	Medical condition	Medical condition	28.4	3271
	Female	50.0	5760		No medical condition	71.3	8204
		Total	11509			Total	11475
Pain intensity	00	35.6	3672				
	10	14.7	1555				
(Mean 23.72)	20	13.1	1383				
	30	7.9	829				
	40	5.5	576				
	50	8.0	843				
	60	4.6	482				
	70	4.9	514				
	80	3.6	383				
	90	1.4	143				
	100	0.8	88				
		Total	10468				

Table 1 also shows that the sample sizes for the medical condition (MC) and no medical condition (NMC) groups are uneven. This raises the possibility of Type 1 Errors occurring where differences between the groups may be incorrectly attributed (Pallant, 2007). It should be noted that the uneven *n* for the two groups reflects the true nature of the population (Tabachnick & Fidell, 2007) because there are less people in a randomly selected sample of the Australian population who have a medical condition than those who do not. While there are various techniques to correct uneven *n*, doing so may risk distorting genuine differences and losing generalisability to the population of interest (Tabachnick & Fidell, 2007). As adjustment methods affect estimated means as well as significance tests, they are not considered suitable for this study which relies heavily on interpreting the means.

An alternative approach to protect against Type 1 Errors in this circumstance is to increase the stringency of alpha significance levels from .05 to .01 during post hoc tests using Tukey's Honestly Significant Different test (HSD). In situations where homogeneity of variance cannot be assumed (when Levene's test is <.05), Dunnett's C test will be used (Pallant, 2007). Where only two groups are compared (MC and NMC groups), SPSS will not allow Dunnett's C test to be conducted. In these circumstances, tests of robustness (Welch and Brown-Forsythe) are the most appropriate to use (Pallant, 2007).

4.4 Descriptive Statistics (Data Distribution)

The distribution of the PWI means and life satisfaction variables (skewness < -1.20) are consistent with the results of other subjective wellbeing (SWB) studies (Cummins et al., 2007b, 2008a, 2008b, 2009a, 2009b). As the majority of a population is generally satisfied with their lives, SWB data usually present as mildly negatively skewed (Cummins, 1995, 1996, 2000a). This is in keeping with most social and behavioural science data which usually presents as skewed (Aron & Aron, 2002). The independent variables also mildly deviate from zero (skewness <$\pm$ 1). The exception to this is the skewness for pain intensity (1.35) for the No Medical Condition (NMC) group. However, as this is an important variable involving both groups (MC, *n* = 3250;

NMC, *n* = 7284), and the skewness is just over 1, pain intensity was retained for further exploration.

When considering the effects of non-normal distributions, sample size also needs to be taken into account. Violations of normality are less likely to adversely affect statistical assumptions when the sample size consists of 100-200 or more cases (Tabachnick & Fidell, 2007). In this study, the sample sizes for the MC and NMC groups are much larger. In addition, the size of each analytical cell meets minimum requirements for the use of techniques such as multiple regression where at least 10 cases per level in each independent variable are required (Babyak, 2004; Peduzzi et al., 1996; Wilson Van Hooris & Morgan, 2007). The smallest cell size in this study is pain intensity with 22 cases at the 100 point level for the NMC group.

Frequencies for pain intensity revealed some interesting patterns for the NMC group as the majority of respondents without a medical condition (59.4%, *n* = 4324) reported some degree of daily pain. This may explain the positive skew of 1.35 for the NMC group on pain intensity reported earlier. Also of interest is the number of respondents with a medical condition (MC group) who do not experience any pain on a daily basis (24.4%, *n* = 792).

As a consequence of these distributions, four sub-groups based on pain intensity were created as (1) those who reported a medical condition and experienced pain on a daily basis (Pain MEDCON, *n* = 2458); (2) those who reported a medical condition but did not experience any daily pain (No Pain MEDCON, *n* = 792); (3) those who did not report a medical condition but still experienced daily pain (Pain NO MEDCON, *n* = 4324); and (4) those who did not report a medical condition and did not experience daily pain (No Pain NO MEDCON *n* = 2960). Figure 2 shows the percentage breakdown within the MEDCON and NO MEDCON groups.

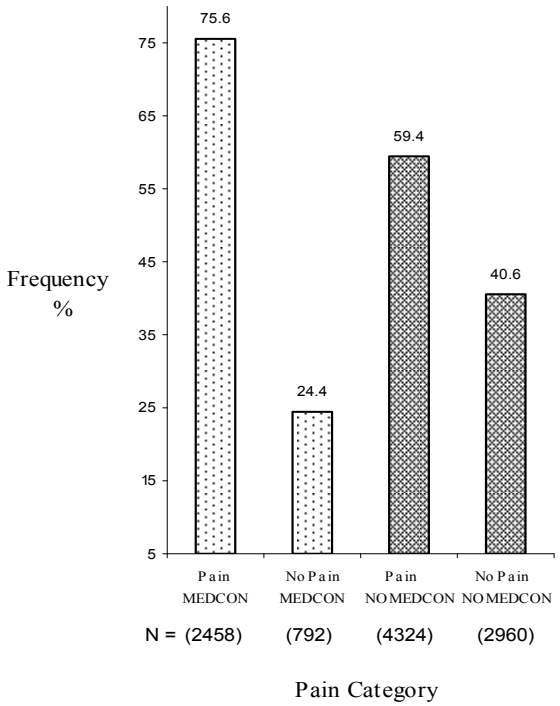


Figure 2. Frequency distribution x pain category

The frequency pattern of pain intensity for each group is shown in Table 2. Note that the percentages for each level of pain intensity are calculated from the size of the Pain MEDCON group (n = 2458) and the Pain NO MEDCON group (n = 4324) separately. The Pain MEDCON group shows a fairly even distribution of responses over the pain intensity categories. However, for the Pain NO MEDCON category, 53.2% (n = 2299) of respondents report around 10-20 points of pain intensity. An ANOVA comparison of the Pain MEDCON and Pain NO MEDCON is significant (p< .000 Welch).

Table 2

Frequency distributions and ANOVA for daily pain (pain x medical condition groups)

	Pain Intensity Experienced Daily														
	00	10	20	30	40	50	60	70	80	90	100	Totals	Grand total	Mean	ANOVA
Pain MEDCON		11.4% *n* =280	14.5% *n* =357	11.3% *n* =278	9.5% *n* =234	17.0% *n* =417	9.5% *n* =234	10.6% *n* =260	9.9% *n* =243	3.6% *n* =89	2.7% *n* =66	75.6% *n* =2458	Medcon 100% *n* =3250	46.7 (SD=25.0)	Pain MEDCON and Pain NO MEDCON $F(1,4581) = 706.93$ $p < .000$ (Welch) Eta^2 .094
No Pain MEDCON	24.4% *n* =792											24.4% *n* =792		00.0	
Pain NO MEDCON		29.4% *n* =1273	23.7% *n* =1026	12.7% *n* =548	7.9% *n* =341	9.9% *n* =425	5.7% *n* =248	5.8% *n* =251	3.2% *n* =138	1.2% *n* =52	0.5% *n* = 22	59.4% *n* = 4324	NO Medcon 100% *n* =7284	31.2 (SD=21.9)	
No Pain NO MEDCON	40.6% *n* =2960											40.6% *n* =2960		00.0	

Due to the significant difference between daily pain intensity for the MC and NMC groups shown in Table 2, the four pain x medical condition categories are included in analyses conducted towards the end of this study.

4.5 Hypothesis 1: That SWB is decreased in the presence of a medical condition.

After examining the difference in SWB between the MC and NMC groups, an ANCOVA is conducted to determine the effects of income, gender, age, and pain intensity on the SWB results.

4.5.1 PWI means (MC and NMC groups). The means of the total PWI score (PWI Means) for the MC and NMC groups are significantly different, as Table 3 illustrates, with the MC group 4.1 points lower than the NMC group. The partial Eta squared statistic (Eta^2) describes the size of the effect (or proportion of variance) which can be classed as either a small effect (.01), a moderate effect (.06), or a large effect (0.14) (Pallant, 2007). In this ANOVA, the Eta^2 of .022 is a small effect.

Table 3

PWI means for MC and NMC groups

Variable	Group	PWI mean	SD	N	PWI difference	p
PWI mean	Medical Condition (MC)	72.12	14.29	327	4.13	F (1, 5078) = 257.93, .000 (Welch)
	No Medical Condition (NMC)	76.25	11.61	820		Eta^2 = .022
	Total	75.07	12.57	1147		

The horizontal band in Figure 3 shows the status of the MC and NMC groups in relation to the normative group data range for SWB in Australia (73.7-76.5 points), as

measured by the PWI means (Cummins et al., 2009b). Normative group data are obtained by using the survey mean scores as data (n = 18 surveys) and subsequently creating a 95% probability range around the mean based on two standard deviations on either side of that mean. This creates a range within which the PWI mean of any population group can be expected to fall (Cummins et al., 2009b).

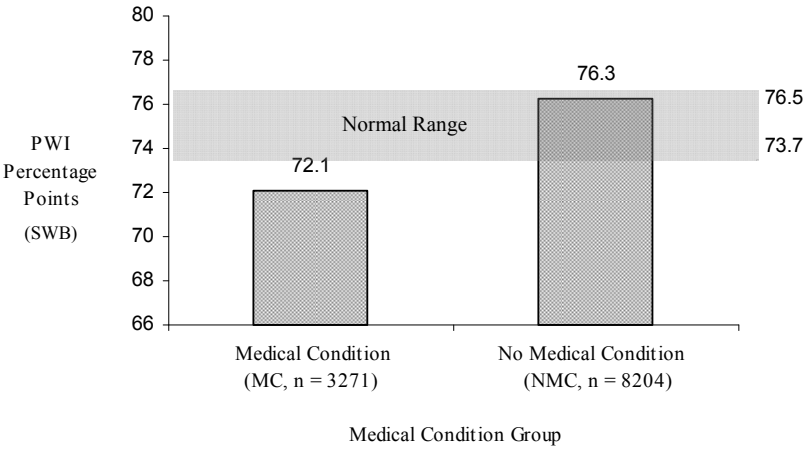


Figure 3. PWI means for medical condition groups (MC and NMC)

As Figure 3 shows, the PWI mean for the MC group falls just below the normative level for group data by 1.4 points, whereas the NMC group is within the normative range. When group means lie below normative levels, it indicates that the homeostatic system has been defeated for a higher proportion of the sample than is normal. Here, the presence of a medical condition increases the probability that the internal buffers have been overwhelmed thus subjecting the sample to a higher risk of depression.

This is also reflected in changes to the standard deviation in Table 3. As discussed in the literature review, when the PWI means are within the normative range, the within-group variance is mainly due to individual differences in set-points. However, when the challenging agent overcomes the homeostatic system and wrests control away from the influence of a normally positive perception of wellbeing (HPMood), SWB values fall and the variance in PWI means increases as a result (Cummins, 2003).The higher standard deviation for the MC group is further

confirmation that a higher than normal proportion of this group are at a greater risk of homeostatic failure and depression than the NMC group.

Overall, these results indicate that SWB is decreased in the presence of a medical condition, as hypothesised. However, it is important to also identify any other factors that may have confounded the results. As discussed earlier, SWB has been associated with income, age, gender (Cummins et al., 2009a, 2009b) and, for medical conditions, pain intensity has been associated with depression and negative mood (Kempen et al., 1997; McCracken et al., 2007; Sarda et al., 2008). Therefore an ANCOVA using the whole data set (n = 9880) will investigate potential confounding factors as a means to reduce the potential for error variance in the results thus far.

4.5.2 Potential covariance. Before investigating covariance, the PWI means for each independent variable are examined to identify any unusual patterns, such as a lack of significant and linear relationships, as this may affect interpretation of ANCOVA results.

4.5.2.1 PWI means for income. A one way ANOVA was used to identify differences between levels of income in regards to SWB. As Table 4 shows, the effect size is small with an Eta^2 of .036 but the differences are statistically significant.

Table 4

PWI means for income

Income	PWI mean	SD	N	Significant differences in PWI means	p
<$15,000 (a)	70.01	16.16	1003	< (b), (c), (d), (e), (f), and (g)	.01 (Dunnett's C)
$15,000 - $30,000 (b)	72.70	13.77	1698	> (a), < (c), (d), (e), (f), and (g)	$Eta^2 = .036$
$31,000 - $60,000 (c)	74.75	11.99	2719	> (a), (b), <(d), (e), (f), and (g)	
$61,000 - $90,000 (d)	75.98	10.97	2137	> (a), (b), (c), < (e), (f), and (g)	
$91,000 - $120,000 (e)	77.41	9.97	1291	> (a), (b), (c), and (d)	
$121,000 - $150,000 (f)	78.23	9.42	528	> (a), (b), (c), and (d)	
> $150,000 (g)	78.50	10.52	504	> (a), (b), (c), and (d)	
Total	72.19	14.32	9880		

SWB progressively increases for each income level up to $91,000-$120,000 where it begins to plateau, as is consistent with homeostasis theory (Cummins, 1995, 1998, 2010a). The PWI means for income are compared to the normative range in Figure 4.

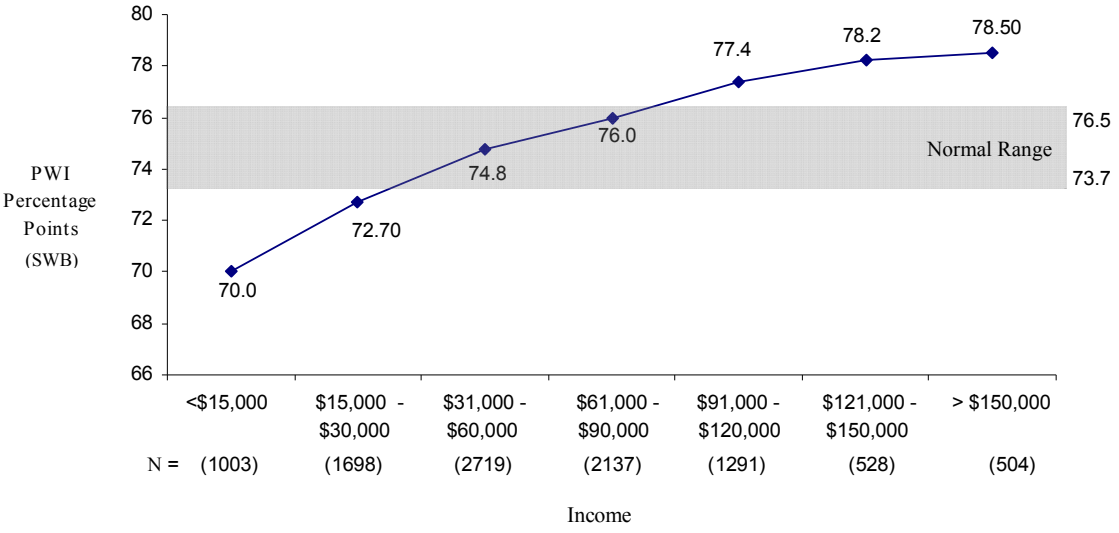


Figure 4. PWI means for income

The two lowest levels of income (<$15,000 and $15,000-$30,000) are below the normative range for group data, while the three highest income groups are above normal. These results also indicate that there is a risk of homeostatic failure when gross household income is $30,000 or less.

4.5.2.2 PWI means for gender. Table 5 shows significantly higher PWI means for females but only to a very small extent (mean difference of .08 and an Eta2 of .001). The SWB of both groups falls comfortably within the normative range.

Table 5

PWI means for gender

Gender	PWI mean	SD	N	PWI difference	p
Male	74.66	12.34	5749	0.80	F (1, 11492) = 11.60, .000 (Welch)
Female	75.46	10.56	5760		
Total	75.06	12.58	11509		Eta^2 = .001

4.5.2.3 PWI means for age. In terms of age, the >75yrs group differs significantly from all other age groups (except 66-75 yrs) with the highest PWI mean of 78.5 points (see Table 6). The effect size is very small once again (Eta^2 of .007).

Table 6

PWI means for age

Age	PWI mean	SD	N	Significant differences in PWI means between age groups	p
18-25 yrs (a)	74.50	12.04	1075		.01 (Dunnett's C)
26-35 yrs (b)	74.77	11.88	1635		$Eta^2 = .007$
36-45 yrs (c)	74.54	12.63	2373		
46-55 yrs (d)	74.22	12.80	2424		
56-65 yrs (e)	75.41	12.12	1977		
66-75 yrs (f)	76.57	12.40	1234	> (a), (b), (c)	
>75 yrs (g)	78.32	11.40	651	> (a), (b), (c), (d), (e)	
Total	75.09	12.55	11369		

As Figure 5 illustrates, SWB tends to increase gradually as people get older with the >75 yrs group extending above the normative range by 1.8 points.

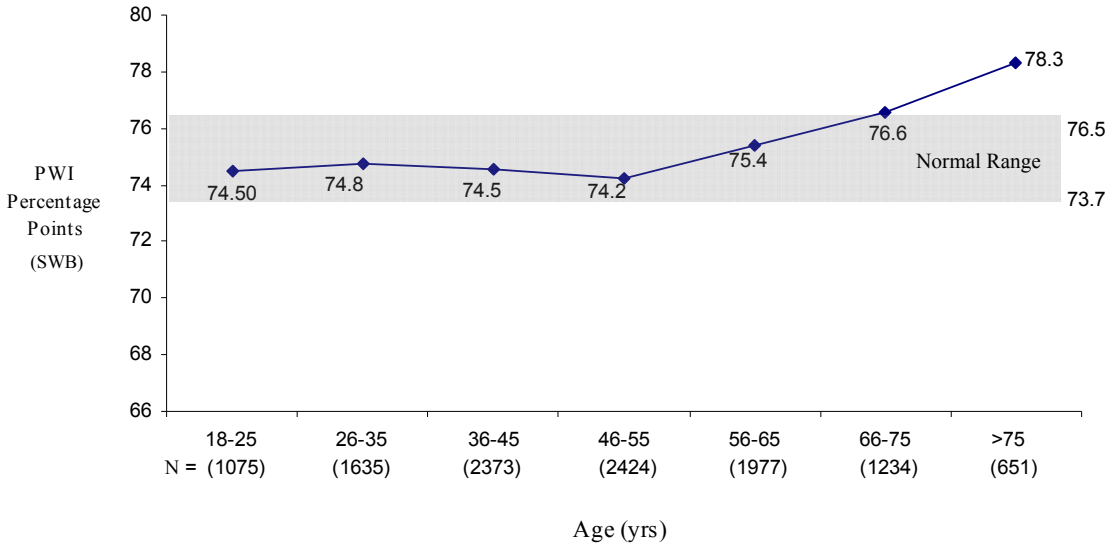


Figure 5. PWI means for age

4.5.2.4 PWI means for pain intensity. The PWI means for various levels of pain intensity are included in Table 7. The combined data continues to be used here as respondents in both the MC and NMC groups reported experiencing daily pain.

Table 7

PWI means for pain intensity

Pain intensity	PWI mean	SD	N	Significant PWI differences between levels of pain intensity	p
00 (a)	77.85	11.38	3762	>(b), (c), (d), (e), (f), (g), (h), (i), (j), (k)	.01 (Dunnett's C)
10 (b)	75.80	11.06	1555	<(a), >(c), (d), (e), (f), (g), (h), (i), (k)	$Eta^2 = .049$
20 (c)	74.93	11.78	1383	<(a), >(c), (d), (e), (f), (g), (h), (i), (k)	
30 (d)	72.89	11.43	829	<(a), (b), (c), >(h)	
40 (e)	71.69	12.56	576	<(a), (b), (c)	
50 (f)	72.41	14.10	843	<(a), (b), (c)	
60 (g)	71.24	13.06	482	<(a), (b), (c)	
70 (h)	69.67	15.15	514	<(a), (b), (c), (d)	
80 (i)	70.89	16.52	383	<(a), (b), (c)	
90 (j)	72.13	16.02	143	<(a)	
100 (k)	66.41	19.59	88	<(a), (b), (c)	
Total	74.88	12.66	10558		

Increasing pain is associated with reductions in SWB with the lowest SWB occurring at 100 points of pain intensity (66.4). At this level the variance is also noticeably higher (SD 19.6). It can be inferred from these results that a challenging agent (pain) may have overcome homeostasis and that respondents in this pain category are at a higher than normal risk of depression. However, while increasing pain is associated with reductions in SWB, Figure 6 shows that reductions do not occur in an entirely linear manner.

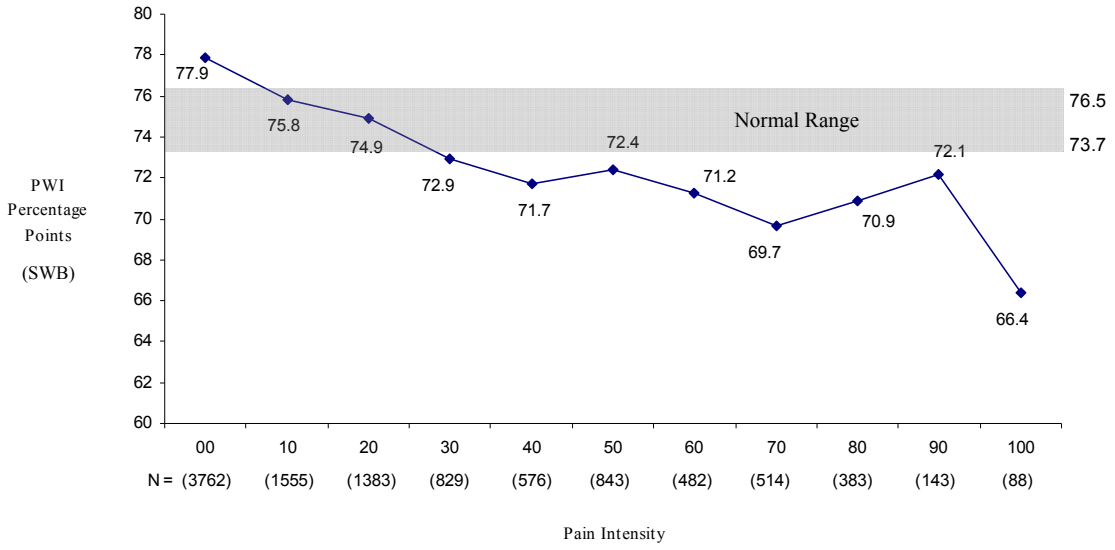


Figure 6. PWI means for pain intensity

In Figure 6, SWB can be observed within normative levels at 10 and 20 points of pain intensity but the remainder are lower than the normative range. The only circumstance in which the SWB rises above normative levels (77.9) is where pain intensity is zero (00) points. Importantly, homeostasis appears to be holding SWB just below the bottom of the normative range (73.7) for 30-90 points of pain intensity, but breaches the homeostatic threshold (a PWI mean of 70 points) when pain intensity is at its maximum level (100 points). Here there is a dramatic drop in SWB to well below normal (66.4 points).

In summary, the lower than normal SWB for income at <$30,000 (70.0) and pain intensity at 100 points (66.4) suggest that homeostasis has been unable to maintain SWB at normal levels. It is possible that the reduced SWB found for the MC group earlier may be confounded by the presence of pain and/or income in particular. On that basis, an ANCOVA will now be conducted for these two variables. To obtain a broader range of information, age and gender have also been included due to their associations with SWB in the literature.

4.5.2.5 PWI covariance and independent variables. The selection of covariates for ANCOVAs requires an assumption of normality, linearity, homogeneity of regression slopes and homogeneity of variance (Pallant, 2007). In this analysis, assumptions of normality could not be assumed due to the inherent negative skew of the SWB data and the unequal sample size (MC n = 2778; NMC n = 6389). This was confirmed by Levene's Test of Equality of Variance (p<.000). As there were only two groups in the comparison, post hoc tests were unavailable in SPSS. In addition, tests of robustness could not be obtained. Therefore, the results in Table 8 should be viewed in their broadest sense.

Table 8

PWI covariates (MC and NMC groups)

Dependent variable	Covariates	df	F	p	Partial Eta^2
PWI mean	Income	1, 9161	244.68	.000	.033
	Gender	1, 9161	24.72	.002	.003
	Age	1, 9161	312.12	.000	.033
	Pain intensity	1, 9161	337.43	.000	.032

Income, age, and pain intensity show almost equal contributions to the variance of no more than 3.3%, while gender provides a much smaller contribution at .3%. When the small effect of the covariates is removed, the PWI mean for the MC group is increased and for the NMC group, small reductions in the mean occurs (Table 9).

Table 9

PWI means adjusted for covariates (MC and NMC groups)

Variable	Group	Raw mean	SD	Adjusted mean	Mean difference	N
PWI mean	MC	72.03	14.03	72.56	0.53	2778
	NMC	76.01	11.49	75.78	- 0.23	6389

In summary, a comparison of PWI means for the MC and NMC groups found that the MC group was significantly lower than the NMC group. A subsequent analysis of covariance of independent variables income, gender, age, and pain intensity resulted in only minor adjustments to the original PWI means for both groups. Thus, SWB for the MC group continues to be significantly lower than the NMC group, and also remains below the normative range.

The small impact of demographic variables on SWB is consistent with a large number of studies (Diener et al., 1999). However, the results for pain are somewhat surprising, given relationships between pain and depression in the literature (Kempen et al., 1997; McCracken et al., 2007; Sarda et al., 2008). Therefore, to obtain a more refined observation of pain and SWB, the data were divided into the four pain categories identified from the distribution data in Table 2. The categories consist of pain with a medical condition (Pain MEDCON), no pain with a medical condition (No Pain MEDCON), pain with no medical condition (Pain NO MEDCON), and no pain and no medical condition (No Pain NO MEDCON).

4.5.3 PWI means for pain groups. In Table 10, The PWI means for the four groups differ significantly with an Eta^2 of .045 representing a small effect. The two pain groups (Pain MEDCON and Pain NO MEDCON) have lower PWI means than the groups where pain is not experienced.

Table 10

PWI means for pain groups

Variable	Group	PWI Mean	SD	N	Significant difference	p
PWI	Pain MEDCON (a)	70.83	14.58	2458	< (b), (c), (d)	.01 (Dunnett's C)
	Pain NO MEDCON (b)	74.62	11.83	4324	> (a),< (c), (d)	Eta^2 = .045
	No Pain MEDCON (c)	76.21	12.41	792		
	No Pain NO MEDCON (d)	78.29	11.06	2960		
	Total	74.89	12.66	10534		

A closer examination of the two pain groups in Figure 7 reveals that the Pain MEDCON group is 3.25 points below the normative range (70.8) whereas the Pain NO MEDCON group is within normative levels (74.6).

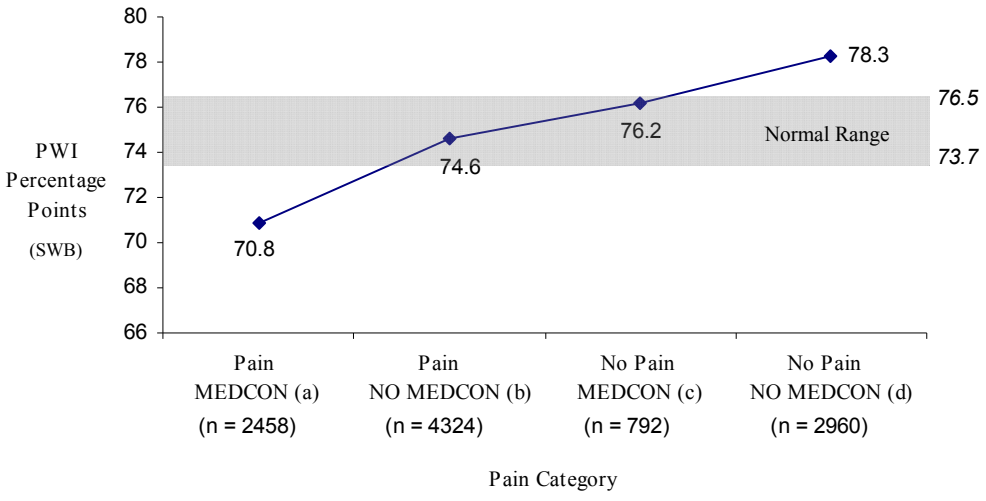


Figure 7. PWI means for pain groups

In conclusion, Hypothesis 1, that SWB is decreased by the presence of a medical condition, is supported as the SWB for the MC group is not only significantly lower than the NMC group, it is also below the normative SWB range. The results show little covariance with the independent variables income, age, gender and pain intensity. However, when the sample was divided into various combinations of medical condition and pain, the lowest PWI mean occurred for the Pain MEDCON group which represented the only group below the SWB normative range. The results suggest that the presence of a medical condition in combination with pain is a potential threat to SWB homeostasis.

Whether homeostasis is subsequently overwhelmed and defeated by these two factors depends on the effectiveness of protective homeostatic mechanisms such as domain compensation. As discussed in the literature review, domain compensation acts to offset low satisfaction in one life domain by increasing satisfaction in other domains in order to maintain SWB within the normal range (Best et al., 2000). In the case of medical conditions and pain, it is expected that satisfaction with health is likely to be below the normative range, but the extent to which this affects SWB is influenced by the presence of domain compensation processes, as investigated in Hypothesis 2.

4.6 Hypothesis 2: That the challenges imposed by specific medical conditions engages domain compensation.

Before testing for domain compensation, it is important to separate the data into specific medical conditions. In previous analyses, the data were divided into MC and NMC groups and later, into four groups according to the presence of a medical condition and pain in combination. However, these groupings fail to take into account potential differences in the characteristics of various medical conditions. Therefore, the analyses for Hypothesis 2 were conducted with nine individual medical conditions identified from the combined data used earlier.

4.6.1 Data preparation. Each medical condition was identified through the question "from the following list, please indicate your medical condition: arthritis, heart problem, diabetes, cancer, asthma, blood pressure, anxiety and other (specify)". Of the 854 respondents selecting "other" the most frequently specified condition was described by respondents as "back problem" (n = 109). The remainder (n = 745) are an eclectic mix of medical conditions with frequencies of less than 39 cases each. For the purpose of more meaningful analysis, cases referring to back problem were retained in the data set and the remaining cases in the "other" category were removed. In keeping with the language used by respondents, the term "back problem" is applied throughout this thesis.

4.6.2 Preliminary analyses of specific conditions. In order to test for domain compensation, the PWI means and domain means need to be identified for each medical condition as this assists in interpreting the results.

4.6.2.1 PWI means. PWI differences between medical conditions were explored using a one way ANOVA (n = 2474) (Table 11) where medical condition type was found to contribute 5.9% to the variance in SWB.

Table 11

PWI means for medical condition type

Medical condition	PWI mean	SD	N	Significant differences in PWI means	p
Blood pressure (a)	76.47	12.44	654	> (d), (e), (f), (g), (h), (i)	.01 (Dunnett's C)
Heart problem (b)	73.82	12.88	405	> (g), (i)	$Eta^2 = .059$
Asthma (c)	72.78	11.70	160	> (i)	
Cancer (d)	72.76	12.94	209	< (a), > (i)	
Arthritis (e)	71.61	15.25	385	< (a), > (i)	
Diabetes (f)	70.15	14.11	279	< (a), > (i)	
Back problem (g)	67.47	15.96	109	< (a), (b)	
Anxiety (h)	66.92	18.20	63	< (a)	
Depression (i)	64.93	16.06	210	< (a), (b), (c), (d), (e), (f)	
Total	72.40	14.23	2474		

A comparison of each condition in relation to the normative SWB range is shown in Figure 8.

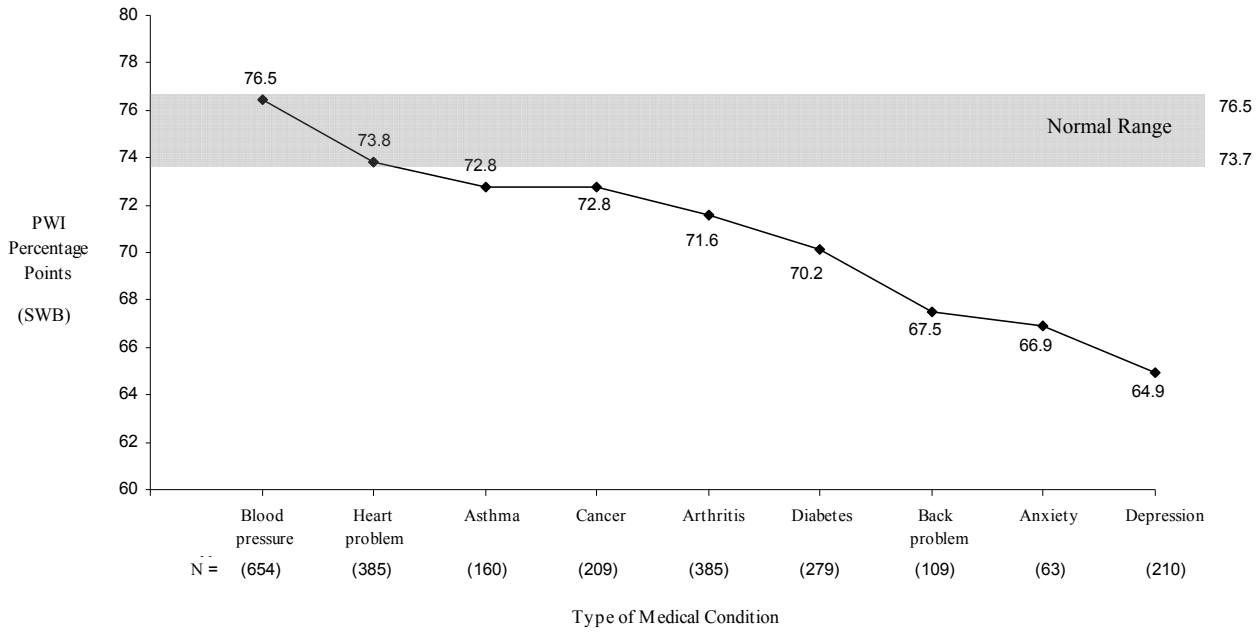
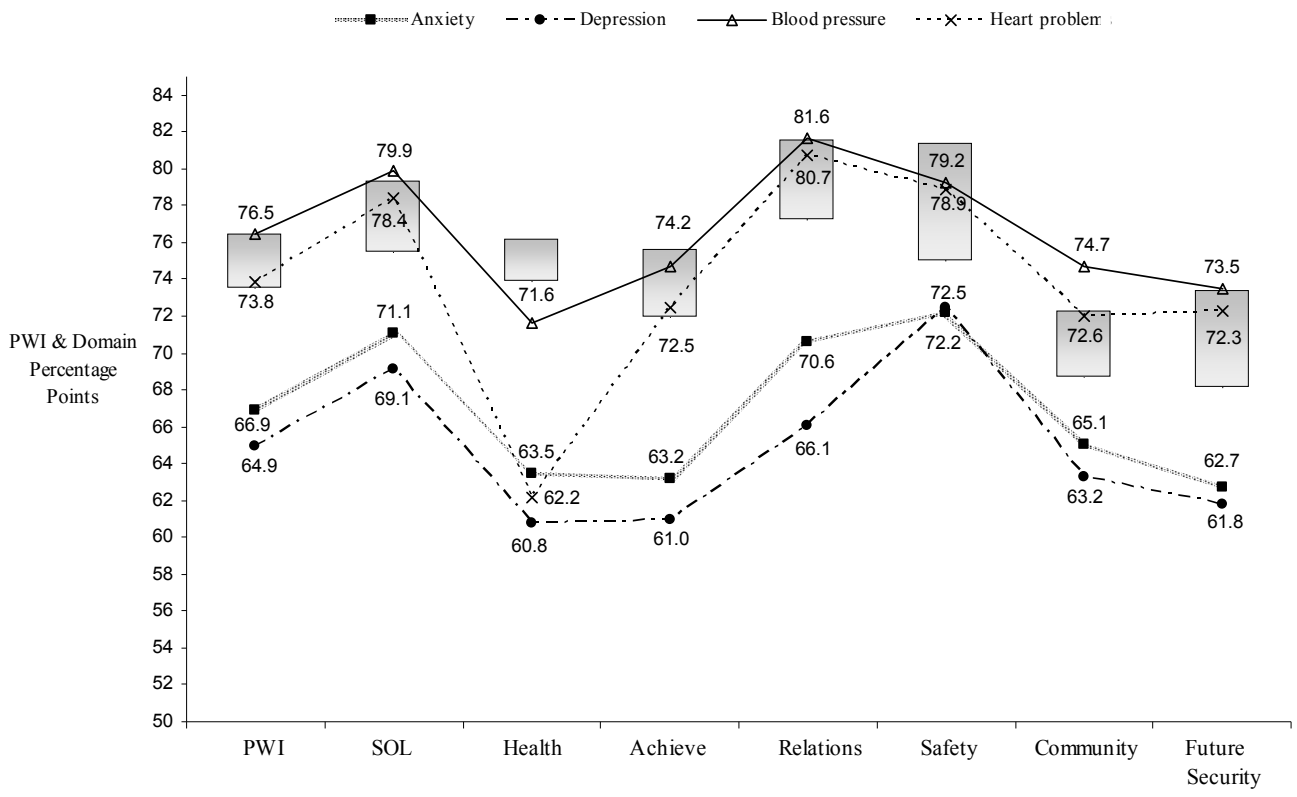


Figure 8. Normative data and PWI means for medical condition type

Blood pressure is of particular interest with the highest mean followed closely by heart problem. However, all other conditions are below the normative SWB range. Greater insight into the SWB of each condition can be obtained by examining the domain means.

