Subjective Wellbeing As An Affective Construct

By

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CANDIDATE DECLARATION

I certify that the thesis entitled: Subjective Wellbeing as an Affective Construct

Submitted for the degree of: Doctor of Philosophy

Is the result of my own research, except where otherwise acknowledged, and that this thesis in whole or in part has not been submitted for an award, including a higher degree, to any other university or institution.

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TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

EXECUTIVE SUMMARY

In 1976, Campbell, Converse & Rodgers (1976) first conceived Subjective Wellbeing (SWB) as a composite of affect and cognition. This view still dominates research despite few investigations of the individual affective and cognitive components. This thesis continues the exploration through three separate studies that concentrate on the contribution of affect.

The circumplex theory remains the most comprehensive theory of affect to date. This proposes that affects are organized in a circular arrangement according to two orthogonal axes of valence and activation. Valence is represented by the horizontal axis and ranges from pleasant-unpleasant, while activation is represented by the vertical axis and ranges from arousal-sleepiness (Russell, 1980; Schlosberg, 1952). Life satisfaction and life dissatisfaction represent the opposing poles of the valence axis. However, it has been argued (e.g. Russell & Carroll, 1999a) that the apparent nature of the relationship between these opposing affects is determined by the response scale. These authors argue that a bipolar response scale forces bipolarity on the respondent while two separate unipolar response scales separately assess the opposing concepts. Thus, unipolar and bipolar response scales produce different views as to the nature of the relationship between these concepts.

Study 1 investigated the influence of response scale in relation to life satisfaction and dissatisfaction. A stronger negative correlation was hypothesised using a unipolar response format because it enables independent testing of the two components of satisfaction and dissatisfaction. This hypothesis was confirmed and an average correlation of -.85 was found between life satisfaction and dissatisfaction when assessed with a unipolar response scale. In contrast, participants were unable to rate life dissatisfaction using a two-way bipolar scale which produced invalid data.

Study 1 confirmed that life satisfaction and dissatisfaction were highly negatively correlated when assessed with two independent unipolar response scales. This finding lead to the use of unipolar scales in Study 2, which investigated the amount of variance in SWB explained by affect, and whether this affective component conforms to the circumplex theory. Over 60% of the variance in life satisfaction was explained by affect in this study, and the affects congregated around the pleasant-unpleasant axis when tested according to the circumplex model. In particular, the six key affects of *content*, *happy*, *satisfied*, *stressed*, *energised* and *pleased* contributed unique variance in the regression equation, and explained the same amount of variance in life satisfaction as a regression including an additional 25 affect items selected from each octant of the circumplex.

While the results of Study 2 confirmed the strength of affect in the prediction of SWB, a large proportion of the variance remained to be explained. Thus, Study 3 tested a proposed model of SWB that incorporated both affective and cognitive components of SWB together with personality. The key affects included in this model of SWB included *content*, *happy*, *satisfied*, *excited* and *discontent*. The affective term of *stressed* was not included in Study 3 because of ambiguity in the meaning of the term, while additional regression analyses suggested the inclusion of the affects *excited* and *discontent*. The model of SWB also included the Five Factor Model of personality, and Multiple Discrepancies Theory.

Structural equation modelling indicated that 88% of the variance in SWB could be explained by the model, which was dominated by affect. The satisfaction judgments of Multiple Discrepancies contributed additional variance beyond affect but these also contained a strong affective component. In contrast, personality was not an important independent predictor of SWB. The strength of affect in this model of SWB is consistent with Russell's (2003) definition of core affect. Thus, it is argued, SWB is largely an assessment of feelings, which describe an individual's current condition. This core affect is free-floating and not described in relation to an object. Core affect is argued to be the driving force behind SWB and responsible for the stability of SWB ratings in Cummins' (2000, 2003) Theory of SWB Homeostasis.

CHAPTER 1: AFFECT

THE IMPORTANCE OF AFFECT

People have been fascinated with emotion since the beginning of time. Ancient philosophers, including Aristotle, Socrates and Plato, developed theories of morality and politics influenced by theses of happiness and emotions or passions (Cooper, 1999). It was from these beginnings in philosophy that psychology emerged as a separate discipline in the late nineteenth century with founders such as Wundt, Freud and James. Consequently, contemporary theories refer to the same desires, emotions, pleasure and pain that first appeared in writings before the birth of Christ.