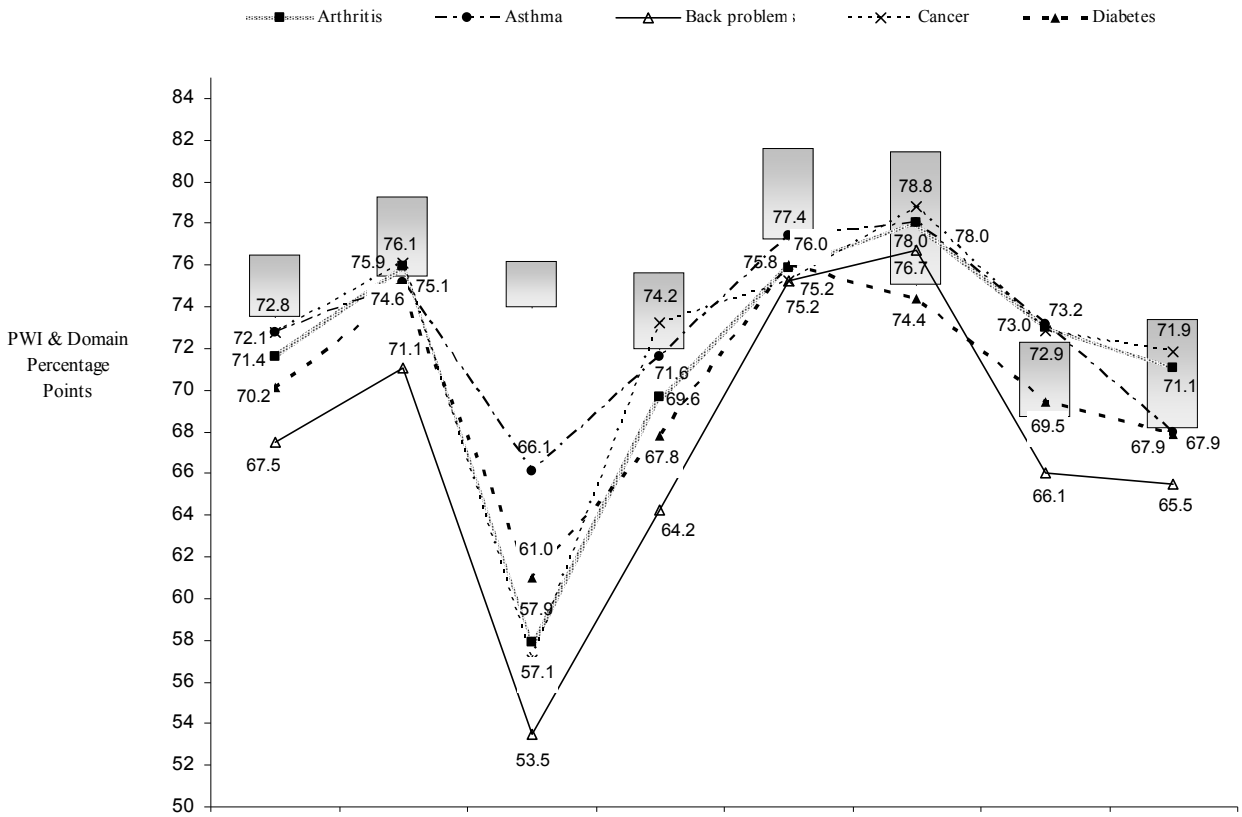
4.6.2.2 Domain means. For ease of interpretation the means for medical conditions with the highest domain satisfaction levels (blood pressure and heart problem) are presented in Figure 9 along with conditions representing the lowest domains scores (anxiety and depression). The PWI means discussed in the previous section are also included here for comparison purposes. Further details of domain satisfaction means and SDs for each condition are available in Appendix A. It should be noted that the normative range for each domain has been obtained from the same cumulative data used to calculate the SWB normative range in Cummins et al. (2009b).



Normative range	76.5	79.4	76.1	75.4	81.5	82.0	72.8	73.4
	73.7	75.5	73.8	71.8	77.1	75.3	68.7	68.2

Figure 9. Domain means for the lowest and highest scoring medical conditions

Domain scores for blood pressure and heart problem are within or above the normal range except for Health (blood pressure 71.6 points; heart problem 60.8 points). At the other extreme, domain scores for depression are below normal levels on all domains with anxiety following a similar pattern. The domain means for the remaining conditions (arthritis, asthma, back problem, cancer, and diabetes), are shown in Figure 10.



	PWI	SOL	Health	Achieve	Relations	Safety	Community	Future Security
Normative range	76.5	79.4	76.1	75.4	81.5	82.0	72.8	73.4
	73.7	75.5	73.8	71.8	77.1	75.3	68.7	68.2

Figure 10. Domain means for arthritis, asthma, back problem, cancer, and diabetes

The domain satisfaction results for the remaining conditions are best reported in conjunction with the PWI means (also shown in Figure 10). Diabetes is below normative levels on all domains except Community Connectedness (69.5 points). Interestingly, this condition does not have the lowest PWI mean. Back problem on the other hand, demonstrates the lowest PWI mean of all the physical conditions, but like diabetes, is below normative levels on all domains except one (Safety, 70.0 points). Conversely, the arthritis group is within or higher than the normal range on four out of the seven domains, but is still below the normal SWB range (71.4 points).

To put these diverse results into their proper context it is important to refer to previous SWB research which has consistently found that when all the domains are

below normal levels, so too is the PWI mean (Cummins, 2010a). This is understandable given that the PWI score used to calculate the means is a composite of the domains. An example of this occurrence is depression (Figure 9), where homeostasis has clearly been defeated and all domains are below their normative range. Of particular interest is the PWI means which are below the normative range for all medical conditions (except blood pressure and heart problems). Despite this, most conditions continue to maintain normal levels of satisfaction on at least some of the domains (with the exception of depression and anxiety).

This may be the result of the psychological homeostatic system attempting to bring SWB back to normal levels, or to prevent it from dropping further through domain compensation processes. As discussed in the literature review earlier, domain compensation acts to offset a loss of satisfaction in one domain with a compensatory increase in satisfaction with other domains in order to maintain SWB within the normative range (Best et al., 2000).

The compensation effect is generally active when SWB is around the threshold of 70 points (Cummins, 2002). This is close to the lower end of the normative SWB range (73.5) and the area in which homeostasis begins to become defeated for people with lower set-points (Cummins, 2010a). At some point, if challenges to SWB continue, domain compensation is likely to lose its effect and homeostatic mechanisms will start to fail. However, the point at which this occurs requires further research.

The PWI means in this study are close to the point at which domain compensation is proposed to be activated (70 points). Therefore it is expected that some conditions will show evidence of this process.

4.6.3 Domain compensation. The method of testing for domain compensation used by Best et al., (2000) involves firstly, converting the domain scores (domain means) for each respondent to a percentage of the total PWI score, thus indicating the relative contribution of each domain. The second step is to compare the groups on these percentages through an analysis of variance (Best et al., 2000). Domain

compensation is proposed to be present in groups where domain mean percentage contributions significantly differ from the general population on one or more domains.

Table 12 presents domain mean percentage contributions to the total PWI score for each medical condition with the total domain contributions in each column equal to 100%, allowing for rounding. The difference between the highest and lowest domain contribution is shown at the bottom of each column as the ‘domain range’. Note that the comparison group representing the normal population (NO MEDCON group) appears in the first column.

Table 12

Domain mean percentage contributions to the PWI x medical condition

PWI domains	Mean % of PWI NO MEDCON group (*n*=2474)	SD	Mean % of PWI Anxiety (*n*=63)	SD	Mean % of PWI Arthritis (*n*=385)	SD	Mean % of PWI Asthma (*n*=160)	SD	Mean % of PWI Back problem (*n*=109)	SD
1. Standard of living	14.70	2.65	15.06	4.60	15.33	3.77	14.70	3.42	15.17	4.38
2. Health	15.02	3.10	13.86	4.78	11.47	4.05	13.00	4.01	11.15	4.51
3. Achieve	13.87	2.81	12.90	4.56	13.84	4.02	14.09	3.39	13.42	5.82
4. Relations	14.82	3.74	14.94	5.28	14.94	5.60	15.13	4.50	15.60	5.29
5. Safety	15.10	3.06	15.57	4.72	15.75	4.15	15.40	4.07	16.92	6.03
6. Community	13.16	3.21	14.62	7.16	14.52	3.76	14.40	3.43	14.31	5.80
7. Security	13.34	2.88	13.06	4.82	14.15	3.68	13.29	3.49	13.43	4.01
Domain range	1.94		2.51		4.28		2.40		5.77	
PWI domains	Mean % of PWI Blood pressure (*n*=654)	SD	Mean % of PWI Cancer (*n*=209)	SD	Mean % of PWI Depresn (*n*=210)	SD	Mean % of PWI Diabetes (*n*=279)	SD	Mean % of PWI Heart problem (*n*=405)	SD
1. Standard of living	14.98	2.49	15.02	3.30	15.12	4.42	15.24	3.35	15.24	3.11
2. Health	13.44	2.98	11.22	4.39	13.57	5.73	12.39	3.83	12.00	3.97
3. Achieve	13.91	3.10	14.33	3.19	13.51	7.55	13.52	4.06	13.74	3.34
4. Relations	15.16	3.75	15.51	4.66	14.37	6.93	15.61	5.47	15.55	4.44
5. Safety	14.85	3.29	15.53	3.46	16.30	5.66	15.22	4.33	15.48	3.89
6. Community	14.02	3.16	14.38	3.71	13.91	5.15	14.34	4.57	14.03	3.19
7. Security	13.64	2.96	14.01	3.15	13.22	4.58	13.68	3.80	14.00	3.33
Domain range	1.72		4.31		3.08		3.22		3.55	

For the NO MEDCON group, there is very little variation in the domain percentages and this represents the expected result for a normal population (Best et al.,

2000). In contrast, back problem represents the largest range of domain contributions (5.8%) followed by cancer (4.3%), and arthritis (4.3%).

A subsequent multivariate analysis of variance (MANOVA) comparing the domain percentage contributions to the PWI for each medical condition revealed a significant multivariate main effect $F(54, 54701) = 26.11$, $p = .000$, Wilk's Lambda = .88, partial $Eta^2 = .021$. Table 13 provides a summary of significant results. This includes domain specific details of significant differences (test of between subjects effects) between the medical conditions and the normal population (NO MEDCON group), as shown in the final column.

Interpretation of the table should focus on the "Mean difference" column which indicates the extent to which each medical condition differs significantly from the NO MEDCON group.

Table 13

MANOVA for domain mean percentage contributions x medical conditions

Domain	Medical condition	Mean % of PWI	SD	N	Mean difference to NO MEDCON	Domain univariate effects
Standard of living	Arthritis	15.33	3.77	385	0.62	F (9,10730) = 5.46, p = .000, Eta^2 = .005
	Heart Problem	15.24	3.11	405	0.54	
Health	Back problem	11.15	4.51	109	-3.87	F (9,10730) = 142.71, p = .000, Eta^2 = .107
	Cancer	11.22	4.39	209	-3.80	
	Arthritis	11.47	4.05	385	-3.55	
	Heart problem	12.00	3.97	405	-3.02	
	Diabetes	12.39	3.83	279	-2.63	
	Asthma	13.00	4.01	160	-2.03	
	Blood pressure	13.44	2.98	654	-1.59	
	Depression	13.57	5.73	210	-1.45	
Achievements	No significant differences between conditions and the NO MEDCON group					
Personal relationships	Heart problem	15.55	4.44	405	0.74	F (9,10730) = 4.18, p = .000, Eta^2 = .003
Safety	No significant differences between conditions and the NO MEDCON group					
Community connectedness	Arthritis	14.52	3.76	385	1.37	F (9,10730) = 21.40, p = .000, Eta^2 = .018
	Asthma	14.40	3.43	160	1.24	
	Cancer	14.38	3.71	209	1.22	
	Diabetes	14.34	4.57	279	1.18	
	Heart problem	14.03	3.19	405	0.87	
	Blood pressure	14.02	3.16	654	0.86	
Future security	Arthritis	14.15	3.68	385	0.81	F (9,10730) = 6.25, p = .000, Eta^2 = .005
	Heart problem	14.00	3.33	405	0.62	

Of most interest are the directions of difference. It can be seen that all medical conditions (except anxiety) show a smaller contribution to the PWI for Health than the normal population (NO MEDCON group). However, this is compensated, to varying degrees, by other domains. Most conditions make their highest contribution to SWB of around 14%, through Community Connectedness. Heart problem and arthritis are also supported by several other compensatory domains.

The exceptions to this are back problem, anxiety, and depression where there are no significant compensatory effects to offset the low PWI contribution made by Health. The lack of domain compensation for depression is understandable as this condition is representative of homeostatic defeat. In this case, satisfaction with all domains is expected to be low and therefore no compensatory domain is available. The result for anxiety is also to be expected as all domains were below normative levels (see Figure 9). Back problem on the other hand, represents the only remaining condition where low Health satisfaction is not offset by compensatory domains. This suggests that, of all the physical conditions, the back problem group is most at risk of homeostatic defeat due to the absence of this compensatory process.

In summary, Hypothesis 2, that the challenges imposed by specific medical conditions engages domain compensation, was found to apply for all conditions except back problem, anxiety, and depression. It is possible that the influence of pain may be contributing to the lack of domain compensation for the back problem group. Hence, the relationship between SWB and pain intensity as reported by this group was investigated further.

4.6.4 Back problem challenges to SWB. In order to obtain a more informed perspective of the back problem group, an ANOVA compared the pain intensity for all medical conditions examined in this study (see Table 14). In this analysis, homogeneity of variance could not be assumed therefore, Dunnett's C (<.01) was used.

Table 14

Differences in pain intensity between medical conditions

Medical condition	Pain mean	SD	N	Significant differences in pain means	p
Back problem (a)	65.78	20.01	109	> (c), (d), (e), (f), (g), (h), (i)	.01 (Dunnett's C)
Arthritis (b)	57.87	23.90	381	> (c), (d), (e), (f), (g), (h), (i)	$Eta^2 = .174$
Depression (c)	32.49	28.85	209	< (a), (b)	
Anxiety (d)	31.11	27.89	63	< (a), (b)	
Cancer (e)	30.87	27.49	208	< (a), (b)	
Heart problem (f)	30.57	28.18	402	< (a), (b)	
Asthma (g)	30.31	27.77	159	< (a), (b)	
Diabetes (h)	30.25	28.90	277	< (a), (b)	
Blood pressure (i)	26.18	27.15	652	< (a), (b)	
Total	35.35	29.67	2460		

As expected, the back problem group has the highest pain intensity rating (65.8), followed by arthritis almost 8 points lower. This suggests that pain may have a greater impact on SWB for back problem than other conditions. The effect size for medical conditions indicates a relatively high contribution to pain intensity at 17.4%.

When the PWI means at various levels of pain intensity were subsequently observed for the back problem group only, a contribution to SWB of 15% is also observed (see Table 15). As homogeneity of variance was assumed for this ANOVA (Levene's $p = .085$), Tukey's HSD was used for post hoc testing. Furthermore, the lower levels of pain intensity were combined to create a 0-40 point category and a 90-100 points category due to small cell sizes in the data.

Table 15

PWI means for pain intensity (BP group only)

Pain Intensity	PWI mean	SD	N	Significant differences in PWI means	p
0-40 (a)	68.57	10.82	14		.05 (Tukey's HSD)
50 (b)	72.00	13.40	15	> (f)	$Eta^2 = .150$
60 (c)	71.95	9.21	19	> (f)	
70 (d)	62.05	17.61	16		
80 (e)	71.67	14.71	29	> (f)	
90-100 (f)	54.49	22.47	14	< (b), (c), (e)	
Total	67.68	15.93	107		

Increasing pain is generally in line with decreases in SWB, except at a pain intensity of 0-40 points and 70 points. At both these levels, there is no significant difference. The pattern of pain intensity in relation to the normative SWB range can be seen in Figure 11.

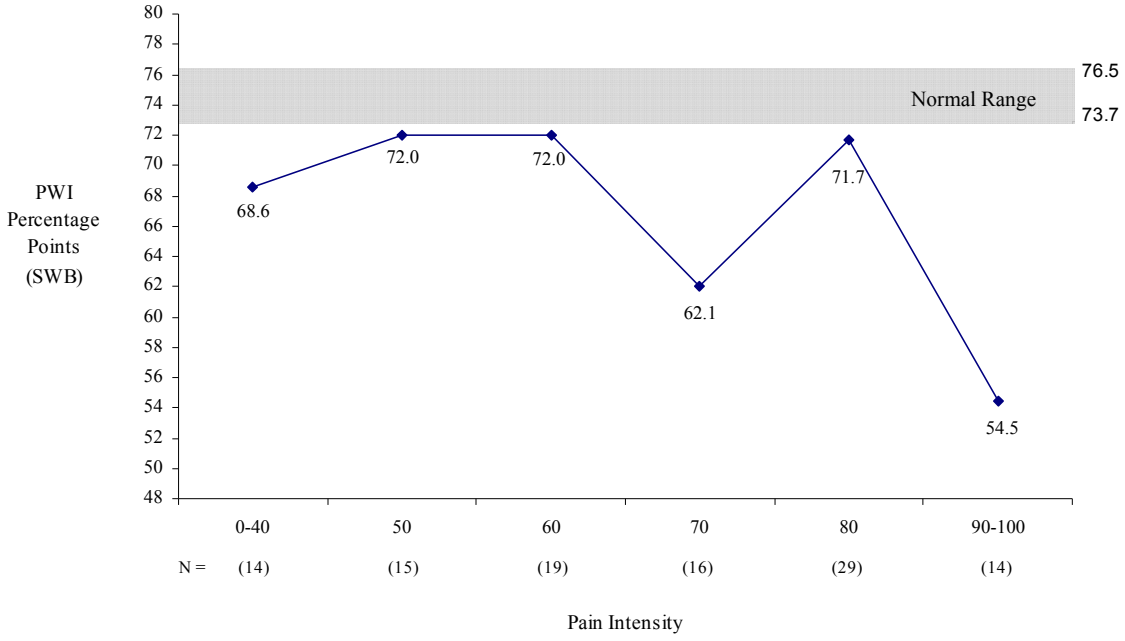


Figure 11. PWI means for pain intensity (BP group only)

With the exception of the non significant results at 40 points and 70 points of pain, increasing levels of pain fail to breach the homeostatic threshold of about 70 points (Cummins, 2002, 2003, 2010a), until pain intensity reaches 90-100 points. Here there is a dramatic drop in SWB to chronically low levels (54.5).

It is also important to observe the significance between levels of pain intensity. As Table 15 shows, differences between levels of pain are only significant (<.05) between 90-100 points and 50, 60, and 80 points. This could be due to small cell sizes, and the results should therefore be treated with caution. A larger sample of people with a back problem is examined again in relation to pain intensity in Study 3.

The additional challenges of older age and limited income were also investigated for the back problem group due to associations with SWB in the literature. While no differences were found for age, the results for income are notable as they contrast with previous research where a gross household income of more than $30,000 (approximately) is required before SWB reaches the lower end of the normative range (Cummins et al., 2009b). In the case of the back problem group however, more than $90,000 is required to reach the same point, as shown in Figure 12.

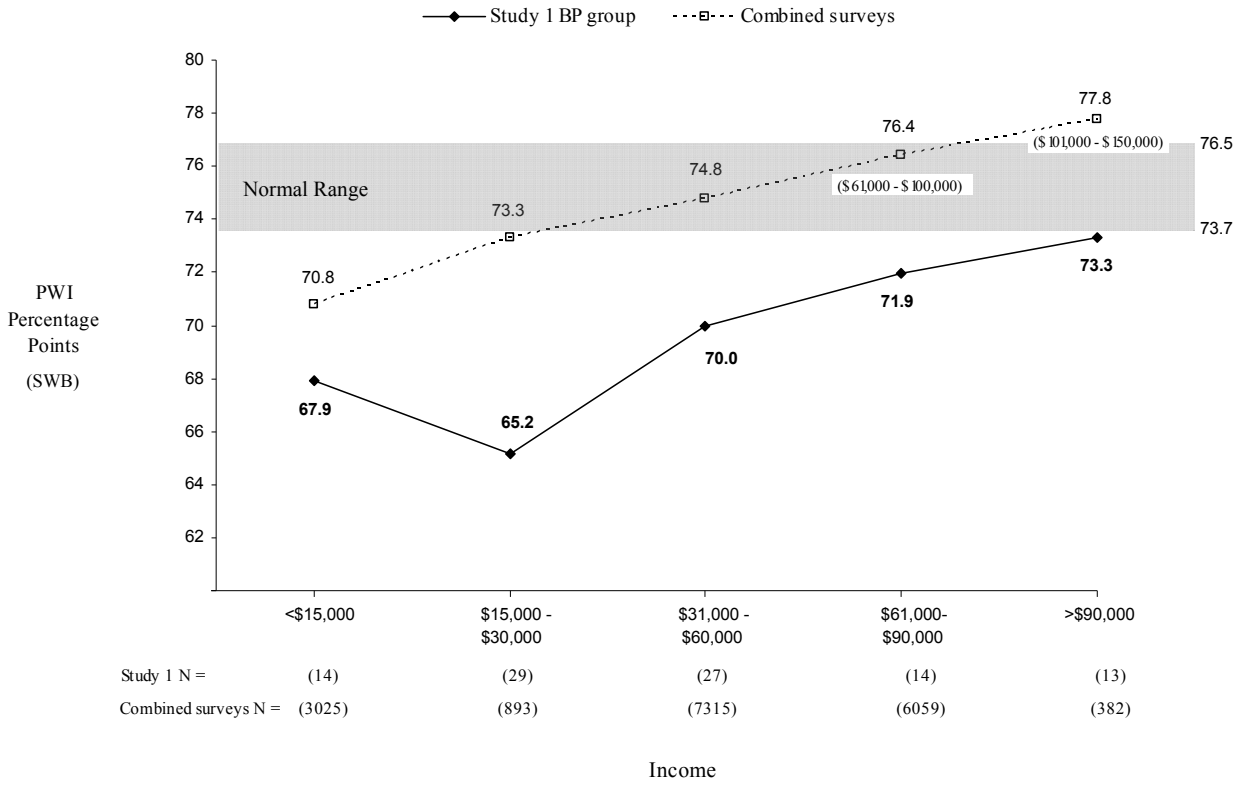


Figure 12. PWI means for income (BP group and combined survey data)

The combined survey data referred to in Figure 12 are the cumulative results from 22 surveys (Cummins et al., 2009b) which are part of the ongoing Australian Unity Wellbeing Index study of the Australian population referred to earlier. In recent years, the categories at higher levels of income have changed. As indicated in Figure 12, the highest pain level for the BP group, is represented by >$90,000, whereas the highest level for the combined surveys is $101,000-$150,000 (see parenthesis). Nevertheless, the income level at which each set of data reaches the bottom of the normal range is clearly evident.

It is concluded that the BP group requires a much higher income to maintain normal levels of SWB. However, the reasons for this are unclear. A further analysis of the relationship between income and SWB for people with a back problem is undertaken in Study 3.

4.7 Study 1 Discussion

Study 1 investigated whether SWB is decreased in the presence of a medical condition, and whether specific conditions engage domain compensation.

4.7.1 Reduced SWB and medical conditions (Hypothesis 1). As expected, there were significant reductions in SWB for the medical condition (MC) group which is consistent with a large literature that associates lower SWB with various medical conditions (Emerson et al., 2009; Kempen et al., 1997; Lucas 2007; Mehnert et al., 1990). In addition, and consistent with homeostasis theory, an increased within-group variance is indicative of low SWB. That is, when homeostasis is challenged, the group variance expands to include lower SWB values, indicating that a higher than normal proportion of people in this group are likely to be homeostatically defeated.

Other influences enhancing the probability of homeostatic defeat are various demographic factors including low income (Cummins, 2000b; Myers & Diener, 1995), and gender (male) (Cummins et al., 2003; Noel-Hoeksema & Rusting, 1999). Research on SWB and advancing age on the other hand, has shown mixed results. Some studies report reduced SWB in older age (Bradburn & Caplovitz, 1965; Ryff, 1989; Shmotkin, 1990; Wilson, 1976), while others report increases in SWB for older samples (Argyle, 1991; Cummins et al., 2006a). Therefore, to identify the effects of these factors on the Study 1 results, a one way, between groups ANCOVA was conducted. Pain intensity was also included as a covariate due to its association with negative mood and depression for people with a medical condition (McCracken et al., 2007; Sarda et al., 2008).

This analysis found that the covariates together had a significant but very small influence on the relationship between SWB and medical condition. While this minor influence of the demographic variables is consistent with other literature (see Diener et al., 1999 for a review), the minor impact of pain as a covariate was not expected.

This lack of effect may have been due to the use of combined data from the MC and NMC groups in the ANCOVA. Although both groups had reported pain, the pattern of pain intensity differed between them. For example, 83% of the NMC group reported low levels of pain and only 16% reported pain at high levels. In contrast, a larger proportion of the MC group (36%) reported high levels of pain. It is possible that the disproportionate levels of pain intensity in the combined data may have skewed the results so that the effect of pain on relationships between SWB and medical condition was minimised.

In order to obtain a more refined analysis of the relationship between pain and SWB, the data were divided into the pain x medical condition categories identified earlier as Pain MEDCON, Pain NO MEDCON, No Pain MEDCON, and No Pain NO MEDCON. In this comparison, only the Pain MEDCON group was below the normal SWB range while also possessing the largest variance. On that basis, it can be inferred that the presence of pain and a medical condition in combination are a potential threat to homeostasis. There is a substantial literature which also attests to the contribution of these two factors in conditions associated with low SWB such as depression (e.g., Kempen et al., 1997; Pincus et al., 2002). The extent to which homeostasis was able to protect SWB through domain compensation was subsequently examined in Hypothesis 2.

4.7.2 Domain compensation and specific conditions (Hypothesis 2). As part of the preliminary investigations into domain compensation, the PWI means for each condition (arthritis, heart problem, diabetes, cancer, asthma, blood pressure, back problem, anxiety, and depression) were compared. Blood pressure and heart problem were within the normal SWB range suggesting that the symptoms of these conditions are less worrying to respondents and consequently, less likely to be reflected in low SWB (Borg et al., 2008; Cummins, Lau et al., 2004). The remaining conditions however, were below the normal SWB range, with back problem representing the lowest of all physical conditions.

In terms of the PWI domains, Health was the only domain below normal levels for all conditions. This is consistent with SWB research in Algeria where respondents with a self-reported health problem were also found to have significantly lower satisfaction with this domain than a normal population (Tiliouine, 2009). However, as discussed earlier, low health satisfaction does not necessarily translate into lower SWB as homeostatic processes may intervene (Cummins, Lau et al., 2004). Thus, the results of this study conform to homeostatic theory (Cummins, 1995, 1998; 2010a) as the SWB of most conditions was being held just below the threshold of 70 points at which homeostasis is still attempting to maintain control.

When domain compensation was examined, all conditions except depression, anxiety and back problem reflected significant increases in satisfaction with Community Connectedness to offset low satisfaction with Health. For depression, there was no opportunity for any domain to act in a compensatory way as they were all below the normal range, as also occurred for anxiety.

For the back problem group, it is possible that the PWI mean score of 67.5 points was too far below the normal range to activate domain compensation. These results are not surprising as chronic back pain is often associated with characteristics of low SWB such as depressed mood (e.g., Cohen et al., 2009; Crisson & Keefe, 1988; Henschke et al., 2009; Pincus et al., 2002). The results are also in keeping with a similar comparison of various conditions by Kempen et al., (1997), where pain intensity was higher for the back problem group than all other conditions examined.

To further understand these results, a closer examination of pain intensity, age and income was undertaken for the BP group. Firstly, for pain, the PWI means for each level of pain intensity were compared to the SWB normative range. Generally, increasing levels of pain did not breach the SWB homeostatic threshold of 70 points (Cummins, 2002, 2003, 2010a) until pain was 90-100 points. At this level, SWB fell dramatically below the normal range to 54.5 points. It is possible therefore, that people with a back problem who also experienced severe pain may be in homeostatic defeat and potentially, suffering from depression. This conclusion is based on previous

research where 59 points represents the emergence of depression for less resilient people (Cummins, 2005, 2010a; Cummins et al., 2007b).

Finally, the potential challenges of older age and limited income were investigated. While age was not significant, the results for income were particularly notable as the BP group did not reach the bottom of the SWB normative range until income was at least $90,000. This is in contrast to a normal population where SWB is within the normal range at $30,000 (Cummins et al, 2009b), thus providing an example of income as a protective resource. Income will be examined again in Study 3, along with pain and other factors associated with the presence of a back problem.

4.8 Study 1 Conclusion

The results of Study 1 are in keeping with the prevailing literature, where the presence of a medical condition and pain are generally associated with low SWB. These data also confirm that having a back problem can be a particularly troublesome condition, presenting the lowest SWB of all physical conditions examined.

The results provide support for the Theory of SWB Homeostasis in which homeostatic mechanisms are proposed to restrain the fall of SWB under challenging conditions, thereby attempting to prevent it from dropping further. In this study, the threshold at which homeostatic defence fails appears to be around 70 points, confirming previous estimations (Cummins, 2002, 2003, 2010a). Thus, the homeostatic process of domain compensation was found to be operating at or above this threshold, but not at 67.5 points (back problem group only). This further suggests that the process of domain compensation is sensitive to levels of SWB. For people with a back problem, the lack of domain compensation and SWB below the homeostatic threshold, presents a high risk of homeostatic defeat. In some cases, such as for people with intense pain, this may have already occurred.

Further research is undertaken in Study 3 to gain additional insight into the relationship between SWB and back problem. It also investigates the influence of perceived control as this construct is intimately associated with SWB (Peterson, 1999; Rothbaum et al., 1982), and also with medical conditions (Lachman & Weaver, 1998; Lefebvre et al., 1999; Thompson & Spacapan, 1991). Beforehand however, Study 2 was conducted to determine whether various control variables that have been previously used in SWB research are suitable for use in Study 3.

Chapter 5: Study 2 - SWB and Control

Study 1 explored the relationship between medical status and SWB and found that respondents with a medical condition had a lower SWB than those without a medical condition, particularly where pain is also present. A subsequent examination of nine medical conditions found that the lowest SWB overall could be attributed to respondents with a back problem. The final study in this thesis (Study 3) involves a closer examination of this condition and the factors involved in the maintenance of SWB. This will include an investigation of relationships between SWB, health satisfaction, perceived control, and back problems using primary data.

Before reporting these data, Study 2 examines the relationship between control and SWB of a general population sample using an existing data set in which medical condition is unspecified. These analyses help to guide the research design for the final study by identifying appropriate control variables for later use. Study 2 contains only one hypothesis; that SWB is decreased in the presence of low perceived control.

5.1 Method

The control variables used to generate these data are a reduced version of the Primary and Secondary Control Scale (PCSC) (Heeps, 2000). Over the course of fourteen surveys, the original list of items has been reduced to nine items representing three control components; Primary Control (PC), Secondary Control (SC) and Relinquished Control (RC). Data were generated in response to the statement “How much do you agree that when something bad happens...”, respondents use a 0-10 point scale where 0 = strongly disagree and 10 = strongly agree. A list of control items in the scale is contained in Appendix B.

Additional control variables that were not part of the PCSC scale, but are theoretically relevant to this study were examined separately. These include Acceptance (see Esteve, et al., 2007; McCracken et al., 2007) and Domain Control

(see Thompson & Spacapan, 1991). For Acceptance, items were worded as "When you think about the following areas of your life, how much do you accept the things about the area that you cannot change?" in which respondents were asked to rate their agreement on 0-10 point scale for each of the seven PWI domains. For Domain Control, items were worded as "Thinking about your own life and personal circumstances, how much control do you feel you have over [PWI domains]." While the Acceptance and Domain Control items are not part of a formal scale, their inclusion in the analyses maximises opportunities to find the most valid and reliable control items for use in Study 3, and broadens the range of available information on perceptions of control.

The dependent variable for this study is the PWI mean, as in Study 1. As before, this data does not include the religion/spirituality life domain as it was added to the PWI after most of the data in this study had already been collected. Additionally, the term "control" is used in this thesis to refer to perceptions of control rather than an individual's attempt to exercise control over their behaviour (see literature review for details).

After examining frequency distributions for normality, removing extreme and missing values, and preparing the data for use in parametric tests, factor analysis and reliability analysis were conducted on the perceived control variables. One way, between groups Analyses of Variance (ANOVA) was subsequently used to address the single hypothesis in this study.

5.2 Data Collection

Existing data from 14 separate longitudinal surveys in the School of Psychology, Deakin University, were selected for this study as they contain appropriate variables with a sufficiently large sample size (n = 7553) to investigate potential perceived control variables for use in Study 3. The wording and scaling of items have been consistent throughout the surveys. However, data from one of the

studies (Survey 13, *n* = 1171) were excluded from the combined data as it does not include the Relinquished Control variable. Instead, the data contains additional control variables (referred to in this study as Acceptance and Domain Control) which may be suitable for use in Study 3. Therefore, Survey 13 is examined separately.

5.3 Data Preparation

All subjective variables in this study have been converted to Percentage of Scale Maximum scores (%SM) to provide a common unit of analysis using the same method as outlined in Study 1.

5.4 Descriptive Statistics (Data Distribution)

All variables were found to meet linearity assumptions while distributions showed a slightly non-normal distribution for the PWI mean and life satisfaction variables (skewness < -1.27). This is consistent with the results of Study 1 and with SWB data generally (Cummins, 1995, 1996, 2000a). The independent variables also mildly deviate from zero (skewness <$\pm$ 1.38).

The smallest cell size is for Standard of Living (SOL) with 15 cases at the 0.00 points level, thus meeting minimum requirements for techniques such as multiple regression where at least 10 cases per cell are required (Babyak, 2004; Peduzzi et al., 1996; Wilson VanHooris & Morgan, 2007).

As in Study 1, all missing cases for the total PWI score and life satisfaction domains were deleted. A total of 50 univariate outliers where the PWI mean was at the maximum value of 100 were deleted. There were no multivariate outliers above the maximum critical value obtained by Mahalanobis distance.

5.5 Hypothesis 1: That SWB is decreased in the presence of low control

Before addressing this hypothesis directly, factor analyses and reliability tests were conducted to determine the strength and reliability of the various control variables.

5.5.1 Factor analysis (Primary, Secondary, and Relinquished Control).

There are two main methods of identifying factors for further use in data analysis; principal components analysis (PCA) and factor analysis (FA). The difference between the two techniques is the way in which variance is measured. PCA examines all variability in an item whereas FA is more mathematically rigorous as it attempts to estimate and eliminate variance caused by error (Tabachnick & Fidell, 2007).

Another consideration is the type of factor rotation method. Rotation creates a more interpretable factor solution without changing its underlying mathematical properties (Tabachnick & Fidell, 2007). The two broad categories of rotation are orthogonal and oblique. Orthogonal rotation (e.g., Varimax) attempts to minimise the number of variables that have high loadings on each factor (Pallant, 2007). Oblique rotation (e.g., Direct Oblimin) provides details on correlations between factors, but is more difficult to interpret (Tabachnick & Fidell, 2007).

The choice between PCA and FA depends on the purpose of the research. If a theoretical solution is required which is not obscured by unique and error variability, and there is also an expectation that underlying constructs will produce scores on the observed variables, FA is the best choice (Tabachnick & Fidell, 2007). Based on the literature and previous studies (e.g., Heeps, 2000), it is expected that a two factor solution involving Primary and Secondary Control is likely to emerge. Therefore, FA may be an appropriate choice for this study.

However, as some methods of extraction and rotation can be more difficult to interpret than others (Pallant, 2007; Tabachnick & Fidell, 2007), this study initially uses four combinations of factor analysis; PCA with oblique (Direct Oblimin)

rotation, PCA with orthogonal (Varimax) rotation, FA with oblique (Direct Oblimin) rotation; and FA with orthogonal (Varimax) rotation. Results which represent the clearest and easiest to interpret are subsequently reported here, as suggested by Pallant (2007). In most analyses, this was FA using the principal axis factoring option in SPSS with Varimax rotation, unless stated otherwise.

The initial extraction produced three factors with eigenvalues >1. There are several methods for determining the number of factors to retain, but the eigenvalues >1 rule is the most widely applied by researchers (Slocum-Gori & Zumbo, 2011).

The correlation matrix identified suitable correlations of >.3 between all variables and at least one other item with the exception of Relinquished Control Items 1 and 2 where the highest correlation was -.296 and .219 respectively. Loadings that are >.4 are shown in the rotated factor matrix at Table 16. According to Tabachnick & Fidell (2007), the greater the loading, the more the variable is a pure measure of the factor. Relinquished Control Item 2 is the only item that loads at low levels (<.4).

Table 16

Initial rotated factor solution for Primary, Secondary, and Relinquished Control

	Factor		
	1	2	3
Secondary Control Item 1	.797		
Secondary Control Item 3	.775		
Secondary Control Item 2	.766		
Primary Control Item 3	.654		
Primary Control Item 2	.617	.425	
Primary Control Item 1		.593	
Relinquished Control Item 3		.551	
Relinquished Control Item 1			.506
Relinquished Control Item 2			(.308)

Factor 1 contains a combination of items representing both Primary Control and Secondary Control. Factor 2 is also a combination of items from Primary Control as well as Relinquished Control. Factor 3 contains Relinquished Control items only.

The complex Primary Control Item 2 was removed in a second iteration to create a simpler factor structure, as shown in Table 17.

Table 17

Second iteration factor solution for Primary, Secondary, and Relinquished Control

	Factor		
	1 (α = .850)	2 (α = .523)	3 (α = .352)
Secondary Control Item 1	.810		
Secondary Control Item 3	.780		
Secondary Control Item 2	.708		
Primary Control Item 3	.642		
Primary Control Item 1		.613	
Relinquished Control Item 3		.567	
Relinquished Control Item 1			.647
Relinquished Control Item 2			(.358)
KMO	.809		
Bartlett's Test	.000		
F1 variance	29.95%		
F2 variance	10.15%		
F3 variance	7.6%		
Total variance	47.71%		

As Table 17 shows, Factors 2 and 3 have only two items loading on each factor. Despite this, Factor 2 may be worth considering further given the reasonable size of the loadings. Factors that include just one variable that loads highly, are poorly defined (Tabachnick & Fidell, 2007). However, if two variables load on a factor, reliability depends on the strength of correlations between them. While larger samples tend to produce smaller correlations (Tabachnick & Fidell, 2007), as may be the case with these data (n = 7553), additional tests involving correlations between pairs of variables can be used to offset this problem. This is achieved in SPSS by observing the Kaiser Myer Olkin Test of Sampling Adequacy (KMO test). Where the KMO test is >.6, the sample is considered to be adequate for factor analysis (Tabachnick & Fidell, 2007). For the solution in Table 17, the KMO test is .809. Moreover, the null hypothesis for Bartlett's Test of Sphericity, that the variables are uncorrelated, was rejected $\chi 2_{(28)} = 16044.65$, (p=.000). This initially indicates that the two factors could be retained.

An additional approach when only one or two variables are present in a factor is to consider the variance accounted for. Where this is low, factors with only one or two variables should be discarded (Tabachnick & Fidell, 2007). After rotation, Factor 1 accounts for 29.95% of the variance, Factor 2 is 10.15% of the variance, and Factor 3 contributes only 7.61% of the variance. Therefore, Factor 2 and Factor 3 appear as the least suitable for further use. This is confirmed via reliability tests using Chronbach's alpha. For Factor 1, internal consistency was high (α = .850) thus meeting the minimum requirement of .7 (Pallant, 2007). Factor 2 on the other hand, was low (α = .523), and Factor 3 was very low (α = .352).

From the analysis presented so far, the Relinquished Control items in particular are not useful measures of control. This is consistent with Heeps (2000) where a two factor solution for Primary Control and Secondary Control was found. To test this in relation to the data set under examination (n = 7553), a separate factor analysis was conducted in which only the Primary Control and Secondary Control

items were examined. The frequency distribution of each item in the Primary Control and Secondary Control factors are included in Appendix C.

Using all four methods of factor analysis described earlier, a single factor emerged with a slightly higher total variance of 51.49% and an internal consistency of .843 (Chronbach's alpha). Table 18 presents the more conservative and rigorous FA solution (principal axis factoring) with Varimax rotation. In this solution, the KMO and Bartlett's Test results are also acceptable (>.6 and <.000 respectively).

Table 18

Final factor solution for Primary and Secondary Control (combined data)

	Factor
	1 (α = .843)
Secondary Control Item 1	.791
Primary Control Item 2	.779
Primary Control Item 3	.777
Secondary Control Item 2	.739
Secondary Control Item 3	.728
Primary Control Item 1	.419
KMO	.831
Bartlett's Test	.000
Total variance	51.49%

The pooling of various samples, such as the combined data used here, is useful to increase sample size but there are some disadvantages. For example, samples that are different with respect to some criteria such as age or socioeconomic status may also result in differences in factor characteristics (Tabachnick and Fidell,

2007). Given that the data examined in this study are from a combined series of 14 surveys undertaken over several years and potentially with slightly different purposes, it was considered prudent to undertake factor analyses on individual survey samples. As expected, a different arrangement of control items emerged, depending on the survey concerned. Surveys 1, 2, 3, and 14 each provided a two factor solution while the remainder resulted in single factors. The results for the two factor solutions are shown in Table 19, along with the internal consistency (Chronbach's alpha) in parenthesis.

Table 19

Primary and Secondary Control solutions (individual data sets)

	Survey 1 (n = 499)		Survey 2 (n = 451)		Survey 3 (n = 597)		Survey 14 (n = 1272)	
	Component >.4		Component >.4		Factor >.4		Factor >.4	
	1	2	1	2	1	2	1	2
	(α = .824)	(α = .596)	(α = .704)	(α = .547)	(α = .770)	(α = .648)	(α = .800)	(α = .643)
SC 1	.854		SC 3 .814		SC 3 .784		SC 3 .749	
SC 3	.850		SC 1 .746		SC 1 .681		SC 1 .737	
SC 2	.800		SC 2 .739		SC 2 .599		SC 2 .655	
PC 2		.817	PC 2	.775	PC 2	.950	PC 2	.967
PC 3	(.423)	.719	PC 1	.742	PC 3	.632	PC 3	.639
PC 1		.674	PC 3 (.419)	.617	PC 1	(.360)	PC 1	(.341)
KMO		.756		.721		.767		.779
Bartlett's Test		.000		.000		.000		.000
F1 variance		39.84%		34.53%		27.31%		28.61%
F2 variance		28.77%		26.40%		27.30%		27.80%
Total variance		68.61%		60.94%		54.61%		56.41%

In all four solutions, Secondary Control provides reasonably high loadings (>.5) on the three items with good internal consistency (>.70) (Pallant, 2007). The reliability of Primary Control items is not within acceptable limits, and they are also subject to cross loadings (shown in parenthesis) on PC 3 in the case of Survey 1 and Survey 2, and PC 1 in Survey 3 and Survey 14.

In conclusion, there may be some utility in retaining the three Secondary Control items for further analysis and dispensing with the Primary Control items altogether. Alternatively, it may be more appropriate to combine both Primary and Secondary Control into a single variable called Perceived Control for use in Study 3. However, before making a decision on these two alternatives, further information was obtained on the various control variables in the Survey 13 data.

5.5.2 Factor analysis (Primary and Secondary Control) (Survey 13). As mentioned earlier, Survey 13 (n =1171) contains additional control-related questions that may reveal potential control variables for use in Study 3, while also providing further insight into relationships between control and SWB. Before exploring these, a preliminary factor analysis was conducted to determine whether the Primary and Secondary Control factors identified in the previous analysis also behave in the same way with the Survey 13 data.

An initial factor analysis revealed a single factor solution containing all six items for Primary and Secondary Control. However, on closer examination of the eigenvalues, the potential for an additional factor was identified through the second eigenvalue of .982. Given the small margin of .008 below the required minimum eigenvalue of 1, and previous theoretical support for a two factor solution in the literature (Heeps, 2000), a second iteration of the factor analysis was conducted where the eigenvalue minimum was set to .98 instead of 1, as shown in Table 20.

Table 20

Two factor solution with eigenvalues >.98 (Survey 13)

	Survey 13 (*n* = 1171) Factor >.4	
	1	2
	(α = .794)	(α = .666)
SC 1	.717	(.383)
SC 2	.701	
SC 3	.689	
PC 2		.972
PC 3	(.340)	.660
PC 1		(.349)
KMO		.789
Bartlett's Test		.000
F1 variance		29.13%
F2 variance		27.95%
Total variance		57.08%

In this case, Primary Control and Secondary Control load as two separate factors with some cross loadings still evident. Primary Control Item 1 (PC 1) continues to present with the lowest loading. Once again, the internal consistency (Chronbach's alpha) is higher for Secondary Control, while Primary Control is still just under acceptable levels (.67). However, if PC 1 is removed during the reliability analysis, the internal consistency increases to .836 (Chronbach's alpha). The problems with PC 1 are further explored in the discussion section later. In the meantime, the additional control-related items contained in this data set will now be examined for other potential control factors.

5.5.3 Factor analysis (Acceptance and Domain Control) (Survey 13).

Survey 13 provided two additional control constructs; perceptions of control over life domains which appears similar in nature to Primary Control, and acceptance of limited control over life domains which could equate to a form of Secondary Control. The control over life domain items were worded as "Thinking about your own life and personal circumstances, how much control do you feel you have over…", in which respondents were asked to rate their agreement on 0-10 point scale for each of the seven PWI domains. The acceptance of limited control items asked, "When you think about the following areas of your life, how much do you accept the things about the area that you cannot change?" To avoid confusion with the variables examined previously as Primary Control and Secondary Control, these two control questions will be referred to as Domain Control and Acceptance respectively.

A factor analysis of both variables resulted in a two factor solution. Factor 1 (Acceptance) loadings were all >.78, and for Factor 2 (Domain Control), loadings ranged between .56 and .78, as shown in Table 21.

Table 21

Rotated factor solution for Acceptance and Domain Control

	Factor	
	1 Acceptance (α = .943)	2 Domain Control (α = .874)
Acceptance Achievements	.874	
Acceptance Relations	.844	
Acceptance Safety	.844	
Acceptance Security	.836	
Acceptance Community	.834	
Acceptance SOL	.811	
Acceptance Health	.788	
Achievements Control		.781
Security Control		.734
SOL Control		.699
Community Control		.646
Safety Control		.611
Relations Control		.594
Health Control		.563
KMO	.890	
Bartlett's Test	.000	
F1 variance	35.17%	
F2 variance	22.71%	
Total variance	57.88%	

With a Kaiser-Myer-Olkin result of .890 and Bartlett's Test of Sphericity at .000, this sample is considered adequate for a factor analysis. The contribution to the variance after rotation for Factor 1 (Acceptance) is 35.17% and 22.71% for Factor 2 (Domain Control), giving a total variance of 57.81%.

Correlations between the items in Acceptance (Factor 1) were all >.6, and for Domain Control (Factor 2), were >.3 and none higher than .55 between items. A reliability analysis revealed an internal consistency of .943 (Chronbach's alpha) for Acceptance (Factor 1), and .874 for Domain Control (Factor 2).

In conclusion, four control factors (Primary Control, Secondary Control, Acceptance, and Domain Control) have been identified for further analysis of the PWI means, using the same Survey 13 data (n = 1171).

5.5.4 PWI means - data preparation (Survey 13 only). As before, the data were checked for linearity, missing PWI data, and univariate and multivariate outliers were removed. The second step involved summing and averaging the PWI items. This method was also applied to the Primary Control and Secondary Control factors to create a single score representing each factor, as done by Heeps (2000) in a comparison of perceived control and SWB. Finally, the Acceptance and Domain Control items were also treated in the same way to create the variables Total Acceptance and Total Domain Control.

In terms of cell sizes, the lower levels of the PWI domains (0-20) were combined in order to meet the minimum requirements of 10 cases per cell (Babyak, 2004; Peduzzi et al., 1996; Wilson VanHooris & Morgan, 2007). The exception to this is Safety which would require combining the 0-30 levels before the minimum cell size could be achieved. Rather than further reducing the levels of all PWI domains to match the Security domain, it was considered more appropriate to leave the cell sizes intact and to interpret the Security domain results with caution.

Additionally, the lower levels of both Primary Control and Secondary Control (0-40 points) were combined due to small cell sizes, resulting in a minimum cell size

of 24 cases (0-40 points for Primary Control). For Total Acceptance, levels 0-10 were combined to create a minimum cell size of 33 cases. Similarly for Total Domain Control, a minimum cell size of 25 cases was achieved by combining levels 0-40. The last step in preparation of the data was to convert the total PWI score, Primary Control, Secondary Control, Total Acceptance and Total Domain Control to %SM scores, as described in Study 1.

Appendix D provides a breakdown of the frequencies for the control variables along with those for age, gender and income. Also of note are the differing cell sizes for each variable which suggest that assumptions of homogeneity may not be possible. Therefore Dunnett's C is used in post hoc tests where necessary. An investigation of the PWI means for the control factors will now be presented as the final step in addressing the only hypothesis in this study; that SWB is decreased by the presence of low control.

5.5.5 PWI means for Primary Control. The previous analyses found that in some data sets, the Primary Control factor was unreliable. In the data set used for the remainder of this study (Survey 13), the Chronbach's alpha of .67 for Primary Control is just outside the recommended .70 (Pallant, 2007). Given the volatile nature of this variable, Primary Control results should be interpreted cautiously in the remaining analyses. On that basis, the PWI means for Primary Control are included in Table 22 as a point of comparison with the more consistent Secondary Control factor, which is discussed later.

Table 22

PWI means for Primary Control (Survey 13)

Primary Control	PWI mean	SD	N	Significant PWI differences between levels of Primary Control	p
0-40 (a)	55.24	19.15	24	< (d), (e), (f), (g)	.01 (Dunnett's C)
50 (b)	65.32	15.48	54	< (e), (f), (g)	$Eta^2 = .136$
60 (c)	69.74	12.20	162	< (e), (f), (g)	
70 (d)	72.98	11.95	293	> (a), < (f), (g)	
80 (e)	76.13	11.69	304	> (a), (b), (c); < (g)	
90 (f)	78.60	11.54	215	> (a), (b), (c), (d)	
100 (g)	81.26	12.58	118	> (a), (b), (c), (d), (e)	
Total	74.50	13.17	1170		

The PWI means for Primary Control do not reach normal levels (73.7-76.5) until after 70 points of control. Also of interest, is the high variance in the lower levels of Primary Control (19.2 at 0-40 points of control). Overall, the variance has a range of 6.57 points between the lower and upper levels of Primary Control. The increased spread of values is representative of homeostatic failure. At higher levels of Primary Control where homeostatic control is intact, the variance is much smaller. Notably, the contribution of Primary Control to SWB of 13.6% represents a large effect (Pallant, 2007).

5.5.6 PWI means for Secondary Control. In terms of Secondary Control, the PWI mean shown in Table 23 is 10.9 points higher than for Primary Control at the lowest levels of control (0-40 points), but this situation reverses at 50-90 points.

Table 23

PWI means for Secondary Control (Survey 13)

Secondary Control	PWI mean	SD	N	Significant PWI differences between levels of Secondary Control	p
0-40 (a)	66.14	16.50	30	< (f), (g)	.01 (Dunnett's C)
50 (b)	62.68	14.27	63	< (d), (e), (f), (g)	$Eta^2 = .153$
60 (c)	68.65	12.97	115	< (e), (f), (g)	
70 (d)	71.46	12.86	202	< (b), (f), (g)	
80 (e)	74.07	10.66	303	> (b), (c), < (f), (g)	
90 (f)	78.50	11.61	269	> (a), (b), (c), (d)	
100 (g)	81.78	12.20	188	> (a), (b), (c), (d), (e)	
Total	74.53	13.15	1170		

The range of the variance is smaller for Secondary Control with only a 4.3 point difference between the higher and lower levels compared to that for Primary Control. This suggests a greater level of homeostatic control for this variable. In addition, the contribution to SWB variance of 15.3% is slightly higher than for Primary Control.

The pattern of PWI means for Primary Control and Secondary Control are more easily observed in Figure 13. The intervals on the X axis refer to respondents' level of agreement that they use Primary and/or Secondary Control "when something bad happens".

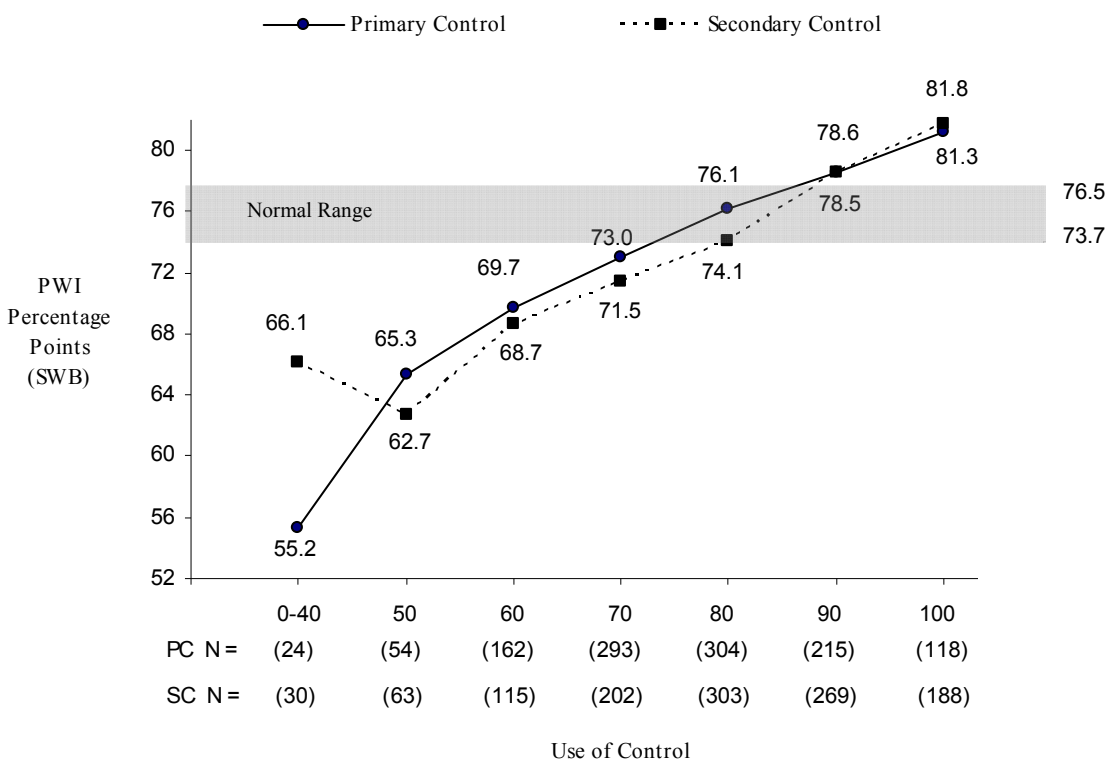


Figure 13. PWI means for Primary Control and Secondary Control (Survey 13)

Both Primary Control and Secondary Control have a positive relationship with the PWI means which increase in a linear fashion from the point where respondents agree that they use these control strategies (>50 points of control). The PWI mean does not enter the normal range for either Primary or Secondary Control until around 75 points of control. Between the control values 50 and 90, the PWI mean for Secondary Control is slightly lower than Primary Control by no more than 2.7 points. Between 90 and 100 points of control use, the difference between Primary Control and Secondary Control is even smaller.

Interestingly, at the 0-40 point level, where there is limited or no use of control, a large gap of 10.9 points between the PWI means for Primary Control and Secondary Control occurs. This seems to suggest that low levels of Primary Control

have a more negative influence on SWB than low levels of Secondary Control. However, it is difficult to make such assumptions with confidence due to the lack of significant difference between 0-40 points of control and the remaining levels, with the exception of 90 and 100 points of control (see Tabble 23).

Nevertheless, Primary and Secondary Control warrant further exploration in Study 3 where a sample group that has a specific health challenge (a back problem) is examined. It is expected that the use of Primary Control and Secondary Control may be more salient to these respondents and therefore potentially have a stronger influence on SWB than for the general population examined in this study. In the meantime, the other two control factors identified earlier (Acceptance and Domain Control) will now be examined in relation to SWB through a comparison of the PWI means.

5.5.7 PWI means for Acceptance. The Acceptance factor is derived from responses to the question "When you think about the following areas of your life [PWI domains], how much do you accept the things about the area that you cannot change".

When the PWI means were compared for each level of Total Acceptance, a curious 'u' shaped curve occurred. To investigate this further, the PWI means for each individual Acceptance item were observed at all levels (0-100). Table 24 presents a summary of these, with full ANOVA results included in Appendix E. Note that a lack of homogeneity of variance has been addressed by using Dunnett's C (.01) in post hoc testing.

Table 24

Summary of PWI means for Acceptance (Survey 13)

Acceptance of Limited Control	Domain Ns	SOL PWI mean n=1169)	SD	Health PWI mean (n=1167)	SD	Achieve PWI mean (n=1166)	SD	Relations PWI mean (n=1165)	SD	Safety PWI mean (n=1165)	SD	Commty PWI mean (n=1168)	SD	Security PWI mean (n=1163)	SD
00 (a)	39-43	79.24	12.76	77.84	12.73	77.39	12.20	80.81	9.52	74.45	14.16	73.09	18.79	68.86	21.00
10 (b)	33–55	73.33	15.41	73.31	14.28	74.44	14.78	75.66	12.25	76.71	12.19	78.23	11.74	77.32	13.36
20 (c)	51-90	74.78	12.84	71.45	13.92	75.25	12.57	72.41	14.36	76.19	12.53	75.99	10.71	74.65	12.58
30 (d)	59–88	71.46	13.26	71.04	12.92	72.52	12.77	71.33	13.66	70.96	13.24	70.98	13.94	70.58	12.38
40 (e)	63–100	66.49	13.98	68.76	13.30	67.08	14.09	66.54	13.60	69.98	14.28	68.92	13.75	70.76	12.39
50 (f)	120–190	66.36	15.20	69.42	14.67	67.10	13.50	68.12	14.42	69.29	13.93	69.35	13.23	68.09	14.41
60 (g)	79–99	69.93	11.72	69.62	10.29	69.86	12.27	71.14	11.55	69.11	11.94	70.38	10.00	69.26	10.45
70 (h)	136–191	71.67	10.01	72.86	11.54	71.76	10.58	70.97	10.43	72.01	11.83	72.50	12.31	73.00	11.47
80 (i)	197–234	77.38	9.58	77.98	10.70	76.79	9.88	76.54	10.40	76.37	9.60	75.76	11.20	76.55	9.61
90 (j)	115–149	78.49	11.38	81.11	10.11	82.47	11.19	79.58	11.16	79.92	12.52	82.14	10.40	81.53	10.55
100 (k)	94–148	82.59	13.20	82.17	13.58	85.10	12.00	84.08	12.37	83.74	13.53	84.13	12.48	85.20	10.78
Total		74.48	13.17	74.49	13.18	74.56	13.09	75.55	13.11	74.52	13.17	74.50	13.18	74.53	13.15
$p = .01$ (Dunnett's C)		$Eta^2 = .150$		$Eta^2 = .129$		$Eta^2 = .175$		$Eta^2 = .159$		$Eta^2 = .124$		$Eta^2 = .139$		$Eta^2 = .161$	

As Table 24 shows, the contribution of Acceptance to explaining the variance in PWI means is similar for each domain with effect sizes (Eta^2) ranging from .129 (Safety Acceptance) to .161 (Security Acceptance). However, the PWI means for each Acceptance domain show an unusual and non-linear pattern. The means are at higher than normal levels where there is no Acceptance of limited control (00), but as the level of Acceptance increases, the means drop below the normative range, reaching their lowest levels at 40-50 points of Acceptance. The pattern subsequently reverses, reaching the normal SWB range at 80 points and appearing well above normal at 90-100 points of Acceptance.

This non-linear pattern is illustrated in Figure 14. For ease of interpretation, only the first four Acceptance domains have been included but it should be noted that the remaining domains, Acceptance of limited control over Safety, Community, and Security follow a similar pattern.

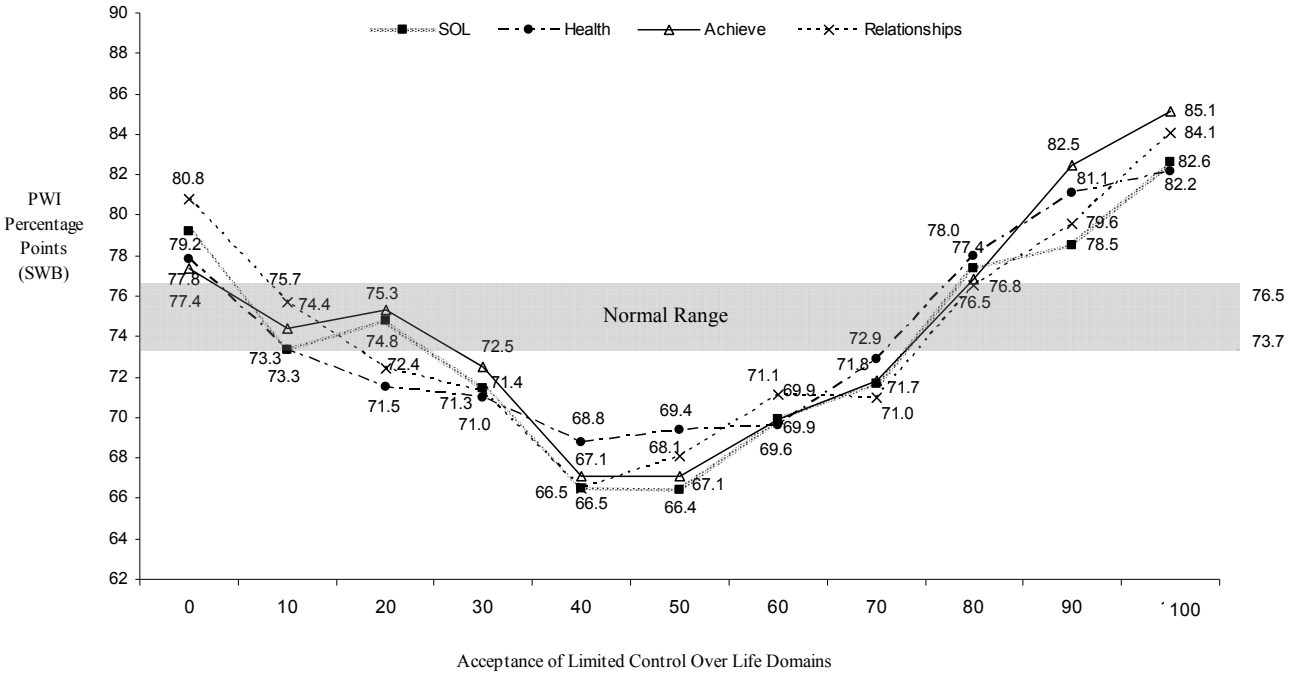


Figure 14. PWI means for Acceptance of limited control

Possible reasons for the lower PWI means in the middle levels of this factor are outlined in the discussion section. In the meantime, it should also be noted from Table 24 that while most of the domain SDs range from 9.58 to 15.2, there are very large SDs for Acceptance of control over Community Connectedness and Security (18.8 and 21.0 respectively) at 00 points, suggesting that homeostasis has little influence where there is a failure to accept limited control over these domains. However, a closer examination of the detailed results in Appendix E reveals that there are no significant differences between levels of Acceptance over Health, Safety, Community Connectedness and Security at 00-20 points. Therefore, this assumption cannot be fully supported.

Overall, the lack of significant differences at the lower levels of Acceptance in most of the domains, the high SDs, and the non-linear pattern of PWI responses make it difficult to interpret this factor with confidence. Therefore, the Acceptance factor is considered unsuitable for further analysis.

The next section will consider the PWI means for the Domain Control factor based on the question 'Thinking about your own life and personal circumstances, how much control do you feel you have over… [life domain]'.

5.5.8 PWI means for Domain Control. The PWI means for the total Domain Control score in Table 25 are more extreme compared to other similar analyses in this study ranging from 44.76 to 90.27 points.

Table 25

PWI means for Total Domain Control

Total Domain Control	PWI mean	SD	N	Significant PWI differences between levels of Primary Control	p
0-40 (a)	44.76	13.03	27	< (c)-(g),	.01 (Dunnett's C)
50 (b)	54.80	11.52	64	< (c)-(g)	$Eta^2 = .594$
60 (c)	61.86	11.42	116	> (a)-(b), < (d)-(g)	
70 (d)	69.89	8.66	244	> (a)-(c), < (e)-(g)	
80 (e)	77.34	7.00	405	> (a)-(d), < (f)-(g)	
90 (f)	84.14	6.89	218	> (a)-(e), < (g)	
100 (g)	90.27	8.19	89	> (a)-(f)	
Total	74.50	13.12	1163		

Therefore, as with the Acceptance factor, it was considered more informative to observe the PWI means of individual Domain Control items (see Table 26), rather than the broad perspective offered by the averaged composite score for Domain Control used here. Full ANOVA results are available in Appendix F. Note that levels 0-20 for each control domain have been combined due to small cell sizes in the original data.

Table 26

Summary of PWI means for Domain Control items (Survey 13)

Domain Control	Domain Ns	SOL PWI mean (n=1171)	SD	Health PWI mean (n=1171)	SD	Achieve PWI mean (n=1170)	SD	Relations PWI mean (n=1170)	SD	Safety PWI mean (n=1168)	SD	Commty PWI mean (n=1169)	SD	Security PWI mean (n=1170)	SD
20 (a)	20–57	51.43	15.09	58.92	14.96	49.56	14.31	53.29	14.93	57.71	17.20	49.40	16.86	56.77	17.41
30 (b)	12–37	55.71	13.62	64.13	12.86	49.62	13.30	57.64	14.70	58.57	12.94	56.82	10.27	59.31	13.20
40 (c)	27–55	57.99	12.74	64.96	13.84	60.32	11.39	57.61	12.95	65.13	13.63	62.94	11.63	63.20	11.30
50 (d)	90–123	63.68	13.88	69.81	13.51	63.78	13.12	65.74	11.88	65.95	13.48	65.84	13.27	65.19	13.34
60 (e)	65–121	67.18	10.95	70.28	12.52	66.74	11.39	68.84	11.40	67.50	13.67	68.85	11.93	70.77	10.13
70 (f)	177–237	73.91	9.00	74.92	10.78	72.90	9.37	71.65	11.10	73.63	10.31	74.29	9.67	74.85	7.87
80 (g)	279–353	77.21	9.20	76.91	9.99	77.55	8.36	76.09	9.10	76.71	10.09	77.06	9.39	78.45	9.28
90 (h)	172–255	81.21	9.24	80.15	11.49	82.09	9.37	80.67	9.68	82.29	10.42	81.70	9.70	82.56	8.56
100 (i)	88-139	87.31	10.14	85.59	10.66	86.17	9.77	84.82	11.71	85.44	12.87	85.57	11.82	86.94	12.16
Total		74.51	13.17	74.51	13.17	74.48	13.15	74.52	13.16	74.52	13.13	74.49	13.18	74.51	13.17
$p = .01$ (Dunnett's C)		$Eta^2 = .395$		$Eta^2 = .225$		$Eta^2 = .431$		$Eta^2 = .343$		$Eta^2 = .236$		$Eta^2 = .340$		$Eta^2 = .369$	

Unlike Acceptance, the Domain Control variables have a linear relationship with the PWI means. The contribution of the Domain Control items to SWB is relatively large with the Eta^2 ranging from .225 for Health Control to .431 for Achievements Control.

Table 26 shows that Community Control presents as the lowest SWB (49.40) when perceptions of control are only 20 points, followed by Achievements Control (49.56) at 30 points of control. These two levels of control also represent the greatest range of SWB results between the domains where the maximum difference is 9 points (at 20 points of control) and 14.5 points (at 30 points of control).

In terms of the standard deviation, each domain (except Health Control) has a similar pattern of SD, where the lowest SD occurs between 70 points and 90 points of control. This indicates that homeostatic is effectively holding SWB at normal or close to normal levels when perceived control is relatively high. Conversely, perceptions of low control (0-20 points) are reflected in increasing variance, suggesting that homeostatic processes are being challenged. This is particularly the case for Security Control (SD 17.4), Safety Control (SD 17.2) and Community Control (SD 16.9) where the range of variance between low control and high control shows the greatest differences. For example the SDs for Security Control extend from 8.56 at 90 points of control up to 17.4 at 20 points of control. Large differences between SDs are less evident for Health Control, and it can be inferred that homeostasis is therefore less challenged by low perceived control over this domain than other domains. As this data set is derived from a general population where no medical conditions are specified, this is to be expected.

The pattern of PWI means and their relationship to the normative SWB range is best observed in Figure 15. Only the four consistently highest and lowest control domains have been included for ease of interpretation. The remaining domains, Safety Control, Community Control and Relationships Control follow a similar pattern.

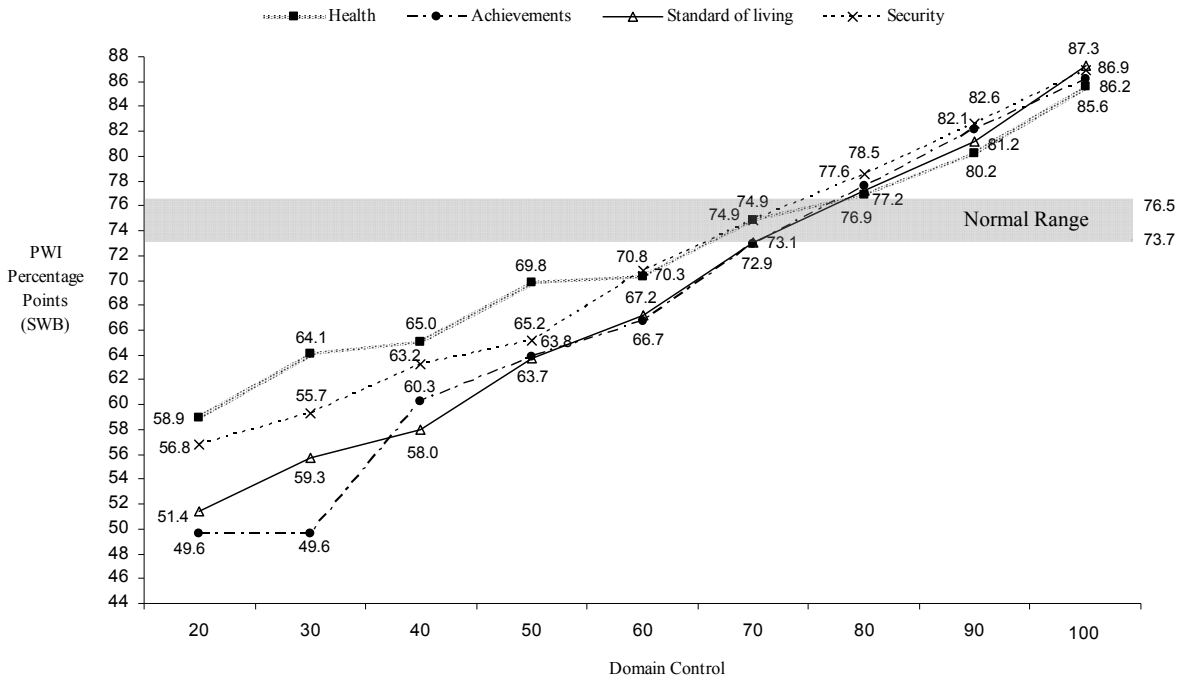


Figure 15. PWI means for Domain Control

For all domains, the normal SWB range is not reached until around 70 points of control. Additionally, after 80 points of control, the PWI means for all domains are above the normal range and are closely aligned with only a small difference between them. Health Control has the highest PWI mean of all control domains for most of the lower points of control suggesting that this domain is less associated with low SWB than other domains. This is consistent with the theory that health is of little concern to people until they start to experience an uncomfortable health problem (Borg et al., 2008; Cummins, Lau et al., 2004).

The results shown here indicate that it is only at the lower levels of perceived control that the greatest differences in SWB occur. Consequently, perceptions of low control over some domains such as Community Connectedness and Achievements may be more important than others (Health) in terms of SWB, but this requires further investigation outside the scope of this thesis.

5.5.9 Summary of SWB and control. In summary, Primary Control, Secondary Control, and the Domain Control items correspond to below normal levels of SWB when control is below 70 points, thus confirming Hypothesis 1 that SWB is decreased in the presence of low control. The control variables also demonstrate a positive linear relationship to SWB, and as such, are generally considered suitable for use in further analyses (Study 3). Notwithstanding these results, there are other factors such as income, gender and age that could act as potential covariates in relationships between SWB and control.

5.5.10 Potential covariance. As there are no specific groups to compare in this study, ANCOVAs could not be conducted. Rather, Pearson Product Moment Correlations have been used in Table 27 to identify relationships between SWB, the control variables, and the demographic variables gender, income, and age. The sample size for this analysis ranged from 1133 for income to 1171 for most of the other variables examined.

Table 27

Pearson Product-Moment Correlations for the PWI and independent variables

	PWI	1	2	3	4	5	6	7	8	9	10	11	12
PWI Mean (SWB)	1.00												
1. Primary Control	.37**	1.00											
2. Secondary Control	.39**	.51**	1.00										
3. SOL Control	.63**	.34**	.35**	1.00									
4. Health Control	.47**	.29**	.30**	.39**	1.00								
5. Achievement Control	.65**	.40**	.41**	.59**	.51**	1.00							
6. Relations Control	.58**	.32**	.33**	.43**	.31**	.55**	1.00						
7. Safety Control	.48**	.25**	.26**	.39**	.36**	.40**	.32**	1.00					
8. Community Control	.58**	.34**	.35**	.40**	.38**	.53**	.46**	42**	1.00				
9. Security Control	.61**	.30**	.31**	.60**	.35**	.50**	.40**	.64**	.48**	1.00			
10. Gender	.01	. .11**	.12**	-.00	.06*	.01	-.02	-.06*	.05	-.05	1.00		
11. Income	.13**	.05	-.08*	.15**	.04	.11**	.02	-.04	.06	.06	-.05	1.00	
12. Age	.14**	.02	.11**	.16**	-.05	.02	.14**	.11**	.11**	.14**	-.15**	-.38**	1.00

* $p<.05$; ** $p<.01$

In Table 27, significant relationships (<.01) between the PWI mean and Primary Control, Secondary Control and the seven Domain Control items are evident with Achievement Control, SOL Control, and Security Control representing the strongest relationships to SWB. Income and age on the other hand, have very little influence on these relationships while gender has no significant effect. Thus, the hypothesis that low perceived control is associated with low SWB continues to be supported.

5.6 Study 2 Discussion

Study 2 aimed to identify control variables that would be most suitable for use in the final study (Study 3). Additionally, the hypothesis that SWB is decreased by the presence of low control was investigated.

Using a combined data set of 14 surveys, the factor structure and internal consistency of five perceived control variables (Primary Control, Secondary Control, Relinquished Control, Acceptance, and Domain Control) were examined prior to an investigation of relationships between SWB and perceived control.

5.6.1 Summary of data management. Relinquished Control was found to be unreliable and was excluded from further analyses. Acceptance was also problematic with a u-shaped distribution curve where the PWI means were at their lowest at the middle levels of Acceptance (see Figure 2). The reason for this could be that non-acceptance of limited control (00 points), and high Acceptance (80-100 points), represent a decisive position on the part of the respondents. This may offer some benefits that a more neutral position of acceptance does not. For example, total refusal to accept limited control over various life domains may bring with it a belief or hope that control can be recaptured, thus resulting in higher SWB. Similarly, high levels of Acceptance could be accompanied by an ability to focus on other issues instead of trying to regain control over a particular life domain.

For respondents at the bottom of the u-shaped curve, however, being unclear on where one stands in response to situations of limited control may offer no such benefits and may reflect a state of unpreparedness when faced with limited control situations. Additional research is needed to test these broad assumptions, but for the purpose of this study, Acceptance was excluded from further analyses due to the lack of a linear relationship with the PWI means, and no significant differences between levels of acceptance on most domains.

When the PCSC scale was factor analysed using the combined data set, Primary and Secondary Control presented as a single factor, which is at odds with previous findings on the PCSC scale (Heeps, 2000) where two factors were evident. However, when the data were analysed as 14 separate surveys, Secondary Control consistently loaded as a single reliable factor but the results for Primary Control were less clear cut. At least one item from Primary Control cross loaded with Secondary Control on most surveys and the internal consistency was low (Chronbach's alpha <.70).

This could be due to problems with Primary Control Item 1 ("I ask others for help or advice") which had the lowest loading of all Primary Control items on most of the surveys. A possible reason for this can be found by examining the frequencies of all Primary Control items in the combined data (see Appendix G). Here, PC Item 1 shows an almost equal split of 55% of respondents who seek help from others (60-100 points) and 45% who do not (00-50 points).

For all other Primary Control items, a large majority of respondents (around 80%) state they would engage in these activities when "something bad happens" The same pattern applies to Survey 13 (see Survey 13 results in Appendix G), where only 66% would seek help or advice from others (PC 1). In contrast, over 90% of respondents would use items PC 2 (look for different ways to solve the problem), and PC 3 (use my skills) during difficult events. This reluctance to seek help from others could explain the inconsistent factor analysis results for the Primary Control variable overall.

Finally, Survey 13 was identified as the most suitable for further analysis of the PWI means due to the availability of Primary Control, Secondary Control, and Domain Control as separate and in most cases, highly reliable factors.

5.6.2 Reduced SWB and low control (Hypothesis 1). Hypothesis 1 proposed that SWB is decreased in the presence of low control. Primary Control and Secondary Control were found to have a positive, linear relationship to SWB with little difference between the two except at low levels of control (0-40 points). Interestingly, the normal

SWB range for group data is not achieved until both forms of control are around 75 points. These results tend to reflect Heeps' (2000) contention that strong levels of both Primary and Secondary Control are required to maintain normal levels of SWB but this would need further investigation beyond the results found here.

The Domain Control items also demonstrated a positive linear relationship to SWB. As for Primary and Secondary Control, the normal SWB range for Domain Control was not reached until at least 71 points of control, depending on the control domain involved. Health Control consistently demonstrated the highest SWB of all control domains and it is possible that maintaining control over health is of less importance to people than having control over domains such as Achievements and Standard of Living which reflect much lower SWB when perceived control is limited. This is consistent with theory which proposes that health is of little concern to people until they experience a health problem (Cummins, Lau et al., 2004). As the data examined in this study do not provide details of any medical conditions, this cannot be verified or tested here. However, Study 3 will inform further on the use of limited Primary, Secondary, and Domain Control when the SWB of people with a back problem is compared to a normal population. Overall, it is concluded from this study that SWB is decreased in the presence of low levels of perceived control.

In terms of potential confounding factors, the lack of comparison groups in this study did not allow ANCOVAs to be conducted. Nevertheless, Pearson Product Moment Correlations found that the strength of relationships between the PWI means, Primary Control, Secondary Control, and the seven Domain Control items were significant. However, gender, income and age demonstrated very little or no significant relationship to these factors, as is normal for objective variables and consistent with homeostatic theory.

5.7 Study 2 Conclusion

Study 2 explored relationships between SWB perceived control and also identified suitable control variables for use in Study 3. Of the five control variables examined, only the Domain Control items, Secondary Control, and to a lesser extent,

Primary Control were considered suitable for further analysis. In all cases, SWB was below normal levels when perceived control was <70 points.

The extent to which the relationships between SWB and perceived control change when respondents are challenged by health problems, such as a back problem, are addressed in Study 3, presented next.

Chapter 6: Study 3 – SWB, Control, and Back Problem

Study 3 addresses the main thesis research question on the relationship between SWB, health satisfaction, and perceived control for people with a back problem. This final study builds on the findings of Study 1 which found that people with a medical condition reported significantly lower SWB than normal, and that those with a back problem had the lowest SWB of seven physical conditions examined. It also builds on Study 2 which found positive relationships between SWB, Primary Control, Secondary Control and the Domain Control variables. For Study 3, primary data were collected to examine relationships between SWB, health satisfaction, and perceived control of people with a back problem. In Study 1, back problem was examined but there were no variables for control available in the data. For Study 2, control was examined for a non-medical sample only. Study 3 therefore, combines these aspects into a final set of analyses that focus specifically on people with a back problem. The following hypotheses are tested:

Hypothesis 1: That SWB is lower in the presence of a back problem.

This hypothesis aims to verify the results previously found in Study 1 in which the PWI mean for people with a back problem was below the normative range.

Hypothesis 2: That domain compensation is operating for people with a back problem.

The aim of this hypothesis is to identify whether the lack of domain compensation found for the back problem group in Study 1 applies to a larger, different sample to that used earlier.

Hypothesis 3: That the SWB of the back problem group is further reduced when perceived control is low.

Hypothesis 3 provides the main focus of this study in which the relationship between SWB and control is examined specifically for the back problem group.

Hypothesis 4: That the strength of the relationship between SWB and perceived control is substantially weakened when Homeostatically Protected Mood (HPMood) is controlled.

Hypothesis 4 has been included in response to a recent publication which proposes that HPMood explains most of the variance in SWB (Cummins, 2010a). As such, the HPMood items content, happy, excited, and alert are included in this study to test the effect of this construct on relationships between SWB and the control variables.

6.1 Method

The categorical variable "back problem" is used as the basis for most statistical analyses in this study. It denotes respondents who report that they currently have some form of back problem (n = 642) in answer to the nominal (yes/no) response question "do you have a back problem that has been diagnosed by a doctor or other health professional?" These data will be referred to as the Back Problem (BP) group. Respondents who do not report a back problem (n = 817) are used for comparative purposes, and will be referred to as the No Back Problem (NBP) group. Independent variables include age, gender, income, back problem frequency, intensity of back pain experienced, and various questions addressing limitations to daily living.

It should be noted that the pain intensity question was changed to reduce the effect of memory bias in pain recall (Erskine et al., 1990; Brodie & Niven, 2000; Morley, 2007). In the secondary data used in Study 1, pain intensity was measured with the question, "on a scale from 0 to 10, how much physical pain do you experience each day?" In this study however, respondents were asked "on a scale of 0 to 10, how much physical pain is your back problem giving you now?"

The full set of questionnaire items for this study can be found in Appendix H where the PWI is represented in Section A, HPMood in Section B, Domain Control in Section C, and Primary and Secondary Control in Section D. In terms of data analysis, the dependent variable is the PWI mean in the first instance, and the various PWI domains in subsequent analyses.

After examining frequency distributions of the dependent and independent variables for normality, removing missing values and extreme PWI values, factor analyses were conducted to confirm the existence of the control factors identified in Study 2. Hypothesis 1 is addressed by presenting the means and standard deviations for all relevant variables using one way, between groups Analysis of Variance (ANOVA) to identify significant differences between the BP and NBP groups. This is followed by a one way, between groups ANCOVA to identify potential covariance from independent variables. For Hypothesis 2, Multivariate Analysis of Variance (MANOVA) is used to identify domain compensation processes for the BP group. Hypothesis 3 also employs ANOVAs to identify differences in PWI means for the perceived control variables. For Hypothesis 4, partial correlations examine relationships between SWB, control, HPMood and the independent variables. Finally, hierarchical multiple regressions investigate contributions to SWB by HPMood and the control variables.

6.2 Data Collection

The primary data used in this study (n = 1458) were gathered from two sources to ensure a sufficient sample size for analysis. Firstly, a convenience sample of chiropractic patients attending clinics in Melbourne (n = 101 responses; 80 with a back problem). The second method involved mailing the self-completion questionnaire to a panel of respondents who have previously expressed interest in participating in longitudinal studies on SWB through the School of Psychology, Deakin University (n = 1357 responses; 560 with a back problem).

6.3 Data Preparation

As in the previous two studies, all subjective variables have been converted to Percentage of Scale Maximum scores (%SM) to provide a common unit of analysis. The Spirituality/Religion PWI domain was not included in any of the analyses to be consistent with the PWI variables used in Study 1 and Study 2. In addition, some levels within variables have been combined due to small cell sizes. Appendix I shows the number of categories and frequencies for demographic variables (age, income gender), for the BP and NBP groups. Frequencies for variables specific to the BP group (back problem frequency, pain intensity, and limitations to daily living) are also included in Appendix I.

In terms of significance tests, the stringency level is maintained at <.01 where possible during post hoc testing, to protect against Type 1 Errors. While Tukey's Honestly Significant Different test (HSD) is normally used, the uneven sample sizes for the BP group (n = 640) and NBP group (n = 817), suggest that homogeneity of variance may not be possible. In these situations, Dunnett's C test is used as an alternative (Pallant, 2007). Finally, test of robustness (Welch) are also conducted where there are only two groups in the analysis (e.g., BP and NBP groups).

6.4 Descriptive Statistics (Data Distribution)

The distribution of the SWB data (skewness < -1.10) are consistent with the results of Study 1 and Study 2 where a small negative skew was also evident. The independent variables also mildly deviate from zero (skewness <$\pm$ 1.10). The exception to this is the skewness for the personal care question "when you are experiencing back pain, how much help do you need with personal care tasks (for example, getting dressed, washing, brushing your teeth)?" (skewness 2.13). This variable was later found to be non-significant and was not used in subsequent analyses.

When considering the effects of non-normal distributions, sample size also needs to be taken into account (Tabachnick & Fidell, 2007). In this study, the size of each analytical cell meets minimum requirements of at least 10 cases per level in each independent variable (Babyak, 2004; Peduzzi et al., 1996; Wilson VanHooris & Morgan, 2007). The smallest cell size is for the Secondary Control question "I remind myself that I am better off than some others" with 10 cases at 80-100 points.

6.5 Factor Analysis (Control Variables)

Factor analyses were conducted to confirm the existence of the control factors identified in Study 2 (Primary Control, Secondary Control, and Domain Control). As in Study 2, this study uses both oblique and orthogonal rotation and is reported using the clearest and easiest solution to interpret, as suggested by Pallant (2007). In most analyses, this was the more mathematically rigorous factor analysis (Tabachnick & Fidell, 2007), using principal axis factoring and Varimax rotation, unless other wise stated.

The six combined Primary Control and Secondary Control items were previously reported in the literature as part of the PCSC Scale (Heeps, 2000). In Study 2, Primary and Secondary Control were examined separately to the other control variables. For consistency, these two factors are examined separately to Domain Control in this study as well.

A two factor solution for Primary and Secondary Control emerged with eigenvalues >1. This is consistent with the results of Study 2. The correlation matrix identified suitable correlations >.3 between all variables and at least one other item. Loadings >.4 are shown in the rotated factor matrix in Table 28.

Table 28

Rotated factor solution for Primary Control and Secondary Control

Secondary Control	Primary Control
(α = .823)	(α = .735)
SC 3 .762	
SC 1 .748	
SC 2 .685	
PC 2	.957
PC 1	.655
PC 3	.447
KMO	.805
Bartlett's Test	.000
F1 variance	30.82%
F2 variance	29.84%
Total variance	60.66%

In this solution, the KMO test is >.6 at .805, and therefore the data is adequate for factor analysis. The null hypothesis for Bartlett's Test of Sphericity, that the variables are uncorrelated, was also rejected $\chi 2_{(15)} = 3628.73$, (p =.000). The internal consistency (Chronbach's alpha) is acceptable for both factors at >.70 (Pallant, 2007), as is the total variance (60.66%).

Notably, the internal consistency for Primary Control can be as high as .827 if the item "I ask others for help or advice" (PC 1) is removed. Indeed, descriptive

statistics in this study (Appendix J) indicate that only 61% of respondents use this form of control (60-100 points) compared to the large majority of respondents who use PC 2 (87%), and PC 3 (88%) at 60-100 points. A similar result was found in Study 2 (Appendix G), suggesting a bias in the Australian culture against asking for assistance, perhaps through fear of appearing needy or helpless. Nevertheless, the item was retained to provide a more comprehensive perspective of control and to meet the minimum requirements of 3 items per factor (Tabachnick & Fidell, 2007).

A second factor analysis was conducted on the Domain Control items. The correlation matrix identified suitable correlations >.3 between all variables and at least one other item. As only one factor emerged, rotated solutions could not be presented. Instead, the component matrix from a principal components analysis is presented in Table 29. Note that the domains are presented in order of highest to lowest loadings rather than the traditional order presented in the PWI scale where Standard of Living (SOL) normally appears first.

Table 29

Component solution for Domain Control

Domain Control	Factor
(α = .871)	1
Achievements Control	.807
Security Control	.791
Community Control	.768
SOL Control	.765
Safety Control	.748
Relations Control	.723
Health Control	.667
KMO	.874
Bartlett's Test	.000
F1 Variance	56.83%
Total Variance	56.83%

The KMO test (.874) and Bartlett's Test of Sphericity $\chi 2_{(21)} = 4418.77$, (p =.000) were satisfactory. While the total variance (56.8%) is slightly lower for the Domain Control factor than for Primary and Secondary Control, the item loadings and internal consistency for Domain Control are adequate for further use in this study. The four hypotheses for Study 3 will now be addressed.

6.6 Hypothesis 1: That SWB is lower in the presence of a back problem

This hypothesis aims to verify the results previously found in Study 1 in which the PWI means for people with a back problem was below the normative range.

6.6.1 PWI means (BP and NBP groups). The PWI means for the back problem group (BP) and no back problem group (NBP) are significantly different, as Table 30 illustrates, with the BP group 4.07 points lower. The Eta^2 describes a small effect (.02) of the presence or absence of a back problem in contributing to SWB variance.

Table 30

PWI means for BP and NBP groups

	Group	PWI mean	SD	N	PWI difference	p
PWI	Back Problem (BP)	71.61	14.79	640	4.07	F (1, 1277) = 31.34, .000 (Welch) Eta^2 = .021
	No Back Problem (NBP)	75.68	12.96	817		

As for the previous two studies, the normative group data range for SWB is 73.7-76.5 points (Cummins et al., 2009b), represented by the horizontal band in Figure 16. Here, the PWI mean for the BP group is observed below the normative level by 2.1 points, whereas the NBP group is well within the normative range.

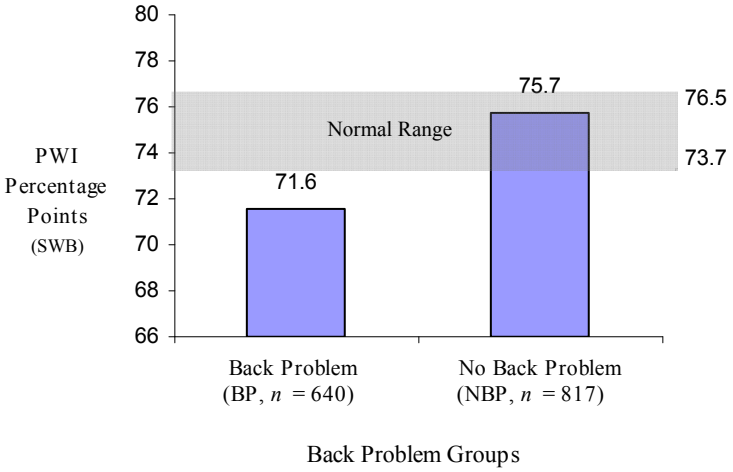


Figure 16. PWI means for BP and NBP groups

As the SWB mean for the BP group lies below normative levels, it indicates that the homeostatic system has been defeated for a higher proportion of the sample than is normal. Moreover, the larger standard deviation for the BP group is also an indication that there is a higher than normal risk of depression for this group.

However, before making further inferences regarding the two groups, it is important to investigate potentially confounding factors that may have influenced the results. As in Study 1, analysis of covariance was conducted to identify influences from income, age, gender, and pain intensity. In addition, two new variables were also tested as covariates; "back problem frequency" and "limitations to daily living" (difficulty in performing personal care tasks and household tasks, moving around the house, and sleeping). Although not part of an existing scale, these items have been included in a broad range of literature on the impact of a back problem and are often referred to more generally as an inability to perform daily tasks (ABS, 2009; Henschke et al., 2008), limitations to mobility (Riddle, 1998), and limitations to self care (ABS, 2006).

6.6.2 Potential covariance. Before testing for covariance, the PWI means for each potential covariate were observed. For age, the results were similar to Study 1 and to other SWB research (Cummins et al., 2009b) where the PWI means increased with advancing age. However, when the BP group was analysed separately, the PWI difference between each age category was not significant. Similarly, gender showed no significant differences, rendering these variables unsuitable for further use in this study. Income and back problem frequency, on the other hand, are worth noting separately.

6.6.2.1 PWI means for income. Separate ANOVAs for the BP and NBP group were conducted for income, commencing with the NBP group as outlined in Table 31.

Table 31

PWI means for income (NBP group only)

Income	PWI mean	SD	N	Significant PWI differences	p
<$15,000 (a)	70.87	19.07	54	< (g)	.01 (Dunnett's C)
$15,000 - $30,000 (b)	74.03	14.49	160	< (g)	$Eta^2 = .025$
$31,000 - $60,000 (c)	75.40	12.94	210	< (g)	
$61,000 - $100,000 (d)	76.26	10.82	164		
$101,000 - $150,000 (e)	76.84	10.41	105		
$151,000 - $250,000 (f)	79.04	9.09	55		
> $250,000 (g)	82.10	9.26	15	> (a),(b),(c),	
Total	75.57	12.86	763		

The PWI means for income are consistent with Study 1 where SWB increases from the lowest income levels but eventually plateaus at the two highest levels. However, not all income levels are significant. Nevertheless, increasing income reaches the normative range at around $30,000, consistent with SWB theory. Also of interest is the effect size for income (2.5%) which is smaller than that for the BP group (6.5%) shown in Table 32, presented next.

Table 32

PWI means for income (BP group only)

Income	PWI mean	SD	N	Significant PWI differences	p
<$15,000 (a)	63.56	16.72	57	< (d), (e),(f),(g)	.01 (Dunnett's C)
$15,000 - $30,000 (b)	69.66	16.11	146	< (f),(g),	$Eta^2 = .065$
$31,000 - $60,000 (c)	71.22	14.14	171	< (f)	
$61,000 - $100,000 (d)	74.11	13.76	134	> (a),	
$101,000 - $150,000 (e)	74.83	10.88	55	> (a),	
$151,000 - $250,000 (f)	80.14	9.71	30	> (a),(b),(c),	
> $250,000 (g)	79.61	8.90	11	> (a),(b),(c),	
Total	71.69	14.70	604		

A similar pattern of increasing income occurs for the BP group with significant differences between income levels. The pattern of PWI means for each group in relation to the normal SWB range can be observed more clearly in Figure 17.

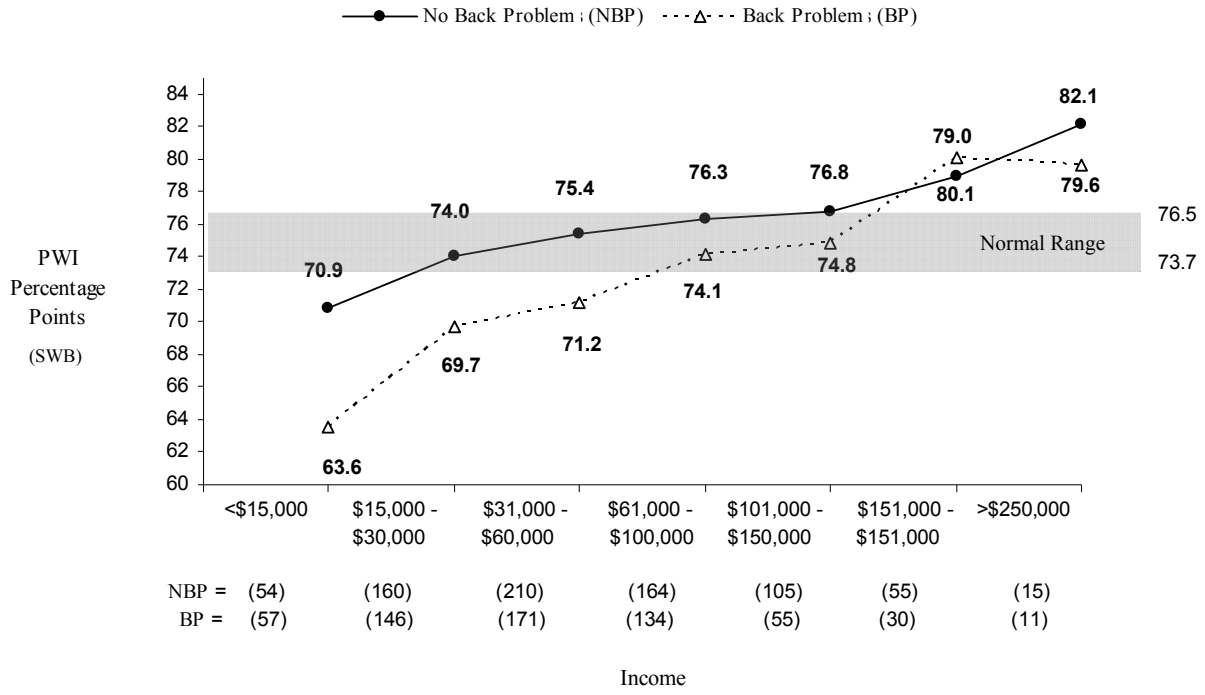


Figure 17. PWI means for income (BP and NBP groups)

The amount of income required to reach the normal SWB range is markedly different for the BP group compared to the normal population (NBP group). For the NBP group, a gross annual household income of around $30,000 is required to avoid the risk of homeostatic failure. This is consistent with the literature (Cummins, 2009b) and the results for the combined data in Study 1. The BP group on the other hand, requires approximately $90,000 to reach the bottom end of the normative range. Figure 17 suggests that the effect of income on SWB is greater for the group under threat of homeostatic failure (BP group) than the normal population (NBP group). However, these results should be treated cautiously due to limited significant differences between income levels.

It is possible that income could have a confounding affect on relationships between the PWI and other factors, particularly for the BP group. Therefore, income will be tested as a covariate, along with other variables that show similar effects.

Another potential confounding factor that demonstrated strong relationships to SWB in Study 1 was pain intensity. In this study however, there are no significant differences between any level of pain intensity at both .01 and .05 (Dunnett's C), as shown in Table 33.

Table 33

PWI means for pain intensity (BP group only)

Pain intensity	PWI mean	SD	N	Significant PWI differences between levels of pain intensity	p
0-20 (a)	72.92	13.61	44	None significant	>.01 and >.05 (Dunnett's C)
30 (b)	66.46	15.03	54		Eta^2 = .039
40 (c)	70.31	14.92	32		
50 (d)	65.84	14.38	44		
60 (e)	70.06	13.38	45		
70 (f)	68.69	15.73	47		
80-100(g)	63.45	14.45	38		
Total	68.21	14.68	304		

The random variation among the small cell sizes may explain this. Of most importance, is the lack of a linear trend in PWI means. In this analysis, increasing levels of pain do not have a corresponding drop in SWB as occurred, in part, in Study 1 This could be due to the more specific pain question used here, compared to the general question in Study 1, but this will be discussed in more detail at the end of this chapter.

While pain intensity was considered unsuitable for further analysis due to the lack of linear relationship to the PWI means, other variables, such as back problem frequency and limitations to daily living were investigated as potential influences on the lower SWB for the BP group.

6.6.2.2 PWI means for back problem frequency. This variable contributes 5.9% (Eta^2) to the variance in SWB and reflects significant differences between PWI means depending on the frequency with which the back problem is experienced (See Table 34).

Table 34

PWI means for back problem frequency (BP group only)

Back problem frequency	PWI mean	SD	N	Significant PWI differences	p
Every day (a)	66.84	16.26	145	< (c), (d), (e), (f)	.01 (Dunnett's C)
Almost every day (b)	69.09	14.92	150	< (f)	$Eta^2 = .059$
Once or twice a week (c)	73.20	12.38	108	> (a)	
Once or twice a month (d)	74.23	14.65	81	> (a)	
Once very few months (e)	74.67	13.73	109	> (a)	
Once a year or longer (f)	78.72	10.77	39	> (a)	
Total	71.49	14.77	632		

The lowest PWI mean occurs when a back problem is experienced every day (66.8), gradually increasing to normal levels at "once or twice a month" (74.2). The every day group is also significantly different to most other frequency categories and has the highest standard deviation. Figure 18 shows the extent to which the first three frequency categories fall below the normative range.

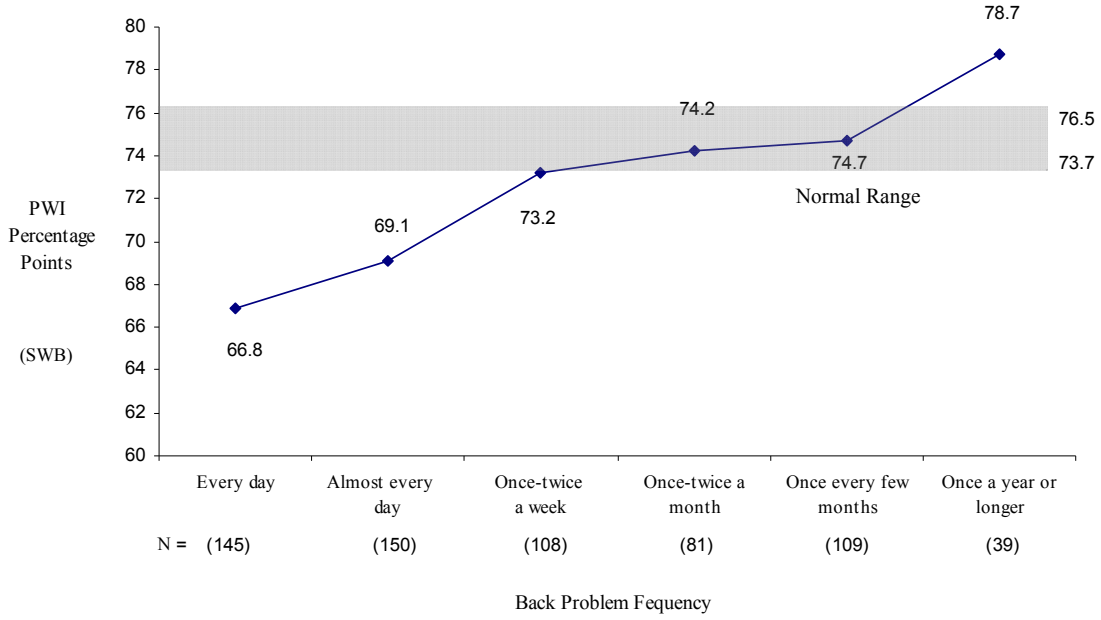


Figure 18. PWI means for back problem frequency (BP group only)

The low PWI mean of the every day group (6.9 points below the normal range) combined with the higher standard deviation for this group suggests that homeostatic mechanisms may be struggling to maintain SWB and thus a higher than normal risk of homeostatic failure is present when a back problem is experienced on a daily basis.

6.6.2.3 PWI means for limitations to daily living. Relationships between PWI means and respondents' perceived functional limitations were examined in regards to the ability to independently carry out personal care tasks, perform household tasks, to move around the house without assistance, and to be able to sleep without the aid of medication. The results of one way ANOVAs are shown in Table 35.

Table 35

PWI means for limitations to daily living (BP group only)

Limitation level	Personal care mean	SD	N	Sig	Household tasks mean	SD	N	Sig	Home mobility mean	SD	N	Sig	Sleeping mean	SD	N	Sig
00 (a)	75.00	14.08	428		76.80	12.85	76	>(i)	79.43	14.04	153	> (g)	75.53	14.71	132	>(i)
10 (b)	70.16	15.33	71		73.44	14.98	74		72.08	13.51	97		76.31	12.60	53	>(i)
20 (c)	70.68	17.67	44		70.98	14.55	73		74.44	14.12	84		73.35	13.79	81	>(i)
30 (d)	66.62	13.79	19		75.12	15.16	70	>(i)	68.73	13.47	64		72.71	13.38	49	
40 (e)	67.91	8.62	13	n/a	75.22	12.39	58	>(i)	73.48	13.87	39		71.36	13.80	43	
50 (f)	62.55	16.34	14		68.54	14.99	82	>(a)	65.86	18.92	50		71.61	14.96	62	
60 (g)	63.29	14.93	20		66.22	16.74	34		67.31	14.38	50		68.49	15.46	52	
70 (h)	70.36	17.29	16		69.90	14.20	59		69.97	14.19	42		69.18	16.01	49	
90-100 (i)	69.14	19.58	10		67.64	14.73	109	<(a) (d) (e)	69.16	15.95	56		65.48	14.46	114	
Total	71.56	14.79	635		71.56	14.79	635		71.56	14.79	635		71.56	14.79	635	
	None significant; $Eta^2 = .031$				.05 Dunnett's C; $Eta^2 = .055$				.05 Dunnett's C; $Eta^2 = .044$				.05 Dunnett's C; $Eta^2 = .062$			
	Not linear				Not linear				Not linear				Not linear			

Differences between various levels of personal care are not significant and there is also very little significant difference between PWI means for household tasks, home mobility, and sleeping which could be partly due to differing cell sizes. The pattern of PWI means in Figure 19 show that, where there are no limitations (00), SWB is within the normative range but with increasing limitations of 10 points or more, SWB decreases for most limitations. However beyond 10 points, evidence of systematic influences on further SWB decreases is lacking.

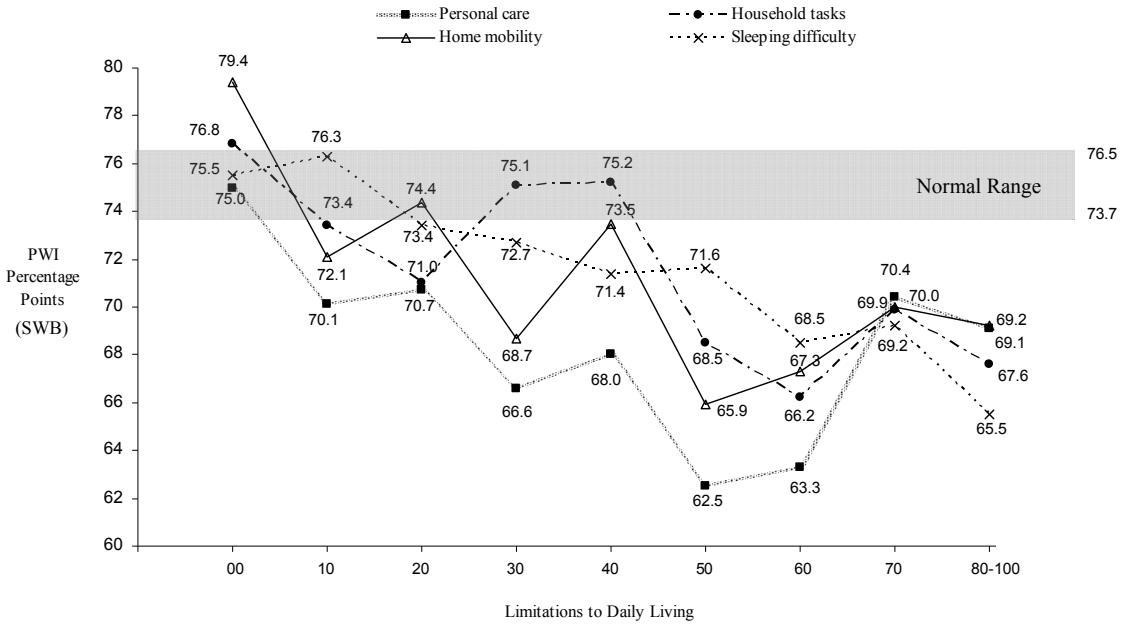


Figure 19. PWI means for limitations to daily living (BP group only)

In broad terms, there is a general downward direction of PWI means as the need for assistance with personal care, household tasks, and mobility around the home increases and also when difficulty in sleeping increases. Nonetheless, the path in between is far from linear and therefore unhelpful for use in more advanced statistical analyses.

In summary, the results so far indicate that only income and frequency of back problem demonstrate a linear relationship to SWB. Therefore, it would be useful at this point to examine their role as potential covariates that may affect the interpretation of results in this study.

6.6.2.4 Income covariance. An ANCOVA was conducted where the PWI mean represented the dependent variable, BP and NBP are the comparison groups (BP n = 604; NBP n = 753), and income is the covariate. Homogeneity of variance could not be assumed and as only two groups were examined, post hoc tests could not be conducted. Therefore the results should be viewed cautiously. On that basis, the covariance for income appears significant F (1, 148) = 20.18, p<.001, but the effect is small (partial Eta^2 .037). This has resulted in minor adjustments to the PWI means of no more than 0.25 points, as shown in Table 36.

Table 36

PWI means adjusted for income covariance (BP and NBP groups)

Dependent variable	Independent variable	Raw mean	SD	Adjusted mean	Mean difference	N
PWI mean	Back Problem (BP)	71.69	14.74	71.94	0.25	604
	No Back Problem (NBP)	75.57	12.86	75.37	- 0.20	703

6.6.2.5 Back problem frequency covariance. As back problem frequency is specific to the BP group only, it is not possible to conduct an ANCOVA as two groups cannot be compared in the same way as for income in the previous analysis. Therefore, the correlation matrix in Table 37 is used to identify relationships between back problem frequency and SWB, income, and the control variables.

Table 37

Pearson Product Moment Correlations for back problem frequency

	PWI (SWB)	PC	SC	SOL Control	Health Control	Achieve Control	Relations Control	Safety Control	Commty Control	Security Control	Income
Back problem frequency	.23**	09*	.10*	.14**	.21**	.17**	.17**	.11**	.14**	.11**	.16**

* $p<.05$; ** $p<.01$

The relationship of back problem frequency to SWB is significant but small (.23) as is Health Control (.21). All other variables have lower correlations and in the case of Primary and Secondary Control, significant only at <.05 (Pearson).

In conclusion, the results indicate that the decreased SWB for people with a back problem covaries with income, resulting in minor adjustments to the PWI mean. Similarly, back problem frequency has a significant but weak relationship to SWB, indicating that both variables are unlikely to affect interpretation of the results overall. On that basis, Hypothesis 1 that SWB is lower in the presence of a back problem is confirmed. This also supports the findings for the BP group in Study 1. The extent to which homeostatic processes are activated for this group is investigated as Hypothesis 2.

6.7 Hypothesis 2: That domain compensation is operating for people with a back problem.

This hypothesis aims to verify the results of Study 1 in which the back problem group did not show any evidence of domain compensation. A comparison of domain means is conducted before testing for domain compensation as this provides important background information.

6.7.1 Domain means. Significant differences (<.01 Welch) between the BP and NBP groups are reflected at the PWI domain level, with the exception of Relationships (.03 Welch) and Community Connectedness (.07 Welch), as shown in Table 38.

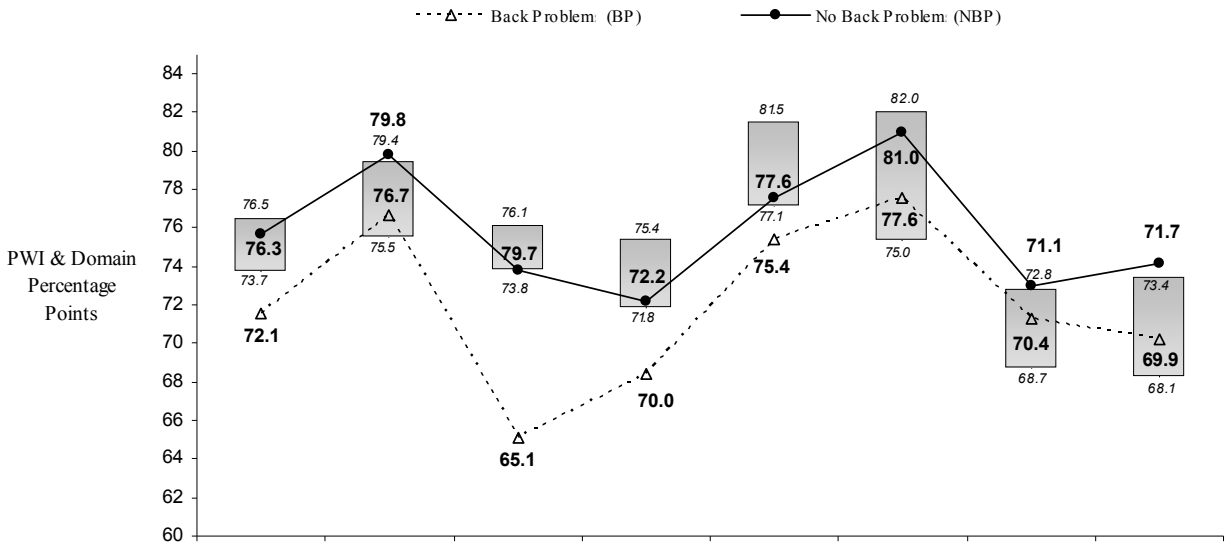
Table 38

Domain means for BP and NBP groups

PWI Domain	Group	Mean	SD	Mean differences	p	N
Standard of living	Back Problem (BP)	76.73	17.36	3.11	F (1, 1261) = 13.48, p =.000 (Welch) Eta^2 = .009	640
	No Back Problem (NBP)	79.84	14.90			817
Health	Back Problem (BP)	65.14	19.20	8.65	F (1, 1273) = 84.23, p =.000 (Welch) Eta^2 = .055	640
	No Back Problem (NBP)	73.79	16.74			817
Achievements in life	Back Problem (BP)	68.44	18.81	3.75	F (1, 1297) = 16.02, P = .001 (Welch) Eta^2 = .011	640
	No Back Problem (NBP)	72.19	16.90			817
Personal relationships	Back Problem (BP)	75.39	19.91	2.24	F (1, 1341) = 4.77, p =.030 (Welch) Eta^2 = .003	640
	No Back Problem (NBP)	77.63	18.98			817
Safety	Back Problem (BP)	77.58	18.11	3.44	F (1, 1274) = 14.94, p = .000 (Welch) Eta^2 = .010	640
	No Back Problem (NBP)	81.02	15.80			817
Community connectedness	Back Problem (BP)	71.27	18.73	1.75	F (1, 1455) = 3.31, p =.070 (Welch) Eta^2 = .002	640
	No Back Problem (NBP)	73.02	17.95			817
Future security	Back Problem (BP)	70.23	19.61	3.91	F (1, 1299) = 15.98, p <.000 (Welch) Eta^2 = .011	640
	No Back Problem (NBP)	74.15	17.68			817

The largest mean difference occurs in the Health domain (8.7 points) with a difference of < 4.00 points for all other domains. The partial Eta^2 for Health indicates that the presence of a back problem contributes 5.5% to the variance in health satisfaction which is much higher than the effect sizes of other domains (0.2% to 1.1%)

The variance for the BP group is also higher than the NBP group on all domains indicating that there are more people with a back problem who fall below the normative range, thus creating a wider distribution of values within that group. Figure 20 presents a comparison of the two groups on each domain.



	PWI	SOL	Health	Achieve	Relations	Safety	Community	Future Security
Normative range	76.5	79.4	76.1	75.4	81.5	82.0	72.8	73.4
	73.7	75.5	73.8	71.8	77.1	75.3	68.7	68.2

Figure 20. Domain means for BP and NBP groups

While domain satisfaction for the BP group is below normal levels on Health, Achievements, and Relations, it is within the normal range for Standard of Living, Safety, Community, and Security. It is possible therefore, that domain compensation (Best et al., 2000) may be operating through some of these domains to offset low satisfaction with Health and to return SWB to normal levels. However, this needs to be confirmed through further statistical analysis as observation of domain means and ANOVA differences provide insufficient information on compensatory processes.

6.7.2 Domain compensation tests. As the PWI mean for the BP group (72.1 points) closely approximates the 70 points at which domain compensation is proposed to be activated (Cummins, 2002), compensatory effects were tested. As in Study 1, the domain means are firstly converted to a percentage of the total PWI score to obtain the relative contribution made by each domain (Best et al., 2000). Domain compensation is proposed to be present in groups where domain mean percentage contributions to the total PWI score significantly differ from the normal population (Best et al, 2000). In this study, the normal population is represented by the NBP group. A multivariate analysis of variance (MANOVA) revealed a significant multivariate main effect F (7, 1449) = 9.18, p=.000, Wilk's Lambda = .96, partial Eta^2 = .042. Table 39 provides a summary of the results.

Table 39

MANOVA for domain mean percentage contributions x BP and NBP groups

Domain	Back problem group	Mean % of PWI	SD	N	Mean difference to NBP Group	Domain univariate effects
Standard of living	Back Problem (BP)	10.81	1.99	640	0.18	F (1,1455) = 3.81 p = .051, Eta^2 = .003
	No Back Problem (NBP)	10.63	1.60	817		
Health	Back Problem (BP)	9.15	2.28	640	- 0.69	F (1,1455) = 36.44 p = .000, Eta^2 = .024
	No Back Problem (NBP)	9.84	2.09	817		
Achievements	Back Problem (BP)	9.54	1.73	640	0.01	F (1,1455) = 0.01 p = .942, Eta^2 = .000
	No Back Problem (NBP)	9.53	1.63	817		
Personal relationships	Back Problem (BP)	10.65	2.77	640	0.42	F (1,1455) = 11.34 p = .001, Eta^2 = .008
	No Back Problem (NBP)	10.23	1.94	817		
Safety	Back Problem (BP)	10.95	2.23	640	0.15	F (1,1455) = 1.70 p = .193, Eta^2 = .001
	No Back Problem (NBP)	10.80	1.96	817		
Community connectedness	Back Problem (BP)	9.98	1.92	640	0.35	F (1,1455) = 12.97 p = .000, Eta^2 = .009
	No Back Problem (NBP)	9.63	1.72	817		
Security	Back Problem (BP)	9.83	2.17	640	0.05	F (1,1455) = 0.21 p = .648, Eta^2 = .001
	No Back Problem (NBP)	9.78	1.69	817		
Domain range	Back Problem (BP) 1.80 points					
	No Back Problem (NBP) 1.27 points					

Significant differences were found between the BP group and the normal population for Health (- 0.69), Personal Relationships (.042), and Community Connectedness (.035). This suggests that domain compensation is operating for the BP group where increased satisfaction with the interpersonal domains of Personal

Relationships and Community Connectedness appear to be at least partially offsetting low satisfaction with Health. Thus Hypothesis 2 is supported. The extent to which low perceived control affects the reduced SWB of the BP group is examined next.

6.8 Hypothesis 3: That the SWB of the back problem group is further reduced when perceived control is low.

Hypothesis 3 provides the main focus of this study in which the relationship between SWB and perceived control is examined in detail. Study 2 addressed the relationship between SWB and perceived control, but only for a general population. This study examines these relationships specifically for people with a back problem.

To prepare the data for this next analysis, the averaged summed scores for Primary Control, Secondary Control, and Domain Control (Total Domain Control) were calculated. In terms of cell sizes, there were a small number of cases at the lower levels of control which necessitated combining the levels at 0-50 points for each control factor. The smallest cell size (36 cases) now occurs at 100 points of Domain Control (BP group).

A series of one way ANOVAs compared the PWI means of the BP and NBP groups on the various levels of Primary Control, Secondary Control and, as a separate analysis, Total Domain Control. In Table 40, only differences at the more stringent significance level (<.01) are shown for Primary Control and Secondary Control. The full ANOVA results for these variables are included in Appendix K, while the results for Total Domain Control are discussed later.

Table 40

PWI means for Primary Control and Secondary Control

Primary Control	Group	PWI mean	SD	N	PWI mean difference	P
0-50	Back Problem (BP)	60.00	16.91	91	- 7.74	F (1, 177) = 11.04 p = .000 Eta^2 = .059
	No Back Problem (NBP)	67.74	14.09	88		
80	Back Problem (BP)	73.51	13.34	152	- 4.36	F (1, 283) = 11.77 p = .000 (Welch) Eta^2 = .032
	No Back Problem (NBP)	77.87	10.84	211		
Secondary Control	Group	PWI mean	SD	N	PWI mean difference	p
0-50	Back Problem (BP)	57.71	17.12	63	- 12.15	F (1,121) = 16.17 p = .000 Eta^2 = .118
	No Back Problem (NBP)	69.86	16.34	60		
80	Back Problem (BP)	73.47	12.31	155	- 3.36	F (1,278) = 8.81 p = .005 (Welch) Eta^2 = .023
	No Back Problem (NBP)	76.83	9.62	221		

Significant differences (<.01) between the BP and NBP groups are only occurring at 0-50 points and 80 points of Primary and Secondary Control. Secondary Control demonstrates the largest significant difference between groups (-12.2) at 0-50 points and also has the largest effect size (Eta^2 .118). Of particular note is the extent to which the PWI mean approximates the normal range when Primary and Secondary Control are at 80 points and 0-50 points, as illustrated in Figure 21.

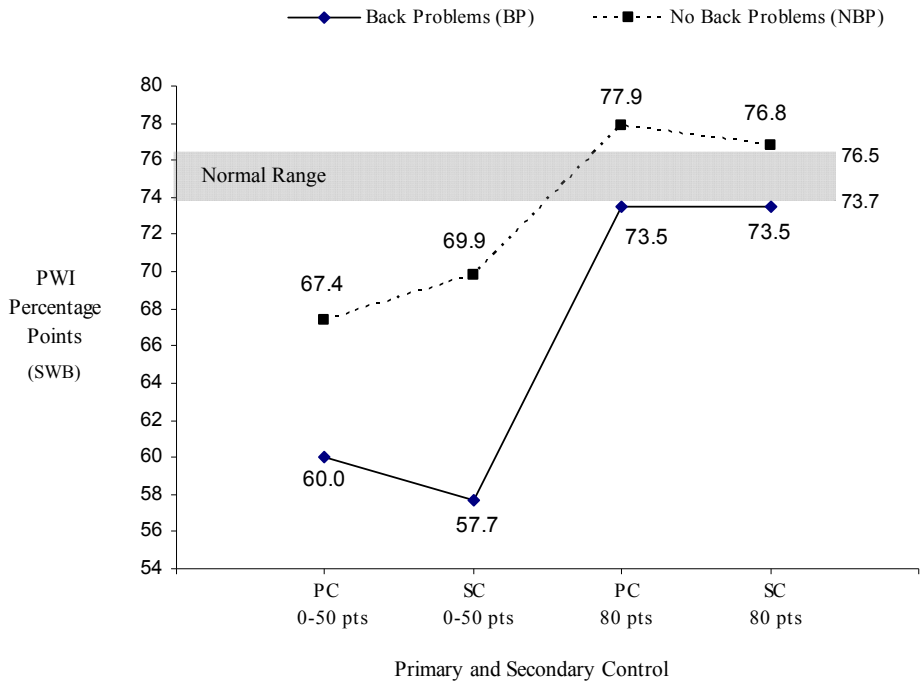


Figure 21. PWI means for Primary and Secondary Control (BP and NBP groups)

At 0-5 points, the PWI mean is below normal for both groups with Secondary Control showing the largest difference between the two groups (12.2 points). At 80 points of control, the BP group is still marginally below the normal SWB range. Finally, the lowest PWI mean overall is for low use of Secondary Control for the BP group which is 16 points below the normal range. However, the lower cell sizes for Secondary Control may have influenced the extent of these results (see Table 40).

For Domain Control, the first comparison between the BP and NBP groups used the Total Domain Control score as the single reliable factor identified earlier. However, there were no significant differences between groups at <.01 (see Appendix L for details). Subsequently, ANOVAs comparing the two groups on individual control domains, found a similar pattern of significant PWI mean differences at 0-50 points and 80 points as occurred for Primary and Secondary Control. Table 41 shows only the significant results at <.01 (Welch) for the BP and NBP groups. This excludes SOL Control and Security Control which were not significant. Full ANOVA results for all Domain Control items are included in Appendix M.

Table 41

PWI means for individual control domains

Control domain	Control level	Group	PWI	SD	N	Mean PWI difference	p
Health Control	0-50 pts	Back Problem (BP)	61.26	15.29	188	- 4.46	F (1, 323) = 6.72, p = .010 Eta^2 = .020
		No Back Problem (NBP)	65.72	13.37	137		
Achievements Control	80 pts	Back Problem (BP)	77.83	9.13	159	- 2.21	F (1, 274) = 7.65, p = .010 (Welch) Eta^2 = .018
		No Back Problem (NBP)	80.04	.. 7.07	257		
Relationships Control	80 pts	Back Problem (BP)	73.55	11.59	156	- 4.42	F (1, 275) = 17.72, p = .000 (Welch) Eta^2 = .045
		No Back Problem (NBP)	77.97	8.81	222		
Safety Control	0-50 pts	Back Problem (BP)	55.99	15.30	108	- 5.72	F (1, 201) = 7.11, p = .008 Eta^2 = .034
		No Back Problem (NBP)	61.71	15.21	95		
	80 pts	Back Problem (BP)	74.57	11.31	189	- 3.09	F (1, 356) = 10.18, p = .002 (Welch) Eta^2 = .022
		No Back Problem (NBP)	77.66	9.40	269		
Community Control	0-50 pts	Back Problem (BP)	55.29	14.71	130	- 4.62	F (1, 259) = 6.61, p = .011 Eta^2 = .025
		No Back Problem (NBP)	59.91	14.38	131		

As in the previous analysis, the control domains are within or very close to the normal SWB range at 80 points for both groups (from 73.6 for the BP group and up to 78.3 points for the NBP group). At 0-50 points, PWI means are below normative levels for both groups with significant differences occurring for Health, Safety and Community Control. In the case of Community Control, the significance of .011 is slightly larger than the cut-off at <.01.

Figure 22 reflects the results for low control (0-50 points) for both groups in ascending order of PWI means. As before, the grey horizontal bar represents the normative SWB range.

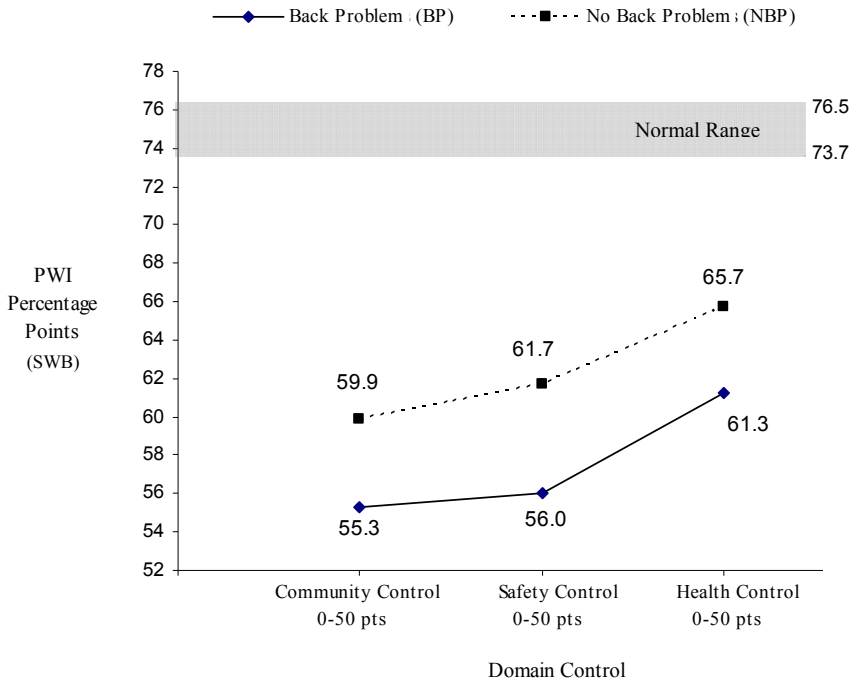


Figure 22. PWI means for control domains (BP and NBP groups)

Figure 22 shows that low perceived control over Community, Safety and Health is associated with below normal SWB for both groups, but more so for the BP group. Of particular note is perceived control over Community Connectedness (BP group) which represents the lowest PWI mean overall at 18.4 points below the normal range. This is closely followed by perceptions of low control over Safety. Table 42 presents a summary of the PWI means for low control (0-50 points) for the various analyses undertaken in this study. Note that for each of the analyses conducted earlier, results are significant at .011 or below.

Table 42

Summary of PWI means for the BP group

	Analysis results	PWI mean
Original PWI means	Raw PWI mean (Table 30)	71.69
	PWI mean after ANCOVA adjustments (Table 36)	71.94
PWI means for low control variables	Health Control 0-50 points (Table 41)	61.26
	Primary Control 0-50 points (Table 40)	60.00
	Secondary Control 0-50 points (Table 40)	57.71
	Safety Control 0-50 points (Table 41)	55.99
	Community Control 0-50 points (Table 41)	55.29

All means shown here are below the normative range. The original mean, obtained when the BP and NBP groups were first compared in Table 30, is just under the normative range at 71.7 points. However, when the various forms of low control are observed, the PWI means for the BP group are lower that the 71.7 points observed earlier, with the largest reduction occurring for low Community Control (55.3). Here, the PWI mean is well below the homeostatic threshold of 70 points (Cummins, 2002; 2003) and also below the 59 points at which SWB is considered to be close to depression (Cummins, Tomyn et al., 2007).

In summary, the results support the contention that the SWB of the back problem group is further reduced when control is low (Hypothesis 3). This represents a substantial risk of homeostatic failure for people with a back problem, particularly in combination with perceptions of low control over Community Connectedness.

It is evident from the literature, however, that there are other factors that may mitigate or confound these results. Recent publications on SWB and homeostatic theory point to the influence of Homeostatically Protected Mood (HPMood) as a driver of SWB that needs to be taken into account during the analysis of SWB data (Cummins,

2010a). The extent to which HPMood may be affecting the statistical relationships between SWB and control identified in the previous analyses is investigated in the next section, thus presenting the final hypothesis for Study 3.

6.9 Hypothesis 4: That the strength of the relationship between SWB and control is substantially weakened when Homeostatically Protected Mood (HPMood) is controlled

Recent literature suggests that Homeostatically Protected Mood (HPMood) is the main influence on SWB judgments and a representation of an individual's normal SWB set-point that is experienced as a positive activated mood (Cummins, 2010a). According to the Theory of Homeostasis (Cummins, 1995, 1998, 2010a), homeostatic mechanisms are activated by a perceived reduction in HPMood in order to return an individual to their normal set-point range. The implications of this theory are that inferences made from SWB data may be attributed to the wrong variables if HPMood has not been taken into account as a potential confounding factor.

HPMood is an aggregated, average score comprising the traits content, happy, alert and excited. The questions are worded as "how content do you generally feel?", "how happy do you generally feel?" and so forth, recorded on a 0-10 point scale (see questions 10, 12, 13 and 14 in the questionnaire at Appendix H).

This final hypothesis investigates the extent to which HPMood contributes to the SWB of people with a back problem and the effect of this on relationships between SWB and the perceived control variables identified in this study. Partial correlations will be used in the first instance, followed by hierarchical regression analysis.

6.9.1 Partial correlations and HPMood.

As the back problem group is of most interest in this study, only the BP data were used to obtain partial correlations which controlled for HPMood. A Pearson product-moment correlation matrix is presented in Table 43 where the sample size ranged from 584 to 637. Note that zero order correlations with the PWI appear next to each control variable. The partial

correlation in which HPMood has been controlled, appears immediately below each control variable.

Table 43

PWI partial correlations controlling for HPMood (BP group only)

	PWI	1	2	3	4	5	6	7	8	9	Diff	R^2 (%)	Z_{obs}
PWI Mean (SWB)	1.00												
1. Primary Control	.41**											16.8	
Partial HPMood	.11*	1.00									-.30	01.2	5.7
2. Secondary Control	.39**	.51**										15.2	
Partial HPMood	.09*	.38**	1.00								-.30	00.8	5.8
3. SOL Control	.63**	.33**	.40**									39.7	
Partial HPMood	.37**	.11*	.20**	1.00							-.26	13.7	6.5
4. Health Control	.49**	.27**	.25**	.46**								24.0	
Partial HPMood	.25**	.08*	.06	.27**	1.00						-.24	06.3	14.4
5. Achieve Control	.67**	.43**	.35**	.60**	.49**							44.9	
Partial HPMood	.38**	.21**	.09*	.37**	.30**	1.00					-.29	14.4	7.4
6. Relations Control	.61**	.38**	.37**	.50**	.44**	.59**						37.2	
Partial HPMood	.30**	.15**	.14**	.24**	.24**	.33**	1.00				-.31	09.0	7.1
7. Safety Control	.57**	.32**	.31**	.49**	.46**	.43**	.46**					32.5	
Partial HPMood	.38**	.14*	.13*	.31**	.32**	.20**	.26**	1.00			-.19	14.4	4.3
8. Community Cntrl	.63**	.40**	.36**	.47**	.37**	.58**	.50**	.57**				39.7	
Partial HPMood	.40**	.21**	.15**	.24**	.17**	.37**	.26**	.43**	1.00		-.23	16.0	5.5
9. Security Control	.63**	.28**	.34**	.59**	.44**	.50**	.40**	.67**	.56**			39.7	
Partial HPMood	.45**	.07	.15**	.44**	.28**	.28**	.16**	.57**	.40**	1.00	-.18	20.3	7.1

* $p<.05$; ** $p<.01$

Differences in correlation coefficients are considered to be statistically significant if the Z_{obs} value is ≤ -1.96 or ≥ 1.96 (Pallant, 2007). In Table 43, all

differences between the zero order correlations and correlations after HPMood is removed are significant with Health Control representing the most significant of these (14.4 Z_{obs}).

Correlations for Primary Control and Secondary Control are substantially reduced when HPMood is removed. In terms of shared variance (r^2), Primary Control is reduced from a 16.8% contribution to SWB variance down to a mere 1.2%. Secondary Control has reduced even further from 15.2% shared variance 0.80%. Individual control domain correlations are also reduced to a smaller extent with shared variance reduced to no less than 6.3% (Health Control).

Overall, the results indicate that HPMood has a stronger influence on relationships between SWB and Primary and Secondary Control than SWB relationships with individual control domains. To investigate the extent to which HPMood contributes to the variance in SWB compared to the variance from perceived control, a series of hierarchical multiple regressions using the same BP sample group (*n* = 640) were undertaken.

6.9.2 Contribution of HPMood to SWB. Hierarchical multiple regression is selected over standard multiple regression for these analyses as it allows the researcher to enter the variables on the basis of theoretical grounds. This method also allows each independent variable to be assessed on what it can add to the model after previously entered variables are controlled for (Pallant, 2007). In this case, the theoretical basis is that HPMood adds a large amount of unique variance to SWB once Primary and Secondary Control have been controlled. This can be inferred from the correlations matrix in Table 43 and confirmed in Table 44. Here, the PWI mean represents the dependent variable while HPMood and Primary and Secondary Control represent the independent variables. Note that the Domain Control variables and HPMood are investigated in a separate analysis to be consistent with the approach taken earlier in this thesis.

Table 44

Hierarchical multiple regression PWI x PCSC and HPMood

	R	R^2	Adj R^2	ΔR^2	B	β	Part	sr^2 (%)
Step 1								
Primary Control					.28***	.28	.242	5.86
Secondary Control					.24***	.25	.212	4.49
	.46	.21	.21				Total	10.35
	Unique variance = .104; Shared variance = .103							
Step 2								
Primary Control					.07*	.07	.054	0.29
Secondary Control					.04	.04	.031	0.93
HPMood					.77***	.71	.607	36.06
	.76	.58	.58	.37***			Total	38.06
	Unique variance = .381; Shared variance = .195							

* $p<.05$; ** $p<.01$; *** $p<.001$

Primary and Secondary Control were entered at Step 1 explaining 21% of the variance in the PWI mean, F (2, 633) = 84.07, $p<.000$. After entering HPMood at Step 2, the total variance explained by the model as a whole is 58%, F (3, 632) = 288.73, $p<.000$. HPMood explained an additional 37% of the variance in the PWI mean F *change* (1, 632) = 551.75, $p<.000$. In the final model, only HPMood is statistically significant at <.01, recording a much higher beta value (beta = .77, $p<.000$) than either Primary Control (beta = .07, $p<.05$) or Secondary Control (beta = .04, $p>.05$).

It is also notable that the unique contribution of HPMood to the PWI mean (sr^2) is also much higher at 36.06% compared to Primary Control (0.29%) and Secondary Control (0.93%). From these results, it is evident that HPMood not only dominates the SWB variance compared to that accounted for by Primary and Secondary Control in Step 1, but it has reduced the significance levels for Primary Control down to <.05 and,

for Secondary Control, removed it's significance completely. When the contributions made by HPMood were subsequently tested with the individual control domains, the effect is less distinct (see Table 45).

Table 45

Hierarchical multiple regression PWI x Domain Control and HPMood

	R	R^2	Adj R^2	ΔR^2	B	β	Part	sr^2 (%)
Step 1								
SOL Control					.16***	.16	.113	1.28
Health Control					.05	.05	.037	0.14
Achieve Control					.21***	.22	.148	2.19
Relations Control					.17***	.19	.144	2.07
Safety Control					.06	.06	.041	0.17
Community Control					.17***	.18	.125	1.56
Security Control					.17***	.18	.121	1.46
	.81	.65	.64				Total	8.87
	Unique variance = .089; Shared variance = .555							
Step 2								
SOL Control					.10**	.10	.070	0.49
Health Control					.02	.02	.017	0.03
Achieve Control					.12***	.12	.080	0.64
Relations Control					.09*	.10	.072	0.49
Safety Control					.05	.06	.038	0.14
Community Control					.12***	.13	.091	0.83
Security Control					.15***	.16	.105	1.10
HPMood					.42***	.38	.259	6.71
	.85	.72	.71	.07***			Total	10.43
	Unique variance = .104; Shared variance = .608							

* $p<.05$; ** $p<.01$; *** $p<.001$

All domain control variables were entered at Step 1, explaining 65% of the variance in the PWI mean, $F(7, 621) = 84.07$, $p<.000$. After entering HPMood at Step 2,

the total variance explained by the model as a whole is 72%, F (8, 620) = 288.73, p<.000. HPMood in this instance explains only an additional 7%, *F change* (1, 620) = 146.62, p<.000.

In the final model, HPMood is statistically significant (<.001) along with Achievements Control, Community Control and Security Control. Relationships on the other hand was reduced from a significance of <.001 to <.05. Once again, HPMood has the higher beta value (beta = .42, p<.05) and the highest unique contribution to SWB (sr^2 = 6.71%). As in the previous analysis, the Domain Control variables are reduced when HPMood is added to the model, but to a lesser extent than for Primary and Secondary Control, with a minor 0.07 change in the R^2.

Overall, the effect of HPMood is much larger on relationships between SWB and Primary and Secondary Control than for Domain Control. Nevertheless, the results presented here confirm Hypothesis 3 that the strength of the relationship between SWB and control are substantially weakened when Homeostatically Protected Mood (HPMood) is controlled, particularly in the case of Primary and Secondary Control.

In conclusion, the potential for HPMood to act as a confounding factor in SWB statistical relationships warrants some caution in making inferences regarding SWB and perceived control for people with a back problem. However, as HPMood is a relatively new concept in the literature, further research is required to confirm this interpretation.

6.10 Study 3 Discussion

Study 3 investigated the extent to which SWB is decreased by the presence of a back problem and whether domain compensation processes are operating for this group. In addition, this study also investigated whether SWB is further reduced by a sense of low control and finally, the extent to which Homeostatically Protected Mood (HPMood) affects relationships between SWB and control.

6.10.1 Back problem and low SWB (Hypothesis 1). As in Study 1, and as expected, SWB was lower in the presence of a back problem (BP). Moreover, the level of SWB in Study 3 (71.6 points) was similar to that in Study 1 (67.5 points) where the back problem group is below the normative SWB range. In addition, the influence of the covariates (gender, age, back problem frequency, and limitations to daily living) on the relationship between SWB and BP was found to be minor or not significant in both studies.

Of particular interest is the interaction between SWB and income. For a normal population, an annual household income of $30,000 is associated with the bottom of the normative SWB range (Cummins et al., 2009b). In contrast, the BP groups examined in Study 1 and Study 3 required approximately $90,000 to reach normative SWB levels. This indicates that income is a more important external resource for this group than for general population samples.

Surprisingly, pain intensity was not associated with a linear decrease in SWB, and the levels of pain were not significantly different to each other. Therefore increases in pain were not associated with corresponding decreases in SWB, as had occurred, in part, in Study 1. Consequently, the pain variable was not used in further analyses.

The difference between the two studies may have been due to the wording of the pain question. In Study 1, respondents were asked “how much physical pain do you experience each day?” For Study 3, this was changed to “how much physical pain is your back problem giving you now?” The latter wording was intended firstly to focus specifically on back pain and secondly, to avoid pain memory bias. As some researchers have found that recalling pain experiences from the past can be inaccurate (Erskine et al., 1990; Brodie & Niven, 2000; Morley, 2007), it was considered more appropriate to focus on current pain experienced by respondents during completion of the questionnaire. However, use of the word “now” rather than “each day” as was used in Study 1, may have unnecessarily restricted the data and magnified individual differences at a single moment in time, thus creating the inconsistent results between the two studies.

In conclusion, SWB was found to be lower in the presence of a back problem, particularly when accompanied by an annual income below $90,000, consistent with the results of Study 1. However, there is no significant association between SWB and pain intensity in this study. The operation of the homeostatic system (domain compensation) in response to SWB reductions for the BP group was investigated further in Hypothesis 2.

6.10.2 Domain compensation (Hypothesis 2). Domain compensation is proposed to offset low satisfaction in some domains with increased satisfaction in others in order to maintain SWB within the normal range, or to prevent low SWB from dropping further (Best et al., 2000). Health satisfaction was found to be the lowest of all domains for the BP group. However, this was offset by significantly higher satisfaction in the interpersonal domains of Personal Relationships and Community Connectedness which is consistent with domain compensation theory (Best et al., 2000). This finding is also consistent with a wider literature on personal relationships and social support as buffers to stressful events (Cummins, 2000b; 2010a; Dahlem et al., 1991; Panzarella & Alloy, 2006; Sarason et al, 1987), including those involving medical conditions (Aronson, 1997; Emerson et al., 2009; Luger et al., 2009; McQuillan et al., 2003), and the presence of a back problem in particular (Australian Institute of Health and Welfare, 2006).

Of interest, is the absence of Standard of Living (SOL) as a compensatory domain given the strong associations between income and SWB for the BP group compared to the NBP group. However, as an annual income of approximately $90,000 is required to reach normal SWB levels for this group, and only 9.1% of the sample is currently in this income bracket (see Appendix I), it is understandable that people with a back problem are not highly satisfied with SOL. Indeed, satisfaction with SOL was just above the bottom of the normative SWB range at 76.7 points.

It is also interesting to note that the domain compensation results found here are in contrast to Study 1 where no such effect was found for the BP group. This could be due to the differing SWB levels between Study 1 (67.5) and Study 3 (71.6). As domain

compensation is proposed to be activated as SWB declines towards the homeostatic threshold of 70 points (Cummins, 2002), the lower SWB for the BP group in Study 1 may have caused domain compensation processes to lose their power to the competing demands of external challenges such as difficult symptoms of a back problem.

This possibility receives support from the results of other medical conditions in Study 1 where domain compensation was present only for conditions with an SWB above 70 points (asthma 72.8 points; cancer 72.8 points; arthritis 71.6 points; and diabetes 70.2 points) but not for back problem at 67.5 points. It appears from these examples that domain compensation may be highly sensitive to a threshold SWB level of around 70 points.

The remainder of Study 3 focused on associations between perceived control and the SWB of people with a back problem.

6.10.3 Back problem, low control, and reduced SWB (Hypothesis 3). As expected, the below normal SWB for the BP group, identified at the start of Study 3 (71.6 points), was further reduced in the presence of low control (<50 points). More specifically, below normal SWB occurred for low Primary Control (60.0 points) and low Secondary Control (57.7 points). These results are consistent with the contention that a perceived loss of control places the normal maintenance of SWB at risk (Cummins, 2005; Heeps, 2000; Rothbaum et al., 1982).

Indeed, this theory is further supported by other sample groups in this thesis which also showed below normal SWB in the presence of low Primary and Secondary Control. These include the no back problem (NBP) group in Study 3 (67.7 and 69.9 points respectively), and the non-medical sample in Study 2 (65.3 and 62.7 points respectively). Nonetheless, these results are not as low as the BP group, where the challenges of low Primary and Secondary Control to SWB homeostasis are further exacerbated in the presence of a back problem.

For Domain Control, it was expected that below normal SWB would be similarly associated with perceptions of low control (<50 points) on each domain. However, only low Community, Safety and Health Control were significantly associated with below normal SWB for the BP group. Of these, the lowest SWB was found for perceptions of low Community Control (55.3 points), closely followed by Safety Control (56.0) and Health Control (65.7). This is well below the 70 point SWB homeostasis threshold and suggests that control over connectedness to the community in particularly is important to the BP group in order to maintain SWB.

Other studies have also reached similar conclusions in regards to the need for social/community connections for people with a medical condition. For example, a study of individuals with multiple sclerosis found that reduced social activities were a greater contributor to low SWB than fatigue, mobility limitations, and unemployment (Aronson, 1997). Along similar lines, restrictions in psychosocial domains such as family relationships, social, and leisure activities for people with Parkinson's disease, were found to be significantly related to lower life satisfaction and symptoms of depression (McQuillan, et al., 2003). Finally, for people with a back problem, limitations on the ability to engage in social and recreational activities were associated with an increased occurrence of depression (Australian Institute of Health and Welfare, 2006).

In regards to low Safety Control, it is possible that feelings of vulnerability and perceptions of an inability to physically protect the self in an emergency could be associated with the low SWB found in this study. By the same token, low Health Control and its association with low SWB could involve ongoing feelings of frustration with difficult-to-resolve symptoms. Nevertheless, both control variables require further investigation to verify their association with below normal SWB.

It is interesting to note that low Community Control (<50 points) has also been associated with below normal SWB (59.9 points) for the NBP group in Study 3 (Table 42), and the non-medical sample in Study 2 (65.8 points, Table 26). Low Safety Control also demonstrated below normal SWB for these groups (61.7 NBP group; 65.6

non-medical sample). For low Health Control, both groups were closer to the normal SWB range, but as discussed earlier, it is the added combination of a back problem with low perceptions of control that appear to be the most challenging to SWB homeostasis.

Overall, the results for Hypothesis 3 indicate that low levels of Primary, Secondary, Health, Safety, and Community Control represent significant challenges to SWB homeostasis. Along similar lines, there is a substantial literature indicating that perceptions of personal control help people to cope better with illness (e.g., Myers & Diener, 1995), and that those with a chronic health problem need to have higher perceptions of control for their SWB to be comparable to a normal population (Lachman & Weaver, 1998). Conversely, chronic illness has been associated with undermining perceptions of control and exacerbating feelings of powerlessness that are linked to depression (Thompson & Spacapan, 1999). However, it is difficult to directly compare the results of Study 3 to medical-related studies as a variety of different control and wellbeing scales have been used in the literature. These will be discussed further in the concluding chapter.

6.10.4 SWB, control, and the effects of HPMood (Hypothesis 4). To address Hypothesis 4, the relationship between SWB, HPMood and perceived control was investigated for the BP group using two separate hierarchical regressions; the first for Primary and Secondary Control, and the second for Domain Control. The first of these regressions predicting SWB, found that when the influence of HPMood was added, the unique SWB variance of Primary Control was substantially reduced, while that for Secondary Control became non-significant. This suggests that the SWB variance explained by Primary Control and Secondary Control is largely represented by HPMood.

In the second regression using the Domain Control variables, it was considered likely that HPMood would make a smaller unique contribution. This is because earlier partial correlations had found that when the variance from HPMood was removed, relationships between SWB and Domain Control were reduced to a lesser degree than for Primary and Secondary Control

As expected in the hierarchical regression, HPMood had little effect on relationships between SWB and the Domain Control variables. This could be due to differences in question abstraction as people tend to respond to specific questions, such as the individual life domain items, by accessing cognitive information. More abstract questions on the other hand, are likely to be answered by referring to the current mood state (Schwarz & Strack, 1999).

Notably, the Domain Control questions require respondents to focus on specific cognitive assessments in response to the question "how much control do you feel you have over your [specific domain]" The Primary and Secondary Control items, on the other hand, are more abstract. They ask respondents to predict the extent to which they would use various coping strategies "when something bad happens" Thus, it can be expected that HPMood will share more SWB variance with Primary and Secondary Control than with Domain Control

In conclusion, the potential for HPMood to act as a confounding factor warrants further consideration when making inferences about relationships between SWB and perceived control for people with a back problem. Nevertheless, the perceived control domains of Community, Safety, and Health still appear to represent the most substantial and significant challenge to SWB for this group, even after the shared SWB variance of HPMood is removed.

6.11 Study 3 Conclusion

This final study confirmed the results of Study 1, that reduced SWB is associated with the presence of a back problem. Further reductions were also found with low perceptions of control (<50 points). However, the strength of the relationship between perceived control and SWB decreased when the shared variance of HPMood was removed.

The results also highlight the importance of interpersonal connections as a buffer to the SWB of people with a back problem; firstly through the compensatory domains of Personal Relationships and Community Connectedness, and again through perceptions of control over the Community Connectedness domain. Along similar lines, the external buffer of income was also notable for people with a back problem as higher than normal income protected SWB.

In terms of SWB theory, further support has been provided for the existence of a SWB homeostatic threshold at about 70 points (Cummins, 2010a), and for the contention that domain compensation is activated at this level in order to retain SWB within the normal range, or to prevent it from dropping further (Cummins, 2002).

Overall, the results in this study are comfortably positioned within the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) where external buffers (relationships and income), cognitive buffers (perceived control, self-esteem, and optimism), and domain compensation processes act as components of an integrated system to maintain SWB within an individual's normal set-point range. In the case of people with a back problem, however, there are weaknesses in the homeostatic system that threaten to defeat SWB. Specifically, these relate to perceptions of low control over Community Connectedness, Safety and Health, and an income below $90,000.

Chapter 7: Summary and Final Synthesis

This thesis investigated relationships between SWB, health satisfaction, and perceived control. Three consecutive studies explored the impact of chronic medical conditions on SWB and the operation of the SWB homeostatic system in response to challenges from these conditions. It was hypothesised that SWB is decreased by the presence of a medical condition, that the challenges imposed by specific conditions engages domain compensation to offset low health satisfaction, and that the SWB of people with a back problem is further reduced when perceived control is low.

7.1 Summary of Results

Study 1 investigated the SWB and health satisfaction of respondents with a self-assessed medical condition using combined data from the Australian Unity Wellbeing Index. Respondents with a medical condition were found to have significantly lower SWB than a normal population, particularly in the presence of pain. In addition, the back problem group presented with the lowest SWB of the seven physical conditions examined. Notably, the homeostatic process of domain compensation was found to be operating to offset low health satisfaction for all physical conditions except back problem. These results suggest that people with a back problem are at greater risk of homeostatic defeat than the other conditions examined. The results also contribute to the SWB literature as back problems have not been previously studied within the framework of SWB homeostasis.

Using secondary data from a non-medical sample, Study 2 identified perceived control variables that have a significant relationship to SWB. It confirmed previous research that low Primary Control and low Secondary Control are associated with low SWB (Heeps, 2000). Furthermore, associations were found between low SWB and low perceived control over individual life domains (Domain Control), thus providing new information on relationships between SWB and perceived control. This was further explored in Study 3.

Study 3 investigated the health satisfaction, perceived control, and SWB of respondents with a back problem. The results verified the findings of Study 1 that SWB is below the normative range for this group. In addition, SWB was found to be further reduced in the presence of low perceived control, thus highlighting the importance of this factor in maintaining SWB for people with a back problem.

7.2 Implications for SWB Homeostasis Theory

All three studies provide support for the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a) in several ways. Firstly, there is evidence of a homeostatic threshold of SWB at around 70 points (Cummins 2010a). This was illustrated for pain intensity (Study 1) where SWB was generally held close to its threshold as pain intensity increased. However, at the highest pain level, the homeostatic threshold was breached and a rapid decline in SWB ensued, consistent with theory. Further evidence of this threshold was found from domain compensation where compensatory processes appear to have been activated around 70 points. However, this ceased as SWB fell to 67.5 points (Study 1), suggesting firstly that these data conform to the theory of a homeostatic threshold (Cummins, 2010a), and secondly, that domain compensation processes may be highly sensitive to levels of SWB. The narrow range at which compensatory processes appear to operate sheds further light on the current literature on domain compensation.

A second contribution to SWB theory is the confirmation of the external buffers of relationships and income as important components in the SWB homeostatic system, particularly for people with a back problem. For example, the interpersonal domains of Personal Relationships and Community Connectedness acted as compensatory domains when satisfaction with Health was below the normative range (Study 3). Moreover, when control over the Community Connectedness domain was perceived as low, SWB reached its lowest point of all the analyses undertaken. Therefore, it appears that connections with others, through personal relationships and/or the community, is particularly important to the SWB of this group.

This is consistent with studies of multiple sclerosis (Aronson, 1997), osteoarthritis (Luger et al., 2009), Parkinson's disease (McQuillan et al., 2003), and back problems (Australian Institute of Health and Welfare, 2006) where limited social engagement and social support was associated with low wellbeing and depression. Along similar lines, the external buffer of income was also found to be an important resource for people with a back problem as a higher than normal income was required in order to protect SWB (Study 1 and Study 3).

Thirdly, this study also adds further support for the role of perceived control as a cognitive buffer in the SWB homeostatic system. This was evident for Primary Control, Secondary Control and the various Control Domains, particularly Community Connectedness.

Finally, the results of Study 3 provide support for the contention that HPMood explains most of the shared variance in SWB (Blore et al., 2011; Cummins 2010a; Davern et al., 2007). In addition, this study contributes new information on the relationship between HPMood and perceived control.

In terms of measurement, the research on perceived control in this thesis represents a departure from common methods of measuring this construct for people with a medical condition. Most of the literature on medical conditions and control refers to medical-specific scales such as the Multidimensional Health Locus of Control scale (MHLC) (Wallston, 2005; Wallston et al., 1994), or various coping scales such as the Ways of Coping Questionnaire (Folkman & Lazarus, 1988). In contrast, this thesis has used perceived control factors normally associated with SWB such as Primary and Secondary Control (Heckhausen & Schulz, 1995; Rothbaum et al., 1982), as well as unpublished scale items in relation to perceived control over specific PWI life domains (Domain Control). This allows perceived control to be analysed within an SWB framework rather than a health-specific framework.

In a similar vein, measures of SWB in this research did not use any of the popular Health Related Quality of Life (HRQOL) scales because they tend to focus on

the absence of depression and anxiety as measures of life quality rather than positive psychological indicators such as life satisfaction (Cummins, Lau et al., 2004). Furthermore, the health-specific focus of these scales is in contrast to the broader perspective obtained through use of the PWI (International Wellbeing Group, 2006). This scale provides a more detailed account of the SWB of people with a back problem and their underlying homeostatic mechanisms than would otherwise be obtained by more traditional health-oriented measures.

One disadvantage to using the PWI however is that direct comparison of the results to HRQOL based studies is not clear cut. This is due to a lack of SWB information available in HRQOL-based studies. Nevertheless, the benefits of a deeper understanding of SWB through use of the PWI tend to outweigh the potential limitations of direct comparisons. Additionally, these benefits extend to the availability of ongoing normative data from the Australian Unity Wellbeing Index (Cummins et al., 2009b) which has been using the PWI to measure the SWB of the Australian population since 2001. By comparing the sample groups with the normative range for the Australian population, valuable insight into the operation of SWB homeostasis has been obtained.

7.3 Limitations

The methodological approach taken in this thesis has limitations. For example, the primary source of data has been cross-sectional. Therefore, although causal relationships may be suggested, they cannot be demonstrated. Similarly, it is not possible to know whether the low SWB of people with a back problem eventually returned to normal levels, or resulted in homeostatic defeat after the data were collected. Therefore, assumptions on the effectiveness of domain compensation in maintaining SWB at normal levels could not be determined.

Secondly, each medical condition was examined without consideration of potential co-morbidity due to the small number of respondents reporting additional

conditions (n = 33). It is possible that co-morbidity may have resulted in lower SWB as the burden of coping with additional difficult symptoms can have a significant and negative effect on psychological outcomes (Mehnert et al., 1990; Verbrugge, Reoma, and Griber-Baldin, 1994). However, given the small number of co-morbidity reports in the data and the diverse range of additional conditions listed, it is unlikely this would have significantly affected the results.

In terms of data analysis, the stringency of alpha significance levels was increased from <.05 to <.01 to reduce Type 1 Errors. However in some cases, this was not possible, and in situations where the results provided useful insight into various constructs of interest, a p value of <.05 was accepted in the absence of < .01 for further discussion.

Finally, this thesis has regarded respondents with a back problem as a relatively homogenous group. In reality, there are various ways in which people with a back problem can be classified. For example, groupings can include the general nature of the back problem (see Study 3 questionnaire in Appendix H) or the pain behaviour exhibited by back problem patients (Keefe, Bradley, & Crisson, 1990). However, when the data in Study 3 were divided into the five categories for back problems identified in the questionnaire, the cell sizes in some categories were too small for further analysis. Additionally, it was not possible to observe patients' pain behaviour in any of the studies. Nevertheless, given the exploratory nature of the research on perceptions of control and SWB, it was considered sufficient to use the broad category of "back problem" for the purpose of SWB comparisons with other medical conditions and non-medical samples.

In sum, these limitations have not unduly compromised the results of this research which overall, has provided a greater understanding of the SWB of people with a back problem and the operation of the SWB homeostatic system for this group.

7.4 Future Research

This thesis offers a number of directions for future research on SWB. For example, additional research is needed to determine why perceptions of low control over Community Connectedness were associated with the lowest SWB for people with a back problem. Similarly, for income, it is understandable that the back problem group should require more of this resource than a normal population to buffer the effects of the condition. However, it is unclear why normal SWB was associated specifically with an income of around $90,000 in both Study 1 and Study 2. Additional research could provide greater insight into the reasons for the relatively consistent results at this income level.

In terms of SWB homeostasis theory, there is very little current research on domain compensation, particularly regarding the narrow range at which this process appears to operate. Further research is required to confirm that domain compensation processes cease to be active at around 68 points, as reported in this thesis.

In addition, the large differences in shared variance between HPMood and the various control variables need further investigation. For example, HPMood was found to share a larger amount of variance with Primary and Secondary Control than that shared with perceived control over individual life domains. It has been proposed that this relates to a higher cognitive content involved in responding to life domain questions (Schwarz & Strack, 1999). Further research is required to verify this and to obtain a better understanding of HPMood as a relatively new SWB construct.

Finally, as this thesis has focused on only one of the three cognitive buffers (perceived control) it would be beneficial for future SWB research to also include the self-esteem and optimism buffers to provide a more comprehensive understanding of SWB homeostasis in relation to people with a back problem.

7.5 Conclusion

While there is a large literature on relationships between the symptoms of chronic illness and psychological outcomes, few papers are available on the SWB experienced by people with a back problem, particularly within the framework of the Theory of SWB Homeostasis (Cummins, 1995, 1998, 2010a). The research presented in this thesis has addressed this gap in the literature.

The major conclusions to be drawn from this research are that (1) having a medical condition is generally associated with low SWB, particularly where pain is also present; (2) perceptions of low control are associated with lower SWB; and (3) people with a back problem are at risk of homeostatic failure due to low perceptions of control, and consistently below normal SWB.

The selection of back problems as the main focus of this research has been driven by the fact that up to 80% of Australians are likely to experience a back problem at some stage in their lives, and 10% of those are predicted to experience a significant disability as a result (Walker et al., 2004). Through a greater understanding of the threats to SWB homeostasis and the compensatory processes that contribute to SWB maintenance, this thesis offers opportunities to assist those with a chronic back problem to return to their normal set-point level of SWB before the onset of severe psychopathology.

References

Abramson, L. Y., Seligman, M. E. P., & Teasdale J. D. (1978). Learned helplessness as a model of depression, *Journal of Abnormal Psychology*, *87*(1), 49-74.

Andersen, F. K., Christensen, K., & Frederiksen, H. (2007). Self-rated health and age: A cross-sectional and longitudinal study of 11,000 Danes aged 45-102, *Scandinavian Journal of Public Health*, *35*(2), 164-171.

Andrews, F. M., & Robinson, J. P. (1991). Measures of subjective wellbeing. In J. P. Robinson, P. Shaver, & L. Wrightsman (Eds.), *Measures of social psychological attitudes* (pp 61-114). San Diego, California: Academic Press.

Andrews, F. M., & Withey, S. B. (1976). *Social indicators of well-being: Americans' perception of life quality*, New York: Plenum Press.

Argyle, M. (1999). Causes and correlates of well-being, in D. Kahneman, E., Diener, and N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp 353-373). New York: Russell Sage Foundation, 353-373.

Aron, A., & Aron E. (2002). *Statistics for Psychology (2nd Ed)*. Upper Saddle River, New Jersey: Prentice Hall.

Aronson, K. J. (1997). Quality of life among persons with multiple sclerosis and their caregivers, *American Academy of Neurology*, *48*(1), 74-80.

Australian Bureau of Statistics (ABS). (2006). *Musculoskeletal Conditions in Australia: A Snapshot, 2004-05* (Report No. 4823.0.55.001). Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics (ABS). (2009). *National Health Survey: Summary of results* (Report No. 4364.0). Canberra: Australian Bureau of Statistics.

Australian Institute of Health and Welfare. (2006). *Australia's Health 2006: The tenth biennial health report of the Australian Institute of Health and Welfare* (AIHW Cat. no AUS 73). Canberra: Australian Institute of Health and Welfare,

Babyak, M. (2004). What you see may not be what you get: A brief, non-technical introduction to over-fitting in regression-type models, *Psychosomatic Medicine, 66*(3), 411-421.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: W.H. Freeman and Company.

Barez, M., Blasco, T., Fernandez-Castro, J., & Viladrich, C. (2007). A structural model of the relationships between perceived control and adaptation of illness in women with breast cancer, *Journal of Psychosocial Oncology*, *25*(1), 21-66

Best, C. J., Cummins, R. A., & Lo, S. K. (2000). The quality of rural and metropolitan life, *Australian Journal of Psychology*, *52*(2), 69-74.

Blore, J. D., Stokes, M. A., Mellor, D., Firth, L., & Cummins, A. R. (2011). Comparing multiple discrepancies theory to affective models of subjective wellbeing, *Social Indicators Research*, *100*(1), 1-16.

Borg, C., Fagerstrom, C., Balducci, C., Burnholt, V., Ferring, D., Weber, G., Wegner, C., Holst, G., & Hallberg, I. R. (2008). Life satisfaction in 6 European countries: The relationship to health, self-esteem, and social and financial resources among people (aged 65-89) with reduced functional capacity, *Geriatric Nursing*, *29*(1), 48-57.

Bradburn, N. M. (1969). *The structure of psychological well-being.* Chicago: Aldine.

Bradburn, N. M., & Caplovitz, D. (1965). *Reports on happiness: A pilot study.* Chicago: Aldine.

Brickman, P., & Campbell, T. (1971). Hedonic relativism and planning the good society. In M. H. Appley (Ed), *Adaptation-level theory* (pp 287-302). New York: Academic Press.

Brickman, P., Coates, D., & Janoff-Bulman, R. (1978). Lottery winners and accident victims: Is happiness relative? *Journal of Personality and Social Psychology*, *36*(8), 917-927.

Brodie, E. E., & Niven, C. A. (2000). Remembering everyday pain: The role of knowledge and experience in the recall of the quality of dysmenorrhoea, *Pain*, *84* (1), 89-94.

Brunstein, J. C., Schultheiss, O. C., & Grassmann R. (1998). Personal goals and emotional well-being: The moderating role of motive dispositions relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles, *Journal of Personality and Social Psychology*, *75*(2), 494-508.

Campbell, A., Converse, P. E., & Rogers, W. I. (1976). *The quality of American life: Perceptions, evaluations and satisfaction*. New York: Russell Sage Foundation.

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior,* Cambridge: Cambridge University Press.

Cohen, S. P., Argoff, C., & Carragee, E. J. (2009). Management of low back pain, *British Medical Journal*, *BMJ 338*(a2718), 100-106.

Costa, P. T., & McCrae R. R. (1980). Influence of extraversion and neuroticism on subjective well-being: Happy and unhappy people, *Social Indicators Research*, *38*(4), 668-678.

Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, Florida: Psychological Assessment Resources.

Cousins, R. (2001). *Predicting subjective quality of life: The contributions of personality and perceived control*, (*Unpublished PhD thesis*, Deakin University, Melbourne, Australia. Retrieved from http://www.deakin.edu.au/research/acqol/publications/member-theses.php

Creed, P. A., & Bartrum, D. A. (2008). Personal control as a mediator and moderator between life strains and psychological well-being in the unemployed, *Journal of Applied Social Psychology*, *38*(2), 460-481.

Crisson, J. E., & Keefe, F. J. (1988).The relationship of locus of control to pain coping strategies and psychological distress in chronic pain patients, *Pain*, *35*(2), 147-154.

Cummins, R. A. (1995). On the trail of the gold standard for subjective well-being, *Social Indicators Research*, *35*(2), 179-200.

Cummins, R. A. (1996). The domains of life satisfaction: An attempt to order chaos, *Social Indicators Research*, *38*(3), 303-328.

Cummins, R. A. (1998). The second approximation to an international standard for life satisfaction, *Social Indicators Research*, *43*(3), 307-334.

Cummins, R. A. (2000a). Objective and subjective quality of life: An interactive model, *Social Indicators Research*, *52*(1), 55-72.

Cummins, R. A. (2000b). Personal income and subjective well-being: A review, *Journal of Happiness Studies*, *1*(2), 133-158.

Cummins, R. A. (2002). Self-rated Quality of Life scales for people with an Intellectual disability: A reply to Ager and Hatton, *Journal of Applied Research in Intellectual Disabilities*, *14*(1), 1-11.

Cummins, R. A. (2003). Normative life satisfaction: Measurement issues and a homeostatic model, *Social Indicators Research*, *64*(2), 225-256.

Cummins, R. A. (2005). Moving from the quality of life concept to a theory, *Journal of Intellectual Disability Research*, *49*(10), October, 699-706.

Cummins, R. A. (2010a). Subjective wellbeing, homeostatically protected mood and depression: A synthesis, *Journal of Happiness Studies*, *11*(1), 1-17.

Cummins, R. A. (2010b). Fluency disorders and life quality: Subjective wellbeing vs. health-related quality of life, *Journal of Fluency Disorders*, *35*(3), 161–172.

Cummins, R. A., Eckersley, R., Lo, S. K., Okerstrom, E., Davern, M., & Hunter, B. (2003a). *Australian Unity Wellbeing Index. Report No. 8. The wellbeing of Australians: Feeling connected to Australia*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Eckersley, Lo, S., Okerstom, E., Hunter, B., & Woerner, J. (2004b), *Australian Unity Wellbeing Index. Report No. 12. The wellbeing of Australians: Job Security*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Eckersley, R., Pallant, J., Van Vugt, J., & Misajon, R. (2003b). Developing a national index of subjective wellbeing: The Australian Unity Wellbeing Index, *Social Indicators Research*, 64, 159-190. http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Gullone, E., & Lau, A. L. D. (2002). A model of subjective well-being homeostasis: The role of personality. In *The universality of subjective wellbeing indicators* (pp. 7-46). The Netherlands: Kluwer Academic Publishers.

Cummins, R. A., Lau, A.L.D., & Stokes, M. (2004). HRQOL and subjective well-being: Non complimentary forms of outcome measurement, *Expert Review Pharmacoeconomics Outcomes Research*, *4*(4), 413-420.

Cummins, R. A., & Nistico, H. (2002). Maintaining life satisfaction: The role of positive cognitive bias, *Journal of Happiness Studies*, *3*, 37-69.

Cummins, R. A., Okerstrom, E., Woerner, J., & Tomyn, A. (2005a). *Australian Unity Wellbeing Index. Report No. 13. The wellbeing of Australians: Caregiving at Home*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R.A., Stokes, M. A., & Davern, M. T. (2007). Core affect and subjective wellbeing: A rebuttal to Moum and Land, *Journal of Happiness Studies*, *8*(4), 457–466. http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Tomyn, A., Gibson, A., Woerner, J., Lai, L. (2007). *Australian Unity Wellbeing Index. Report No. 17.1 Special Report. The Wellbeing of Australians: Carer Health and Wellbeing* (Report No. 17.1, October, 2007). Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Walter, J., & Woerner, J. (2007). *Australian Unity Wellbeing Index Survey 16.1: Special Report: The wellbeing of Australians - Groups with the highest and lowest wellbeing in Australia*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Weinberg, M. J., Perera, C., & Woerner, J. (2010). *Australian Unity Wellbeing Index. Report No. 24. The wellbeing of Australians: Changing Conditions to Make Life Better.* Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., & Chester, M. (2009a). *Australian Unity Wellbeing Index. Report No. 20.1. The wellbeing of Australians: The effect of fire in Victoria and floods in Queensland*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Gibson, A., Lai, L., Weinberg, M., & Collard, J. (2008a). *Australian Unity Wellbeing Index. Report No. 19. The wellbeing of Australians: Links with exercise, nicotine and alcohol*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Gibson, A., Lai, L., Weinberg, M., Collard, J. (2008b). *Australian Unity Wellbeing Index. Report No. 20. The wellbeing of Australian: Money, debt, and loneliness*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Gibson, A., Lai, L., Weinberg, M., & Collard, J. (2009b). *Australian Unity Wellbeing Index. Report No. 21.The wellbeing of Australians: Gambling, chocolate and swine flu* (Report No. 21.0, May 2009). Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Tomyn, A., Gibson, A., & Knapp, T. (2007a). *Australian Unity Wellbeing Index. Report No 17. The wellbeing of Australians: Work, Wealth and Happiness*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Tomyn, A., Gibson, A., & Knapp, T. (2005b). *Australian Unity Wellbeing Index. Report No. 14. The wellbeing of Australians: Personal relationships*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Tomyn, A., Gibson, A., & Knapp, T. (2006a). *Australian Unity Wellbeing Index. Report No. 15. The wellbeing of Australians: Income security*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Tomyn, A., Gibson, A., & Knapp, T. (2006b). *Australian Unity Wellbeing Index. Report No. 16. The wellbeing of Australians: Mortgage payments and home ownership*. Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Tomyn, A., Gibson, A., Lai, L., & Collard, J. (2007b). *Australian Unity Wellbeing Index. Report No. 18. The wellbeing of Australians: changing conditions to make life better.* Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Cummins, R. A., Woerner, J., Weinberg, M., Perera, C., Gibson-Prosser, A., Collard, J., Horfiniak, K. (2010). *Australian Unity Wellbeing Index. Report No. 24. The wellbeing of Australians: Trust, life better/worse and climate change*). Retrieved from Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/auwbi/survey-reports/

Dahlem, N. W., Zimet, S. G., & Walker, R. R. (1991). The Multidimensional Scale of Perceived Social Support: A confirmation study, *Journal of Clinical Psychology*, *47*(6), November, 1991, 756-761.

Davern, M. T. (2004). *Subjective wellbeing as an affective construct* (Unpublished PhD thesis, Deakin University, Melbourne, Australia). Retrieved from http://www.deakin.edu.au/research/acqol/publications/member-theses.php

Davern, M. T., Cummins, R. A., & Stokes, M. A. (2007). Subjective wellbeing as an affective-cognitive construct, *Journal of Happiness Studies*, *8*(4), 429–449.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior, *Psychological Inquiry*, *11*(4), 227-268.

DeNeve, K. M., & Cooper, H. (1998). The happy personality: A meta-analysis of 137 personality traits and subjective well-being, *Psychological Bulletin*, *124*(2), 197-229.

Diener, E. (1984). Subjective well-being, *Psychological Bulletin*, *95*(3) 542-575.

Diener, E. (1996). Traits can be powerful but are not enough: Lessons from subjective well-being, *Journal of Research in Personality 30*(0027), 389-399.

Diener, E., & Diener, M. (1995). Cross-cultural correlates of life satisfaction and self-esteem, *Journal of Personality and Social Psychology*, *68*(4), 653-663.

Diener, E., & Diener, C. (1996). Most people are happy, *Psychological Science*, *7*(3) 181-185.

Diener, E., & Emmons, R. A. (1985). The independence of positive and negative affect, *Journal of Personality and Social Psychology*, *47*(5), 1105-1117.

Diener, E., Emmons, R., Larsen, R.J., & Griffin, S. (1985). The Satisfaction with Life Scale, *Journal of Personality Assessment*, *49*(1), 71-75.

Diener, E., & Fujita, F. (1997). Social comparisons and subjective well-being. In B. P. Bunk and F. X. Gibbons (Eds.), *Health, coping and well-being: Perspectives from Social Comparison Theory* (pp. 329-357). New Jersey: Lawrence Erlbaum.

Diener, E., Lucas, R. E., Oishi, S., & Suh, E. M. (2002). Looking up and looking down: Weighting good and bad information in life satisfaction judgments, *Personality and Social Psychology Bulletin*, *28*(4), 437-445.

Diener, E., Lucas, R. E., & Scollon C. N. (2006). Beyond the hedonic treadmill: Revising the adaptation theory of well-being, *American Psychologist*, *61*(4), 305–314.

Diener, E., Scollon, C. N., & Lucas, R. E. (2003). The evolving concept of subjective well-being: The multifaceted nature of happiness, *Advances in Cell Aging and Gerontology*, *15*, 187–219.

Diener, E., Suh, E.M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress, *Psychological Bulletin*, *125*(2), 276-302.

Emerson, E., Honey, A., Madden, R., & Llewellyn, G. (2009). The well-being of Australian adolescents and young adults with self-reported long-term health conditions, impairments or disabilities: 2001 and 2006, *Australian Journal of Social Issues*, *44*(1), 39-54.

Emmons, R. A. (1986). Personal strivings: an approach to personality and subjective well-being, *Journal of Personality and Social Psychology*, *51*(5), 1058-1068.

Emmons, R. A., & Diener, E. (1985). Factors predicting satisfaction judgments: A comparative examination, *Social Indicators Research*, *16*(2), 157-167.

Emmons, R. A., & King, L. A. (1988). Conflict among personal strivings: Immediate and long-term implications for psychological and physical well-being, *Journal of Personality and Social Psychology*, *54*(6), 1040-1048.

Erskine, A., Morley, S., & Pearce, S. (1990). Memory for pain: A review, *Pain*, *41*(3), 182-203.

Esteve, R., Ramirez-Maestre, C., & Lopez-Martinez, A. E. (2007). Adjustment to chronic pain: The role of pain acceptance, coping strategies, and pain-related cognitions, *Annals of Behavioral Medicine*, *33*(2), 179-188.

Folkman, S. (1984). Personal control and stress and coping processes: A theoretical analysis, *Journal of Personality and Social Psychology*, *46*(4), 839-852.

Folkman, S., & Lazarus, R. S. (1988). *Manual for the Ways of Coping Questionnaire*. Palo Alto, California: Consulting Psychologists Press.

Folkman, S., & Maskowitz, J. T. (2000). Positive affect and the other side of coping, *American Psychologist*, *55*(6), 647-654.

Frederick, S., & Loewenstein, G. (1999). Hedonic adaption. In D. Kahneman, E. Diener, and N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp 302-329). New York: Russell Sage Foundation.

Fujita, F., Diener, E., & Sandvik, E. (1991). Gender differences in negative affect and well-being: The case for emotional intensity, *Personality and Individual Differences*, *61*(3), 427-434.

Geisser, M. E., Robinson, M. E., Keefe, F. J., & Weiner, M. L. (1994). Catastrophizing, depression and the sensory, affective and evaluative aspects of chronic pain, *Pain*, *59*(1), 78-83.

George, L. K., & Landerman, R. (1984). Health and subjective well-being: A replicated secondary data analysis, *The International Journal of Aging and Human Development*, *19*(2), 133-155.

George, L. K., Okun, M. A., & Landerman, R. (1985). Age as a moderator of the determinants of life satisfaction, *Research on Aging*, *7*(2), 209-233.

Hagerty, M. R., Cummins, A. R., Ferriss, A. L., Land, K., Michalos, A. C., Peterson, M., Sharpe, A., Sirgy, J., & Vogel, J. (2001). Quality of life indexes for national policy: Review and agenda for research, *Social Indicators Research*, *55*(1), 1-96.

Haring, M. J., Stock, W. A., Okun, M. A. (1984). A research synthesis of gender and social class as correlates of subjective well-being, *Human Relations*, *37*(8), 645-657.

Headey, B. (2006). Subjective Well-being: Revisions to dynamic equilibrium theory using national panel data and panel regression methods, *Social Indicators Research*, *79*(3), 369-403.

Headey, B. (2008). The set-point theory of well-being: Negative results and consequent revisions, *Social Indicators Research*, *85*(3), 389–403.

Headey, B., Muffels, R., & Wagner G. G. (2010). Long-running German panel survey shows that personal and economic choices, not just genes, matter for happiness, *Proceedings of the National Academy of Sciences (PNAS)*, *107*(42), 17922-17926.

Headey, B., & Wearing, A. (1988). The sense of relative superiority: Central to well-being, *Social Indicators Research*, *20*(5), 497-516.

Headey, B. W., & Wearing, A. J. (1989). Personality, life events and subjective well-being: Toward a dynamic equilibrium model, *Journal of Personality and Social Psychology*, *57*(4), 731-739.

Heckhausen, J., & Schulz, R. (1995). A life span theory of control, *Psychological Review*, *102(*2), 284-304.

Heckhausen, J., Wrosch, C., & Schulz, R. (2010). A motivational theory of life-span development, *Psychological Review*, *117*(1), 32-60.

Heeps, L. (2000). *The role of primary and secondary control in positive psychological adjustment* (Unpublished PhD thesis, Deakin University, Melbourne, Australia). Retrieved from http://www.deakin.edu.au/research/acqol/publications/member-theses.php

Helson, H. (1964). *Adaptation-level theory: An experimental and systematic Approach to Behavior,* New York: Harper and Row.

Henschke, N., Maher, C.G., Refshauge, K.M. Herbert, R. D., Cumming, R.G., Bleasel, J., York, J., Das, A., McAuley, J.H. (2008). Prognosis in patients with recent onset low back pain in Australian primary care: Inception cohort study, *British Medical Journal*, *BJM 337*(a171), 1-7.

Horley, J., & Lavery, L. L. (1995). Subjective well-being and age, *Social Indicators Research*, *34*(2), 275-282.

International Wellbeing Group. (2006). *Personal Wellbeing Index 2006 manual.* Retrieved from Deakin University, Australian Centre on Quality of Life website: http://www.deakin.edu.au/research/acqol/instruments/wellbeing_index.htm

Keefe, F. J., Bradley, L. A., & Crisson, J. E. (1990).Behavioral assessment of low back pain: Identification of pain behavior subgroups, *Pain*, *40*(2), 153-160.

Keefe, F. J., Crisson, J. E., Urban, B. J., & Williams, D. A. (1990). Analyzing chronic low back pain: The relative contribution of pain coping strategies, *Pain*, *40*(3), 293-301.

Keefe, F. J., Rumble, M. E., Scipio, C. D., Giordano, L. A., & Perri, L. M. (2004). Psychological aspects of persistent pain: Current state of the science, *The Journal of Pain*, *5*(4), 195-211.

Keefe, F. J., Salley Jr., A. N., & Lefebvre, J. C. (1992). Coping with pain: Conceptual concerns and future directions (Guest Editorial), *Pain*, *51*(1), 131-134.

Kempen, G. I. J. M., Ormel, J., Brilman, E. I., & Relyveld, J. (1997). Adaptive responses among Dutch elderly: The impact of eight chronic medical conditions on health-related quality of life, *American Journal of Public Health*, *87*(1), 38-44.

Koriat, A., Goldsmith, M., & Pansky, A. (2000). Toward a psychology of memory accuracy, *Annual Review of Psychology*, *51*(1), 481-537.

Lachman, M. E., & Weaver, S. L. (1998). The sense of control as a moderator of social class differences in health and well-being, *Journal of Personality and Social Psychology*, *74*(3), 763-773.

Lau, R. R., Hartman, K. A., & Ware, J. E. (1986). Health as a value: Methodological and theoretical considerations, *Health Psychology*, *5*(1), 25-43.

Lawton, M. P. (1984). Investigating health and subjective well-being: Substantive challenges, *International Journal of Aging and Human Development*, *19*(2), 157-165.

Lefebvre, J. C., & Keefe, F. J. (2002). Memory for pain: The relationship of pain catastrophizing to the recall of daily rheumatoid arthritis pain, *The Clinical Journal of Pain, 18*(1), 56-63.

Lefebvre, J. C., Keefe, F. J., Affleck, G., Raezer, L. B., Starr, K., Caldwell, D. S., Tennen, H. (1999). The relationship of arthritis self-efficacy to daily pain, daily mood, and daily pain coping in rheumatoid arthritis patients, *Pain*, *80*(1-2), 425-435.

Leplege, A., & Hunt, S. (1997). The problem of quality of life in medicine, *Journal of the American Medical Association (JAMA)*, *278*(1), 47-59.

Lucas, R. E. (2005). Time does not heal all wounds a longitudinal study of reaction and adaptation to divorce, *Psychological Science*, *16*(12), 945-950.

Lucas, R. E. (2007). Long-term disability is associated with lasting changes to subjective well-being: Evidence from two nationally representative longitudinal studies, *Journal of Personality and Social Psychology*, *92*(4), 717-730.

Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and the set point model of happiness: Reactions to changes in marital status, *Journal of Personality and Social Psychology*, *84*(3), 527–539.

Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2004). Unemployment alters the set point for life satisfaction, *Psychological Science*, *15*(1), 8-13.

Lucas, R. E., Diener, E., & Suh, E. (1996). Discriminant validity of well-being measures, *Journal of Personality and Social Psychology*, *71*(3), 616-628.

Luger, T., Cotter, K. A., & Sherman, A. M. (2009). It's all in how you view it: Pessimism, social relations, and life satisfaction in older adults with osteoarthritis, *Aging & Mental Health*, *13*(5), 635–647.

Lykken, D., & Tellegen, A. (1996). Happiness is a stochastic phenomenon, *Psychological Science*, *7*(3), 186-189.

Lyubomirsky, S., & Ross, L. (1997). Hedonic consequences of social comparison: A contrast of happy and unhappy people, *Attitudes and Social Cognition*, *73*(6), 1141-1157.

Magnus, K., Diener, E., Fujita, F., & Pavot, W. (1993). Extraversion and neuroticism as predictors of objective life events: A longitudinal analysis, *Journal of Personality and Social Psychology*, *65*(5), 1046-1053.

McCabe, M. P., & McKern, S. (2002). Quality of life and multiple sclerosis: Comparison between people with multiple sclerosis and people from the general population, *Journal of Clinical Psychology in Medical Settings*, *9*(4), 287-295.

McCracken, L. M., Eccleston, C., & Bell, L. (2005). Clinical assessment of behavioral coping responses: Preliminary results from a brief inventory, *European Journal of Pain*, *9*(1), 69–78.

McCracken, L. M., Vowles, K. E., & Gauntlett-Gilbert, J. (2007). A prospective investigation of acceptance and control-oriented coping with chronic pain, *Behavioral Medicine*, *30*(4), 339-349.

McQuillen, A. D., Licht, M. H., & Licht, B. G. (2003). Contributions of disease severity and perceptions of primary and secondary control to the prediction of psychosocial adjustment to Parkinson's disease, *Health Psychology*, *22*(5), 504-512.

Meenan, R. F., Mason, J. H., Anderson, J. J., Guccione, A. A., & Kazis, L. E. (1992). AIMS2: The content and properties of a revised and expanded Arthritis Impact Measurement Scales Health Status Questionnaire, *Arthritis and Rheumatism*, *35*(1), 1–10.

Mehnert, T., Krauss, H., Nadler, R., & Boyd, M. (1990). Correlates of life satisfaction in those with disabling conditions, *Rehabilitation Psychology*, *35*(1), 3-17.

Michalos, A. C. (1985). Multiple discrepancy theory (MDT), *Social Indicators Research*, *16*(4), 347-413.

Michalos, A. C. (2004). Social indicators research and health-related quality of life research, *Social Indicators Research*, *65*(1), 27-72.

Morley, S. (2007). Thanks for the memory, *Pain*, *132*(3) 231-232.

Mossey, J. M., & Shapiro, E. (1982). Self-rated health: A predictor of mortality among the elderly, *American Journal of Public Health*, *72*(8), 800-808.

Moum, T. (2007). A critique of ‘‘subjective wellbeing as an affective cognitive construct’’ by Davern, Cummins and Stokes, *Journal of Happiness Studies*, *8*(4), 451–453.

Myers, D. G., & Diener, E. (1995). Who is happy? *Psychological Science*, *6*(1), 10-19.

Niven, C. A., & Brodie, E. E. (1995). Memory of labor pain: Context and quality, *Pain*, *64*(2), 387-392.

Nolen-Hoeksema, S., & Rusting, C. L. (1999). Gender differences in well-being. In D. Kahneman, E. Diener, and N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology,* (pp. 330-352), New York: Russell Sage Foundation.

Okun, M. A., Stock, W. A., Haring, M. J., Witter, R. A. (1984). Health and subjective well-being: A meta-analysis, *The International Journal of Aging and Human Development*, *19*(2), 111-132.

Okun, M. A., Olding, R. W., & Cohn, C. M. G. (1990). A meta-analysis of subjective well-being interventions among elders, *Psychological Bulletin*, *108*(2), 257-266.

Pallant, J. (2007). *SPSS Survival manual: A step by step guide to data analysis using SPSS*. (3rd ed.). Sydney: Allen and Unwin.

Panzarella, C., Alloy, L. B., & Whitehouse, W. G. (2006). Expanded hopelessness Theory of depression: On the mechanisms by which social support protects against depression, *Cognitive Therapy and Research*, *30*(3), 307-333.

Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale, *Psychological Assessment*, *5*(2), 164-172.

Pearlin, L. I., Menaghan, E. G., Lieberman, M. A., & Mullan, J. T. (1981). The stress process, *Journal of Health and Social Behavior*, *22*(4), 337-356.

Peduzzi, P., Concato, J., Kemper, E., Holford, T., & Feinstein, A. R. (1996). A simulation study of the number of events per variable logistic regression analysis, *Journal of Clinical Epidemiology*, *49*(12), 1373-1379.

Penny, K. I., Purves, A. M., Smith, B. H., Chambers, W. A., & Smith, W. C. (1999). Relationship between the chronic pain grade and measures of physical, social and psychological well-being, *Pain*, *79*(2-3), 275-279.

Peterson, C. (1999). Personal control and well-being. In D. Kahneman, E. Diener, and N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 288-301). New York: Russell Sage Foundation.

Peterson, C. (2000). The future of optimism, *American Psychologist*, *55*(1), 44-55.

Pincus, T., Burton, A. K., Vogel, S., & Field, A. P. (2002). A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain, *Spine*, *27*(5), 24-56.

Posner, J., Russell, J. A., & Peterson, B. S. (2005). The circumplex model of affect: An integrative approach to affective neuroscience, cognitive development, and psychopathology, *Development and Psychopathology*, *17*(3), 715–734.

Rapkin, B. D., & Fischer, K. (1992). Framing the construct of life satisfaction in terms of older adults' personal goals, *Psychology and Aging*, *7*(1), 138-149.

Riddle, D. L. (1998). Classification and low back pain: A review of the literature and critical analysis of selected systems, *Physical Therapy*, *78*(7), 708-738.

Rosenberg, M. (1965). *Society and the adolescent self-image*. New Jersey: Princeton University Press.

Rosenberg, M. (1989). *Society and the adolescent self-image (revised edition).* Connecticut: Wesleyan University Press.

Rosenberg, M., Schooler, C., & Schoenbach, C. (1989). Self-esteem and adolescent problems: Modeling reciprocal effects, *American Sociological Review*, *54*(6), 1004-1018.

Rosenberg, M., Schooler, C., Schoenbach, C., & Rosenberg, F. (1995). A new look at motivated inference: Are self-serving theories of success a product of motivational forces? *American Sociological Review*, *60*(1), 141-156.

Rosenstiel, A. K., & Keefe, F. J. (1983). The use of coping strategies in low-back pain patients: Relationship to patient characteristics and current adjustment, *Pain, 17*(1), 33–40.

Rothbaum, F., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the self: A two-process model of perceived control, *Journal of Personality and Social Psychology*, *42*(1), 5-37.

Russell, J. A. (1980). A circumplex model of affect, *Journal of Personality and Social Psychology*, *39*(6), 1161-1178.

Russell, J. A. (2003). Core affect, *Psychological Review*, *110*(1), 145-172.

Russell, J. A. (2009). Emotion, core affect, and psychological construction, *Cognition and Emotion*, *23*(7), 1259-1283.

Russell, J. A., & Feldman Barrett, L. (1999). Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, *76*(5), 805–819.

Ryan R. M., & Deci, E. I. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being, *American Psychologist*, *55*(1), 68-78.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being, *Journal of Personality and Social Psychology*, *57*(6), 1069-1081.

Ryff, C. D. (1991). Possible selves in adulthood and old age: A tale of shifting horizons, *Psychology and Aging*, *6*(2), 286-295

Sarason, I. G., Sarason, B. R., Shearin, E. N., & Pierce, G. R. (1987). A brief measure of social support: Practical and theoretical implications, *Journal of Social and Personal Relationships*, *4*(4) 497-510.

Sarda, J., Nicholas, M. K., Pimenta, C. A. M., & Asghari, A. (2008). Psychometric properties of the DASS-Depression scale among a Brazilian population with chronic pain, *Journal of Psychosomatic Research*, *64*(1), 25-32.

Scheibe, S., & Carstensen, L. (2010). Emotional aging: Recent findings and future trends, *Journal of Gerontology: Psychological Sciences*, *65B*(2), 135-144.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping and health: Assessment and implications of generalised outcome expectancies, *Health Psychology*, *4*(3), 219-247.

Scheier, M. F., & Carver, C. S. (1993). On the power of positive thinking: The benefits of being optimistic, *Current Directions in Psychological Science*, *2*(1), 26-30.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test, *Journal of Personality and Social Psychology*, *67*(6), 1063-1078.

Schimmack, U., Diener, E., & Oishi, S. (2002). Life-satisfaction is a momentary judgment and a stable personality characteristic: The use of chronically accessible and stable sources, *Journal of Personality*, *70*(3), 345-384.

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states, *Journal of Personality and Social Psychology*, *45*(3), 513-523.

Schwarz, N., & Strack, F. (1999). Reports of subjective well-being: Judgmental processes and their methodological implications. In D. Kahneman, E. Diener, and N. Schwarz (Eds.), *Well-being: The foundation of hedonic psychology,* (pp. 61-84). New York: Russell Sage Foundation.

Slocum-Gori, S. L., & Zumbo, B. D. (2011). Assessing the unidimensionality of psychological scales: Using multiple criteria from factor analysis, *Social Indicators Research*, *102*(1) 443-461.

Shmotkin, D. (1990). Subjective well-being as a function of age and gender: A multivariate look for differentiated trends, *Social Indicators Research*, *23*(3), 201-230.

Steel, P., & Ones, D. S. (2002). Personality and happiness: A national-level analysis, *Journal of Personality and Social Psychology*, *83*(3), 767-781.

Stewart, A. L., Hays, R. D., & Ware, J. E. (1988). The MOS Short-form General Health Survey: Reliability and validity in a patient population, *Medical Care*, *26*(7) 724-735.

Stroebe, W., Stroebe, M., Abakoumkin, G., & Schut, H. (2003). The role of loneliness and social support in adjustment to less: A test of attachment versus stress theory, *Journal of Personality and Social Psychology*, *70*(6), 1241 -1249.

Suh, E., Diener, E., & Fujita, F. (1996). Events and subjective well-being: Only recent events matter, *Journal of Personality and Social Psychology*, *70*(5), 1091-1102.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. New York: Pearson International.

Taylor, E. S., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health, *Psychological Bulletin, 103*(2), 193-210.

Taylor, E. S., & Brown, J. D. (1994). Positive illusions and well-being revisited: Separating fact from fiction, *Psychological Bulletin*, *116*(1), 21-27.

Tellegen, A., Lykken, D. T., Bouchard, T. J., Wilcox, K. J., Sega N. L., & Rich, S. (1988). Personality similarity in twins reared apart and together, *Journal of Personality and Social Psychology*, *54*(6), 1031-1039.

Temane, Q. M., & Wissing, M. P. (2006). The role of subjective perceptions of health in the dynamics of context and psychological well-being, *South African Journal of Psychology*, *36*(3), 564-581.

Thompson, S. C. (1981). Will it hurt less if I can control it? A complex answer to a simple question. *Psychological Bulletin*, *90*(1), 89-101.

Thompson, S. C., Thomas, C., Rickabaugh, C. A., Tantamjarik, P., Otsuki, T., Pan, D., Garcia, B. F., & Sinar, E. (1998). Primary and secondary control over age-related changes in physical appearance, *Journal of Personality*, *66*(4), 583-605.

Thompson, S. C., & Spacapan, S. (1991). Perceptions of control in vulnerable populations, *Journal of Social Issues*, *47*(4), 1-21.

Tiliouine, H. (2009). Health and subjective well-being in Algeria: A developing country in transition, *Applied Research in Quality of Life*, *4*(2), 223-238.

Verbrugge, L. M., Reoma, J. M., & Gruber-Baldini, A. L. (1994). Short-term dynamics of disability and well-being, *Journal of Health and Social Behavior*, *35*(2), 97-117.

Walker, B. F., Muller, R. M., & Grant, W. D. (2004). Low back pain in Australian adults: Prevalence and associated disability, *Journal of Manipulative and Physiological Therapeutics*, *27*(4), 238-243.

Wallston, K. A. (2005). The validity of the Multidimension Health Locus of Control Scales, *Journal of Health Psychology*, *10*(5), 623-631.

Wallston, K. A., Stein, M. J., & Smith, C. A. (1994). FORM C of the MHLC Scales: A condition-specific measure of locus of control, *Journal of Personality Assessment*, *63*(3), 534-553.

Watkins, K. W., Shifren, K., Park, D. C., & Morell, R. W. (1999). Age, pain, and coping with rheumatoid arthritis, *Pain*, *82*(3), 217–228.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood, *Psychological Bulletin*, *98*(2), 219-235.

Wilson, W. (1967). Correlates of avowed happiness, *Psychological Bulletin*, *67*(4), 294-306.

Wilson VanHooris, C. R., & Morgan, B. L. (2007). Understanding power and rules of thumb for determining sample sizes, *Tutorials in Quantitative Methods for Psychology*, *3*(2), 43-50

Appendix A: Domain Means for Medical Conditions

Domain Means x Standard of Living

Standard of living	Domain mean	SD	N	Significant differences in domain means	p
Blood pressure (a)	79.94	16.48	654	> (f), (h), (i)	.01 (Dunnett's C)
Heart problems (b)	78.42	17.53	405	> (i)	
Cancer (c)	76.08	18.91	209		$Eta^2 = .030$
Arthritis (d)	75.92	19.78	385	> (i)	
Asthma (e)	75.13	20.28	160		
Diabetes (f)	74.55	19.18	279	< (a)	
Anxiety (g)	71.11	21.64	63		
Back Problems(h)	71.10	20.83	109	< (a)	
Depression (i)	69.14	22.07	210	< (a), (b), (d)	
Total	76.29	19.06	2474		

Domain Means x Health

Health	Domain mean	SD	N	Significant differences in domain means	p
Blood pressure (a)	71.59	17.50	654	> (a), (e), (f) – (i)	.01 (Dunnett's C)
Asthma (b)	66.13	20.86	160	> (d), (g), (h)	
Anxiety (c)	63.49	22.66	63		$Eta^2 = .067$
Heart problems (d)	62.20	21.79	405	< (a)	
Diabetes (e)	60.97	20.09	279	< (a)	
Depression (f)	60.76	23.83	210	< (a)	
Arthritis (g)	57.87	22.96	385	< (a), (b)	
Cancer (h)	57.08	23.13	209	< (a), (b)	
Back Problems(i)	53.49	24.32	109	< (a), (b)	
Total	63.22	21.85	2474		

Domain Means x Achievements

Achievements	Domain mean	SD	N	Significant differences in domain means	p
Blood pressure (a)	74.69	19.14	654	> (e), (g), (i)	.01 (Dunnett's C)
Cancer (b)	73.25	18.55	209	> (i)	
Asthma (c)	71.63	18.73	160	> (i)	$Eta^2 = .037$
Heart problems (d)	71.56	20.64	405	> (i)	
Arthritis (e)	69.64	22.39	385	< (a); > (i)	
Diabetes (f)	67.81	23.10	279	< (a)	
Back Problems (g)	64.22	25.40	109	< (a)	
Anxiety (h)	63.17	25.33	63		
Depression (i)	61.00	24.70	210	< (a) – (e)	
Total	70.38	21.65	2474		

Domain Means x Relationships

Relationships	Domain mean	SD	N	Significant differences in domain means	p
Blood pressure (a)	81.64	21.81	654	> (i)	.01 (Dunnett's C)
Heart problems (b)	80.72	22.74	405	> (i)	
Asthma (c)	77.44	24.00	160	> (i)	$Eta^2 = .032$
Diabetes (d)	75.99	24.65	279	> (i)	
Arthritis (e)	75.84	27.56	385	> (i)	
Cancer (f)	75.23	27.13	209	> (i)	
Back Problems (g)	75.23	27.13	109		
Anxiety (h)	70.63	27.17	63		
Depression (i)	66.05	29.22	210	< (a) – (f)	
Total	77.60	24.94	2474		

Domain Means x Safety

Safety	Domain mean	SD	N	Significant differences in domain means	p
Blood pressure (a)	79.24	18.42	654	> (h)	.01 (Dunnett's C)
Heart problems (b)	78.91	17.86	405	> (h)	
Cancer (c)	78.80	18.94	209		$Eta^2 = .014$
Arthritis (d)	78.00	19.81	385		
Asthma (e)	78.00	19.84	160		
Back Problems (f)	76.70	19.58	109		
Diabetes (g)	74.41	21.51	279		
Depression (h)	72.48	21.36	210	< (a), (b)	
Anxiety (i)	72.22	22.39	63		
Total	77.47	19.58	2474		

Domain Means x Community Connectedness

Community connectedness	PWI mean	SD	N	Significant differences in domain means	p
Blood pressure (a)	74.72	19.01	654	> (i)	.01 (Dunnett's C)
Asthma (b)	73.19	19.69	160	> (i)	
Arthritis (c)	72.96	21.47	385	> (i)	$Eta^2 = .028$
Cancer (d)	72.87	20.06	209	> (i)	
Heart problems (e)	72.59	19.25	405	> (i)	
Diabetes (f)	69.46	21.00	279	> (i)	
Back Problems (g)	66.06	23.41	109		
Anxiety (h)	65.08	23.82	63		
Depression (i)	63.24	23.25	210	< (a) - (e)	
Total	71.65	20.79	2474		

Domain Means x Security

Security	PWI mean	SD	N	Significant differences in domain means	p
Blood pressure (a)	73.50	19.61	654	> (f), (i)	.01 (Dunnett's C)
Heart problems (b)	72.32	19.68	405	> (i)	
Cancer (c)	71.87	20.54	209	> (i)	$Eta^2 = .029$
Arthritis (d)	71.06	21.96	385	> (i)	
Asthma (e)	67.94	20.83	160		
Diabetes (f)	67.85	22.11	279	< (a)	
Back Problems (g)	65.50	23.82	109		
Anxiety (h)	62.70	25.22	63		
Depression (i)	61.81	25.46	210	< (a) – (d)	
Total	70.17	21.61	2474		

Appendix B: Primary and Secondary Control (PCSC) Scale Items

Primary Control

Item 1 (PC1): I ask others for help or advice

Item 2 (PC2): I look for different ways to improve the situation

Item 3 (PC3): I use my skills to overcome the situation

Secondary Control

Item 1 (SC1): I remind myself that something good may come of it

Item 2 (SC2): I remind myself I am better off than some others

Item 3 (SC3): I remember that the situation will improve if I am patient

Relinquished Control

Item 1 (RC1): I don't do anything as nothing can help

Item 2 (RC2): I spend time by myself

Item 3 (RC3): I just let my feelings out so others know how I feel

Appendix C: Frequencies for Primary and Secondary Control Items

Combined Survey Data (Study2)

PC Item 1 Ask others for help or advice	Freq	Valid %	PC Item 2 Look for different ways	Freq	Valid %	PC Item 3 Use my skills	Freq	Valid %
00	257	3.4	00	36	.6	00	34	.5
10	354	4.7	10	22	.3	10	34	.5
20	489	6.5	20	64	.8	20	61	.8
30	518	6.9	30	109	1.4	30	144	1.9
40	420	5.6	40	332	4.4	40	347	4.6
50	1324	17.5	50	653	8.7	50	679	9.0
60	848	11.2	60	728	9.7	60	696	9.2
70	1120	14.8	70	1448	19.2	70	1430	19.0
80	1132	15.0	80	1990	26.4	80	1990	26.4
90	538	7.1	90	1156	15.3	90	1240	16.5
100	552	7.3	100	995	13.2	100	876	11.6
Total	7552	100.0	Total	7533	100.0	Total	7531	100.0

SC Item 1 Something good may come of it	Freq	Valid %	SC Item 2 Better off than some others	Freq	Valid %	SC Item 3 Situation will improve if patient	Freq	Valid %
00	103	1.4	00	64	.8	00	119	1.6
10	99	1.3	10	70	.9	10	109	1.4
20	164	2.2	20	132	1.8	20	177	2.4
30	297	3.9	30	225	3.0	30	310	4.1
40	385	5.1	40	229	3.0	40	433	5.8
50	1027	13.6	50	514	6.8	50	999	13.3
60	695	9.2	60	511	6.8	60	745	9.9
70	1245	16.5	70	908	12.1	70	1213	16.1
80	1610	21.4	80	1730	23.0	80	1621	21.6
90	1073	14.2	90	1639	21.8	90	1010	13.4
100	832	11.0	100	1508	20.0	100	785	10.4
Total	7530	100.0	Total	7530	100.0	Total	7521	100.0

Appendix D: Frequencies Distributions for Survey 13

Perceived Control Factors

Variable	Category	Freq %	N	Variable	Category	Freq %	N
Primary Control (Mean 76.41)	0-40	2.1	24	Secondary Control (Mean 79.20)	0-40	2.6	30
	50	4.6	54		50	5.4	63
	60	13.8	162		60	9.8	115
	70	25.0	293		70	17.3	202
	80	26.0	304		80	25.9	303
	90	18.4	215		90	23.0	269
	100	10.1	118		100	16.1	188
		Total	1170			Total	1170
Total Acceptance (Mean 65.49)	0-10	2.9	33	Total Domain Control (Mean 76.77)	0-40	2.3	25
	20	4.0	45		50	5.5	63
	30	5.7	65		60	9.9	113
	40	6.2	70		70	21.1	240
	50	14.1	161		80	35.0	398
	60	10.8	123		90	18.5	211
	70	14.8	168		100	7.7	88
	80	19.2	218				
	90	13.9	158				
	100	8.5	97				
		Total	1146			Total	1163

Age, Income and Gender

Variable	Category	Freq %	N	Variable	Category	Freq %	N
Age	18-25	2.3	27	Income	<$15,000	8.6	98
(Mean 65.50 yrs)	26-35	6.5	76	(Mean $74,291)	$15,000-$30,000	19.7	223
	36-45	14.6	171		$31,000-$60,000	27.4	311
	46-55	21.3	249		$61,000-$100,000	23.3	263
	56-65	26.5	310		$101,000-$150,000	13.3	151
	66-75	19.0	222		$151,000-$250,000	6.0	68
	76+	9.9	116		>$250,000	1.6	24
		Total	1171			Total	1138
Gender	Male	48.0	562				
	Female	52.0	609				
		Total	1171				

Appendix E: ANOVA and PWI Means for Acceptance Items

(Survey 13)

PWI Means x SOL Acceptance

SOL Acceptance	PWI mean	SD	N	Significant PWI differences between levels of SOL	p
00 (a)	79.23	12.76	39	> (e), (f)	.01 (Dunnett's C)
10 (b)	73.33	15.41	33		
20 (c)	74.78	12.84	90	> (f); < (k)	$Eta^2 = .150$
30 (d)	71.46	13.26	82	< (j), (k)	
40 (e)	66.49	13.98	63	< (a), (i), (j), (k)	
50 (f)	66.36	15.20	120	< (a), (c), (i), (j), (k)	
60 (g)	69.93	11.72	84	< (i), (j), (k)	
70 (h)	71.67	10.01	157	< (i), (j), (k)	
80 (i)	77.38	9.55	217	> (e), (F), (g); < (k)	
90 (j)	78.49	11.38	136	> (d) - (h)	
100 (k)	82.59	13.20	148	> (c) - (i)	
Total	74.48	13.17	1169		

PWI Means x Health Acceptance

Health Acceptance	PWI mean	SD	N	Significant PWI differences between levels of Health	p
00 (a)	77.84	12.73	43		.01 (Dunnett's C)
10 (b)	73.31	14.28	47		
20 (c)	71.45	13.92	78	< (j), (k)	$Eta^2 = .129$
30 (d)	71.04	12.92	88	< (i), (j), (k)	
40 (e)	68.76	13.30	100	< (i), (j), (k)	
50 (f)	69.42	14.67	123	< (i), (j), (k)	
60 (g)	69.62	10.29	99	< (i), (j), (k)	
70 (h)	72.86	11.54	155	< (i), (j), (k)	
80 (i)	77.98	10.71	197	> (d) - (h)	
90 (j)	81.11	10.11	117	> (c) - (h)	
100 (k)	82.17	13.58	120	> (c) - (h)	
Total	74.49	13.18	1167		

PWI Means x Achievements Acceptance

Achievements Acceptance	PWI mean	SD	N	Significant PWI differences between levels of Achievements	p
00 (a)	77.39	12.20	40	< (e), (f)	.01 (Dunnett's C) Eta^2 = .175
10 (b)	74.44	14.78	55	< (k)	
20 (c)	75.25	12.57	90	> (f); < (j), (k)	
30 (d)	67.08	12.77	73	< (j), (k)	
40 (e)	72.52	14.09	70	< (a), (i), (j), (k)	
50 (f)	67.08	13.50	138	< (a), (c), (i), (j), (k)	
60 (g)	67.10	12.27	81	< (i), (j), (k)	
70 (h)	69.86	10.58	191	< (i), (j), (k)	
80 (i)	76.79	9.88	212	> (e) - (k)	
90 (j)	82.47	11.19	115	> (c) - (i)	
100 (k)	85.10	12.00	101	> (b) - (i)	
Total	74.56	13.09	1166		

PWI Means x Relationships Acceptance

Relationships Acceptance	PWI mean	SD	N	Significant PWI differences between levels of Relationships	p
00 (a)	80.81	9.52	39	> (d) - (h)	.01 (Dunnett's C) Eta^2 = .159
10 (b)	75.66	12.25	55	> (e); < (k)	
20 (c)	72.41	14.36	71	< (k)	
30 (d)	71.33	13.66	59	< (a), (j), (k)	
40 (e)	66.54	13.60	73	< (a), (b), (i), (j), (k)	
50 (f)	68.11	14.42	145	< (a), (i), (j), (k)	
60 (g)	71.14	11.55	95	< (a), (i), (j), (k)	
70 (h)	71.00	10.43	136	< (a), (i), (j), (k)	
80 (i)	76.54	10.40	220	> (e) – (h); < (k)	
90 (j)	79.54	11.16	149	> (c) - (h)	
100 (k)	84.08	12.37	129	> (b) - (i)	
Total	74.55	13.11	1165		

PWI Means x Safety Acceptance

Safety Acceptance	PWI mean	SD	N	Significant PWI differences between levels of Safety	p
00 (a)	76.45	14.16	31		.01 (Dunnett's C) Eta^2 = .124
10 (b)	76.71	12.19	43		
20 (c)	76.19	12.53	51		
30 (d)	70.96	13.24	67	< (j), (k)	
40 (e)	69.98	14.28	59	< (i), (k)	
50 (f)	69.29	13.93	190	< (i), (j), (k)	
60 (g)	69.11	11.94	79	< (i), (j), (k)	
70 (h)	72.01	11.83	177	< (i), (j), (k)	
80 (i)	76.37	9.61	228	> (f) - (h); < (k)	
90 (j)	79.92	12.52	131	> (d) - (h)	
100 (k)	83.74	13.53	109	> (d) - (i)	
Total	74.52	13.17	1165		

PWI Means x Community Acceptance

Community Acceptance	PWI mean	SD	N	Significant PWI differences between levels of Community	p
00 (a)	73.09	18.79	31		.01 (Dunnett's C) Eta^2 = .139
10 (b)	78.23	11.74	38	> (f)	
20 (c)	75.99	10.71	56	> (f); < (k)	
30 (d)	70.98	13.94	63	< (j), (k)	
40 (e)	68.92	13.75	65	< (j), (k)	
50 (f)	69.35	13.23	214	< (b), (c), (i), (j), (k)	
60 (g)	70.38	10.97	97	< (i), (j), (k)	
70 (h)	72.50	12.31	146	< (j), (k)	
80 (i)	75.76	11.20	234	> (f), (g); < (j), (k)	
90 (j)	82.14	10.40	130	> (d) - (i)	
100 (k)	84.13	12.48	94	> (b) - (i)	
Total	74.50	13.18	1168		

PWI Means x Security Acceptance

Security Acceptance	PWI mean	SD	N	Significant PWI differences between levels of Security	p
00 (a)	68.86	21.01	30		.01 (Dunnett's C) Eta^2 = .161
10 (b)	77.32	13.36	41		
20 (c)	74.65	12.58	62	< (k)	
30 (d)	70.58	12.38	76	< (j), (k)	
40 (e)	70.76	12.39	64	< (j), (k)	
50 (f)	68.09	14.41	151	< (i), (j), (k)	
60 (g)	69.26	10.45	81	< (i), (j), (k)	
70 (h)	73.00	11.47	179	< (j), (k)	
80 (i)	76.55	9.61	208	> (f), (g); < (j), (k)	
90 (j)	81.53	10.55	145	> (d) - (i)	
100 (k)	82.20	11.78	96	> (b) - (i)	
Total	74.53	13.15	1163		

Appendix F: ANOVA and PWI Means for Control Domains

(Survey 13)

PWI Means x SOL Control

SOL Control	PWI mean	SD	N	Significant PWI differences between levels of SOL	p
0-20 (a)	51.42	15.09	32	< (d) - (i)	.01 (Dunnett's C)
30 (b)	55.71	13.62	27	< (e) - (i)	
40 (c)	57.99	12.74	27	< (f) - (i)	$Eta^2 = .395$
50 (d)	63.68	13.88	96	< (a) - (i)	
60 (e)	67.18	10.95	107	< (a), (b), (f), (g), (h), (i)	
70 (f)	73.91	9.00	235	> (a) - (e); < (g) - (i)	
80 (g)	77.21	9.20	333	> (a) - (d); < (h), (i)	
90 (h)	81.21	9.24	208	> (a) - (g); < (i)	
100 (i)	87.31	10.14	106	> (a) - (h)	
Total	74.51	13.17	1171		

PWI Means x Health Control

Health Control	PWI mean	SD	N	Significant PWI differences between levels of Health	p
0-20 (a)	58.92	14.96	53	< (d) - (i)	.01 (Dunnett's C)
30 (b)	64.13	12.86	36	< (f) - (i)	
40 (c)	64.96	13.84	55	< (f) - (i)	$Eta^2 = .225$
50 (d)	69.81	13.51	123	> (a); < (g) - (i)	
60 (e)	70.28	12.52	121	> (a); < (g) - (i)	
70 (f)	74.92	10.78	234	> (a) - (c), < (h), (i)	
80 (g)	76.91	9.99	279	> (a) - (e); < (i)	
90 (h)	80.15	11.49	174	> (a) - (f); < (i)	
100 (i)	85.59	10.60	96	> (a) - (h)	
Total	74.51	13.17	1171		

PWI Means x Achievements Control

Achievements Control	PWI mean	SD	N	Significant PWI differences between Achievements levels	p
0-20 (a)	49.56	14.31	29	< (d) - (i)	.01 (Dunnett's C)
30 (b)	49.62	13.30	19	< (d) - (i)	
40 (c)	60.32	11.39	45	< (f) - (i)	Eta^2 = .431
50 (d)	63.78	13.12	90	> (a), (b); < (f) - (i)	
60 (e)	66.74	11.39	104	> (a), (b); < (f) - (i)	
70 (f)	72.90	9.37	221	> (a) - (e); < (g) - (i)	
80 (g)	77.55	8.36	353	> (a) - (f); < (h), (i)	
90 (h)	82.09	9.37	182	> (a) - (g); < (i)	
100 (i)	86.17	9.77	124	> (a) - (h)	
Total	74.48	13.15	1170		

PWI Means x Relationships Control

Relationships Control	PWI mean	SD	N	Significant PWI differences between levels of Relationships	p
0-20 (a)	53.29	14.93	30	< (d) - (i)	.01 (Dunnett's C)
30 (b)	57.64	14.70	26	< (f) - (i)	
40 (c)	57.61	12.95	43	< (e) - (i)	Eta^2 = .343
50 (d)	65.74	11.88	97	> (a); < (f) - (i)	
60 (e)	68.83	11.40	65	> (a), (c); < (g) - (i)	
70 (f)	71.65	11.10	177	> (a) - (d); < (g) - (i)	
80 (g)	76.09	9.10	338	> (a), (f); < (h), (i)	
90 (h)	80.67	9.68	255	> (a) - (g); < (i)	
100 (i)	84.82	11.71	139	> (a) - (g)	
Total	74.52	13.16	1170		

PWI Means x Safety Control

Safety Control	PWI mean	SD	N	Significant PWI differences between levels of Safety	p
0-20 (a)	57.71	17.20	20	< (g), (h), (i)	.01 (Dunnett's C)
30 (b)	58.57	12.94	12	< (h), (i)	
40 (c)	65.13	13.63	49	< (f) - (i)	Eta^2 = .236
50 (d)	65.95	13.48	115	< (f) - (i)	
60 (e)	67.50	13.67	112	< (f) - (i)	
70 (f)	73.63	10.31	231	> (c) - (e); < (h), (i)	
80 (g)	76.71	10.09	333	> (a) - (e); < (h), (i)	
90 (h)	80.29	10.42	194	> (a) - (g); < (i)	
100 (i)	88.44	12.87	102	> (a) - (g)	
Total	74.52	13.13	1168		

PWI Means x Community Control

Community Control	PWI mean	SD	N	Significant PWI differences between levels of Community	p
0-20 (a)	49.40	16.86	26	< (a), (e), (f), (g), (h), (i)	.01 (Dunnett's C)
30 (b)	56.82	16.27	31	< (d) - (i)	
40 (c)	62.94	11.63	36	< (f) - (i)	Eta^2 = .340
50 (d)	65.84	13.27	126	> (a), (b); < (f) - (i)	
60 (e)	68.85	11.93	111	> (a), (b); < (f) - (i)	
70 (f)	74.29	9.67	217	> (a) - (e); < (h), (i)	
80 (g)	77.06	9.39	326	> (a) - (e); < (h), (i)	
90 (h)	81.70	9.70	190	> (a) - (g)	
100 (i)	85.57	11.81	106	> (a) - (g)	
Total	74.49	13.18	1169		

PWI Means x Security Control

Security Control	PWI mean	SD	N	Significant PWI differences between levels of Security	p
0-20 (a)	56.77	17.41	57	< (e) - (i)	.01 (Dunnett's C)
30 (b)	59.31	13.20	37	< (e) - (i)	
40 (c)	63.20	11.30	54	< (e) - (i)	Eta^2 = .369
50 (d)	65.19	13.34	123	< (e) - (i)	
60 (e)	70.77	10.13	106	> (a) - (c); < (g), (h), (i)	
70 (f)	74.85	7.87	237	> (a) - (d); < (g), (h), (i)	
80 (g)	78.45	9.28	296	> (a), (f); < (h), (i)	
90 (h)	82.56	8.56	172	> (a) - (g)	
100 (i)	86.94	12.16	88	> (a) - (g)	
Total	74.51	13.17	1170		

Appendix G: PC Item 1 Comparisons

Combine Survey Data (Study 2)

PC Item 1 Ask others for help or advice		Freq	Valid %	PC Item 2 Look for different ways		Freq	Valid %	PC Item 3 Use my skills		Freq	Valid %
00		257	3.4	00		36	.6	00		34	.5
10		354	4.7	10		22	.3	10		34	.5
20	0-50 =	489	6.5	20	0-50 =	64	.8	20 =	0-50	61	.8
30	44.6%	518	6.9	30	16.2%	109	1.4	30	17.3%	144	1.9
40		420	5.6	40		332	4.4	40		347	4.6
50		1324	17.5	50		653	8.7	50		679	9.0
60		848	11.2	60		728	9.7	60		696	9.2
70	>60 =	1120	14.8	70	>60 =	1448	19.2	70	>60 =	1430	19.0
80	55.4%	1132	15.0	80	83.8%	1990	26.4	80	82.7%	1990	26.4
90		538	7.1	90		1156	15.3	90		1240	16.5
100		552	7.3	100		995	13.2	100		876	11.6
Total		7552	100.0	Total		7533	100.0	Total		7531	100.0

Survey 13 Data

PC Item 1 Ask others for help or advice		Freq	Valid %	PC Item 2 Look for different ways		Freq	Valid %	PC Item 3 Use my skills		Freq	Valid %
00		23	2.0	00		2	.2	00		3	.3
10		33	2.8	10		3	.3	10		4	.3
20	0-50 =	69	5.9	20	0-50 =	4	.3	20	0-50 =	2	.2
30	36.3%	53	4.5	30	7.2%	9	.7	30	8.8%	8	.7
40		39	3.3	40		13	1.1	40		13	1.1
50		208	17.8	50		54	4.6	50		72	6.2
60		136	11.6	60		102	8.7	60		109	9.2
70	>60 =	164	14.0	70	>60 =	244	20.8	70	>60 =	232	19.8
80	65.7%	213	18.2	80	92.8%	352	30.1	80	91.2%	347	29.7
90		133	11.4	90		221	18.9	90		216	18.5
100		100	8.5	100		167	14.3	100		164	14.0
Total		1171	100.0	Total		1171	100.0	Total		1170	100.0

Appendix H: Questionnaire Items for Study 3

Subjective Wellbeing Back Problems Study

DEAKIN UNIVERSITY AUSTRALIA

Thank you for your involvement in this study. The aim of this project is to obtain information about people's experiences with back pain. By completing this questionnaire you are consenting to take part in the research as explained in the enclosed Plain Language Statement. Please ensure that you do not include your name, or any other comments that will make you identifiable as this process is designed to be anonymous. The questionnaire should take approximately 20 minutes to complete. It is your first and true impressions which are of most importance. When completed, please seal the questionnaire in the envelope provided for return delivery to Deakin University.

Please answer each question as honestly as you can without thinking too hard. It is your first and true impressions which are of most importance.

SECTION A PERSONAL WELLBEING

The following questions ask **how satisfied you feel,** on a scale from zero to ten. **Zero (0)** means you feel **completely dissatisfied. Ten (10)** means you feel **completely satisfied.** The middle of the scale means you feel neutral.

Thinking about your own life and personal circumstances, please circle the number that best represents how satisfied you feel with your life.

How satisfied are you with...		Completely dissatisfied					Neutral					Completely satisfied
1	your life as a whole?	0	1	2	3	4	5	6	7	8	9	10
2	your standard of living?	0	1	2	3	4	5	6	7	8	9	10
3	your health?	0	1	2	3	4	5	6	7	8	9	10
4	what you are currently achieving in life?	0	1	2	3	4	5	6	7	8	9	10
5	your personal relationships?	0	1	2	3	4	5	6	7	8	9	10
6	how safe you feel?	0	1	2	3	4	5	6	7	8	9	10
7	feeling part of your community?	0	1	2	3	4	5	6	7	8	9	10
8	your future security?	0	1	2	3	4	5	6	7	8	9	10
9	your spirituality or religion?	0	1	2	3	4	5	6	7	8	9	10
	or (If you have no spiritual or religious beliefs)	na										

SECTION B HOW YOU GENERALLY FEEL

Please indicate how each of the following describes your **feelings** when you think about **your life in general** by circling the appropriate number where zero **(0)** means **not at all** and ten **(10)** means **extremely.**

		Not at all										Extremely
10	How content do you generally feel?	0	1	2	3	4	5	6	7	8	9	10
11	How unhappy do you generally feel?	0	1	2	3	4	5	6	7	8	9	10
12	How excited do you generally feel?	0	1	2	3	4	5	6	7	8	9	10
13	How alert do you generally feel?	0	1	2	3	4	5	6	7	8	9	10
14	How happy do you generally feel?	0	1	2	3	4	5	6	7	8	9	10

SECTION C CONTROL OVER YOUR LIFE

Thinking about your life and personal circumstances, **how much control** do you feel you have over...

		No control at all										Complete control
15	your life as a whole?	0	1	2	3	4	5	6	7	8	9	10
16	your standard of living?	0	1	2	3	4	5	6	7	8	9	10
17	your health?	0	1	2	3	4	5	6	7	8	9	10
18	what you are currently achieving in life?	0	1	2	3	4	5	6	7	8	9	10
19	your personal relationships?	0	1	2	3	4	5	6	7	8	9	10
20	your safety?	0	1	2	3	4	5	6	7	8	9	10
21	being a part of your community?	0	1	2	3	4	5	6	7	8	9	10
22	your future security?	0	1	2	3	4	5	6	7	8	9	10
23	your spirituality or religion? (only if this applies to you)	0	1	2	3	4	5	6	7	8	9	10

SECTION D WAYS OF COPING

How much do you agree with the following statements? **When something bad happens I...**

		Strongly disagree										Strongly agree
24	ask others for help or advice.	0	1	2	3	4	5	6	7	8	9	10
25	look for different ways to improve the situation.	0	1	2	3	4	5	6	7	8	9	10
26	use my skills to overcome the problem.	0	1	2	3	4	5	6	7	8	9	10
27	remind myself that something good may come of it.	0	1	2	3	4	5	6	7	8	9	10
28	remind myself that I am better off than some others.	0	1	2	3	4	5	6	7	8	9	10
29	remember that the situation will improve if I am patient.	0	1	2	3	4	5	6	7	8	9	10

SECTION E RECENT EVENTS IN YOUR LIFE

30 Has anything happened to you recently that makes you **feel happier or sadder than normal** right now? Please tick as appropriate.

☐ Yes, happier ☐ Yes, sadder ☐ No—Please go to item 33

		Very weak										Very strong
31	(If Yes) On a scale from 0 to 10, **how strong** would you rate this influence?	0	1	2	3	4	5	6	7	8	9	10

32 Which area of your life has been **most strongly influenced** by this event? Please tick **one box only**.

☐ Standard of living ☐ Relationships ☐ Achieving in life ☐ Future security
☐ Health ☐ Personal safety ☐ Connection to your community

SECTION F THE NATURE OF YOUR BACK PROBLEM

33 Do you have a **back problem** that has been diagnosed by a doctor or other health care professional?

- ◯ Yes
- ◯ No—If no, please go to item 45

34 If yes, please indicate the general nature of your back problem:

- ◯ Rheumatoid arthritis
- ◯ Osteoarthritis
- ◯ Osteoporosis
- ◯ Muscular problems
- ◯ Disc problems
- ◯ Other (please provide details)

35 **How long** have you been **receiving treatment** for your back problem from a doctor or other health professional? (Please tick **only one box**)

- ◯ I am not receiving treatment
- ◯ Less than one month
- ◯ One–three months
- ◯ Four–six month
- ◯ Six–12 months
- ◯ More than a year

36 How **often do you experience** your back problem? (Please select **only one answer**).

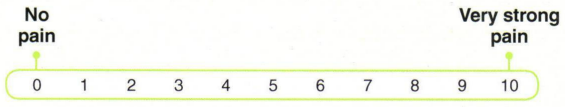
- ◯ Every day
- ◯ Almost every day
- ◯ Once or twice a week
- ◯ Once or twice a month
- ◯ Once every few months
- ◯ Once a year or longer

SECTION G BACK PAIN

37 Right now, is your **back problem** giving you **physical pain?**

- ◯ Yes
- ◯ No—Please go to Item 39

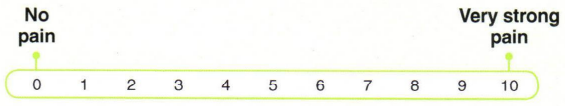
38 (If Yes) On a scale from 0 to 10, **how much physical pain** is your back problem giving you now?



39 Right now, do you have **physical pain** from some other **condition that is NOT your back problem?**

- ◯ Yes
- ◯ No—Please go to Item 41

40 (If Yes) how much **physical pain overall** are you experiencing now?



SECTION H BACK PROBLEMS AND DAILY LIVING

The following questions relate to your ability to go about your daily life **when you are experiencing problems with your back.**

41 When you are experiencing back pain, **how much help** do you need with **personal care tasks** (for example, getting dressed, washing, brushing your teeth etc)?

No help at all — Help with all personal care tasks

0 1 2 3 4 5 6 7 8 9 10

42 When you are experiencing back pain, how easily can you **perform house-hold tasks without help?**

Very easily — With great difficulty

0 1 2 3 4 5 6 7 8 9 10

43 When you are experiencing back pain, how easily are you able to **move around your home by yourself?**

Very easily — With great difficulty

0 1 2 3 4 5 6 7 8 9 10

44 When you are experiencing back pain, how much difficulty do you have **sleeping without the aid of medication?**

No difficulty sleeping — Great difficulty sleeping

0 1 2 3 4 5 6 7 8 9 10

SECTION I DEMOGRAPHIC INFORMATION

45 What is your **age group** (please tick **one box only**).

- ☐ 18 to 25 yrs
- ☐ 26 to 35 yrs
- ☐ 36 to 45 yrs
- ☐ 46 to 55 yrs
- ☐ 56 to 65 yrs
- ☐ 66 to 75 yrs
- ☐ Over 75 yrs

46 What is your **gender?** (please tick **one box only**).

- ☐ Male
- ☐ Female

47 Please indicate from the list **who you live with** (select **as many as applies**).

- ☐ No one, I live by myself
- ☐ My partner and children
- ☐ My partner only
- ☐ My children only
- ☐ One or both parents
- ☐ Other adults who are not my parents or my partner

48 What is your approximate **total household annual income before tax?** (please tick **one box only**).

- ☐ Less than $15,000
- ☐ $15,000 to $30,000
- ☐ $31,000 to $60,000
- ☐ $61,000 to $100,00
- ☐ $101,000 to $150,000
- ☐ $151,000 to $250,000
- ☐ $251,000 to $500,000
- ☐ More than $500,000

49 Please make **any comments** you think are relevant to your back problem.

Thank you for your valuable contribution to this study

Appendix I: Frequency Distributions for Study 3

Demographic Variables (BP and NBP Groups)

Variable	Category	Freq %	N	Variable	Category	Freq %	N
Age	18-35	5.8	46	Age	18-35	3.5	22
NBP Group	36-45	13.0	103	BP Group	36-45	11.2	70
	46-55	22.4	178		46-55	18.3	115
(Mean 54 yrs)	56-65	25.0	199	(Mean 55.8 yrs)	56-65	29.3	184
	66-75	21.7	173		66-75	26.5	166
	>75	12.1	96		>75	11.2	70
		Total	795			Total	627
Income	<$15,000	7.0	54	Income	<$15,000	9.4	57
NBP Group	$15,000-$30,000	21.0	160	BP Group	$15,000-$30,000	24.2	146
(Mean $62,483)	$31,000-$60,000	27.5	210	(Mean $55,883)	$31,000-$60,000	28.3	171
	$61,000-$90,000	21.5	164		$61,000-$90,000	22.2	134
	$91,000-$120,000	13.8	105		$91,000-$120,000	9.1	55
	$121,000-$150,000	7.2	55		$121,000-$150,000	5.0	30
	>$150,000	2.0	15		>$150,000	1.8	11
		Total	763			Total	604
Gender	Male	43.3	345	Gender	Male	42.0	264
NBP Group	Female	56.7	452	BP Group	Female	58.0	364
		Total	797			Total	628

Back Problem Specific Variables (BP group only)

Variable	Category	Freq %	N	Variable	Category	Freq %	N
Frequency of back problem (Mean Almost every day)	Every day	23.1	146	Back pain intensity (Mean 49.34)	0-20	14.5	44
	Almost everyday	23.7	150		30	17.8	54
	Once or twice a week	17.1	108		40	10.5	32
	Once or twice a month	12.8	81		50	14.5	44
	Once every few months	17.2	109		60	14.8	45
	Once a year or longer	6.2	39		70	15.6	47
					80–100	12.5	38
		Total	633			Total	304
Personal care limitations (Mean 10.22)	00	67.1	429	Household task limitations (Mean 7.31)	00	11.9	76
	10	11.2	71		10	11.6	74
	20	6.9	44		20	11.5	73
	30	3.0	19		30	11.2	71
	40	3.0	14		40	9.1	58
	50	2.2	13		50	12.9	82
	60	3.1	20		60	5.3	34
	70	2.5	16		70	9.3	59
	80-100	1.6	10		80-100	17.1	109
		Total	636			Total	636
Home mobility limitations (Mean 26.94)	00	24.1	153	Difficulty sleeping (Mean 29.39)	00	20.9	133
	10	15.3	97		10	8.3	53
	20	13.2	84		20	12.7	81
	30	10.2	65		30	7.7	49
	40	6.1	39		40	6.8	43
	50	7.9	50		50	9.7	63
	60	7.9	50		60	8.2	52
	70	6.6	42		70	7.7	49
	80-100	8.8	56		80-100	17.9	114
		Total	636			Total	637

Appendix J: Frequency Summary of Control Variables

All Data
(Study 3)

PCSC	PCSC item	Item No	0-50 N	0-50 %	60-100 N	60-100 %
Primary Control	Ask others for help or advice	PC 1	570	39.2%	884	60.8%
	Look for different ways to improve the situation	PC 2	189	12.9%	1267	87.1%
	Use my skills to overcome the situation	PC 3	168	11.6%	1288	88.4%
Secondary Control	Remind myself that something good may come of it	SC 1	281	19.4%	1174	80.6%
	Remind myself I am better off than some others	SC 2	130	09.0%	1326	91.0%
	Remember that the situation will improve if I am patient	SC 3	258	17.1%	1199	82.3%
Domain Control	SOL	n/a	186	12.8%	1268	87.2%
	Health		325	22.4%	1127	77.6%
	Achievements		264	18.2%	1188	81.8%
	Relations		229	15.8%	1226	83.3%
	Safety		203	14.1%	1250	85.9%
	Community		261	17.9%	1194	82.1%
	Security		315	21.7%	1133	78.3%

Appendix K: ANOVA Results for Primary and Secondary Control

Primary Control	Group	PWI mean	SD	N	PWI mean difference	p
0-50	Back Problem (BP)	60.00	16.91	91	- 7.74	F (1, 177) = 11.04, p = .000 Eta^2 = .059
	No Back Problem (NBP)	67.74	14.09	88		
60	Back Problem (BP)	65.80	14.54	87	- 4.91	F (1, 215) = 6.33, p = .013 Eta^2 = .028
	No Back Problem (NBP)	70.71	14.02	130		
70	Back Problem (BP)	71.98	13.10	137	- 2.99	F (1, 311) = 4.54, p = .034 Eta^2 = .014
	No Back Problem (NBP)	74.97	11.65	176		
80	Back Problem (BP)	73.51	13.34	152	- 4.36	F (1, 283) = 11.77, p = .000 (Welch) Eta^2 = .032
	No Back Problem (NBP)	77.87	10.84	211		
90	Back Problem (BP)	78.37	10.58	115	- 1.78	F (1, 254) = 1.76, p = .186 Eta^2 = .007
	No Back Problem (NBP)	80.15	10.77	141		
100	Back Problem (BP)	79.38	12.40	55	- 1.88	F (1, 122) = 0.58, p = .450 Eta^2 = .005
	No Back Problem (NBP)	81.26	14.75	69		

Secondary Control	Group	PWI mean	SD	N	PWI mean difference	p
0-50	Back Problem (BP)	57.71	17.12	63	- 12.15	F (1, 121) = 16.17, p = .000 Eta^2 = .118
	No Back Problem (NBP)	69.86	16.34	60		
60	Back Problem (BP)	65.44	16.41	57	- 3.9	F (1, 137) = 2.82, p = .133 Eta^2 = .016
	No Back Problem (NBP)	69.34	14.00	82		
70	Back Problem (BP)	69.77	12.56	125	- 0.66	F (1, 247) = 0.17, p = .679 Eta^2 = .001
	No Back Problem (NBP)	70.40	12.77	124		
80	Back Problem (BP)	73.47	12.31	155	- 3.36	F (1, 278) = 8.81, p = .005 (Welch) Eta^2 = .023
	No Back Problem (NBP)	76.83	9.62	221		
90	Back Problem (BP)	74.53	12.51	143	- 3.29	F (1, 350) = 5.76, p = .017 Eta^2 = .016
	No Back Problem (NBP)	77.82	12.67	209		
100	Back Problem (BP)	79.54	14.05	96	-3.02	F (1, 213) = 2.98, p = .086 Eta^2 = .014
	No Back Problem (NBP)	82.56	11.59	119		

Appendix L: ANOVA Results for Total Domain Control

Total Domain Control	Group	PWI mean	SD	N	PWI mean difference	p
0-50	Back Problem (BP)	48.24	12.01	73	2.73	F (1, 114) = 1.55, p = .215 Eta^2 = .013
	No Back Problem (NBP)	45.51	10.17	43		
60	Back Problem (BP)	58.68	10.20	76	- 4.00	F (1, 146) = 3.78, p = .054 Eta^2 = .025
	No Back Problem (NBP)	62.08	11.07	72		
70	Back Problem (BP)	70.06	8.38	127	0.35	F (1, 268) = 0.11, p = .738 Eta^2 = .000
	No Back Problem (NBP)	69.71	8.58	143		
80	Back Problem (BP)	76.02	7.60	189	- 1.51	F (1, 480) = 5.11, p = .024 Eta^2 = .011
	No Back Problem (NBP)	77.53	6.85	293		
90	Back Problem (BP)	84.00	8.46	122	- 0.72	F (1, 192) = 0.79, p = .374 (Welch) Eta^2 = .003
	No Back Problem (NBP)	84.72	5.68	187		
100	Back Problem (BP)	89.55	6.89	36	- 0.41	F (1, 100) = 0.67, p = .798 Eta^2 = .001
	No Back Problem (NBP)	89.96	7.95	67		

Appendix M: ANOVA Results for PWI x Control Domains (<.05)

Control domain	Control level	Back problem group	PWI mean	SD	N	PWI Mean difference	p
SOL Control	0-50 pts	Back Problem (BP)	53.68	14.04	99	- 5.19	F (1, 184) = 5.38, p = .021 Eta^2 = .028
		NO Back Problem (NBP)	58.87	16.45	87		
	80 pts	Back Problem (BP)	76.33	10.31	180	- 1.79	F (1, 468) = 3.91, p = .049 Eta^2 = .008
		NO Back Problem (NBP)	78.12	9.10	290		
Health Control	0-50 pts	Back Problem (BP)	61.26	15.29	188	- 4.46	F (1, 323) = 6.72, p = .010 Eta^2 = .020
		NO Back Problem (NBP)	65.72	13.37	137		
Achievements Control	0-50 pts	Back Problem (BP)	55.16	13.88	138	- 3.36	F (1, 262) = 4.47, p = .036 Eta^2 = .017
		NO Back Problem (NBP)	58.82	14.28	126		
	80 pts	Back Problem (BP)	77.83	9.13	159	- 2.21	F (1, 274) = 7.65, p = .010 (Welch) Eta^2 = .018
		NO Back Problem (NBP)	80.04	7.07	257		
Relationships Control	80 pts	Back Problem (BP)	73.55	11.59	156	- 4.42	F (1, 275) = 17.72, p = .000 (Welch) Eta^2 = .045
		NO Back Problem (NBP)	77.97	8.81	222		
	90 pts	Back Problem (BP)	79.41	11.19	140	- 2.57	F (1, 230) = 6.29, p = .020 (Welch) Eta^2 = .018
		NO Back Problem (NBP)	81.98	7.85	205		
Safety Control	0-50 pts	Back Problem (BP)	55.99	15.30	108	- 5.72	F (1, 201) = 7.11, p = .008 Eta^2 = .034
		NO Back Problem (NBP)	61.71	15.21	95		
	80 pts	Back Problem (BP)	74.57	11.31	189	- 3.09	F (1, 356) = 10.18, p = .002 (Welch) Eta^2 = .022
		NO Back Problem (NBP)	77.66	9.40	269		
	90 pts	Back Problem (BP)	79.98	11.48	123	- 3.00	F (1, 228) = 5.93, p = .019 (Welch) Eta^2 = .021
		NO Back Problem (NBP)	82.98	9.06	155		

Community Control	0-50 pts	Back Problem (BP)	55.29	14.71	130	- 4.62	F (1, 259) = 6.61, p = .011 Eta^2 = .025
		NO Back Problem (NBP)	59.91	14.38	131		
	60 pts	Back Problem (BP)	67.70	10.43	64	- 4.03	F (1, 158) = 5.66, p = .019 Eta^2 = .035
		NO Back Problem (NBP)	71.73	10.52	96		
	70 pts	Back Problem (BP)	71.42	10.07	121	- 2.91	F (1, 268) = 6.24, p = .013 Eta^2 = .023
		NO Back Problem (NBP)	74.33	9.10	149		
	80 pts	Back Problem (BP)	76.19	10.32	164	- 2.12	F (1, 317) = 4.60, p = .036 (Welch) Eta^2 = .012
		NO Back Problem (NBP)	78.31	8.62	204		
	90 pts	Back Problem (BP)	80.40	10.81	114	- 3.77	F (1, 185) = 11.46, p = .022 (Welch) Eta^2 = .040
		NO Back Problem (NBP)	84.17	7.31	160		
Security Control	0-50 pts	Back Problem (BP)	57.29	14.77	172	- 4.06	F (1, 313) = 5.81, p = .017 Eta^2 = .018
		NO Back Problem (NBP)	61.35	14.99	143		
	80 pts	Back Problem (BP)	77.12	11.10	136	- 2.59	F (1, 229) = 6.19, p = .020 (Welch) Eta^2 = .018
		NO Back Problem (NBP)	79.71	8.23	211		

END