Emotions, or affect, defined as the conscious experience of affective states, are central to our existence as human beings. Our world is based on relationships between ourselves, and the environment around us. These connections are communicated in affective and cognitive expressions wherein semantic terms describe our inner state. Affect, together with cognition, drives the communication of needs, such as seeking support and intimacy with others. Furthermore, affect is a central component of many forms of psychopathology such as depression, dysthymia, bipolar disorder, mania and anxiety disorders (American Psychiatric Association, 1994). Thus, greater understanding of affect is important to the understanding of psychopathology or ill being, and SWB. These two concepts of psychopathology/ill being and SWB are commonly referred to as though they were opposing affective states. Is ill being the opposite of wellbeing? The literature review below summarises the history of affect to explore this issue.

THE HISTORY OF AFFECT

In order to understand current theories of affect it is useful to review the history of earlier research and theory in the area. The following section reviews the work of the most influential early theorists from the late nineteenth and early twentieth century before elaborating on the major theories of the present day.

Sigmund Freud

Freud's interest in emotions began in neurobiology while working with Jean Martin Charcot and Hippolyte Bernheim. He witnessed patients with functional disabilities that could not be explained by nerve damage but were thought due to psychological processes. The link between physical and mental was evident in some patients and gradually Freud became more interested in the mind than neurology (Mitchell & Black, 1995). He was interested in affect because he thought that various affective states were linked to hysterical symptoms (Yovell, 2000). His theory developed and together, Freud & Breuer (1893) proposed that intense affect was caused by psychic trauma related to memory. This involved

both the details of an event in memory and the feelings associated with the event, which combined in the construction of an affective memory.

Affect was also an integral part of Freud's theory of repression (Freud, 1897/1966, 1917/1966). Freud believed that individuals needed to discharge the excitation associated with events that were unbearable to the conscious mind. The excitation could either occur with an original event and associated unpleasant affect, or retrospectively as in the case of affective memory. If the excitation associated with affect was not discharged, a traumatic memory formed and repression occurred. Freud's psychoanalytic theories were an example of early psychological theory emphasising the importance of affect valence and the hedonic aspect of pleasure and unpleasure. Like the ancient philosophers before him, Freud included pleasure and unpleasure in his writing and the importance of this hedonic valence aspect is demonstrated by its inclusion in all affect theories. According to Freud, people have an insatiable appetite for pleasure, a primitive drive contained within the id, and this desire is only concealed by the regulatory function of the ego and superego to enable functioning within society (Mitchell & Black, 1995). Furthermore, Freud theorised that the act of birth produced unpleasurable feelings and physical sensations repeated in the form of anxiety and in the development of neuroses (Freud, 1917/1966).

Freud's views were unconventional, particularly during a time when scientific discoveries were flourishing. Moreover, theories of the unconscious mind could not be empirically tested. This was not true, however, of his contemporaries including James and Lange who developed more physiologically based theories of emotions.

William James

Medicine and science were popular and well respected areas of study at the turn of the 19th century, and unlike Freud's theory of psychoanalysis, biologically based theories dominated. Research focussed more on the biology of behaviour and thought. These biologically based theories were easier to assess in laboratories and were easier to comprehend than the less measurable theories of psychoanalysis.

In the latter part of the 19th century, William James proposed his theory of emotion which was in stark contrast to the emerging theory of Freud. Unlike psychoanalysis which referred to psychic emotions, James' theory was grounded in the physical reactions of the body, which occurred following instinctive physiological and biological reactions. For example, emotions of fear and anger are seen as instinctive behaviours that produce sensory experiences through bodily changes. James believed that what a person feels equates to the experience of bodily reactions. For example, increases in heart rate and muscle tone cause people to feel fear. His theory is the reverse of the understanding today, that emotions produce autonomic reactions. For James, emotional activity is seen as feelings of bodily activities and physiological expression, with self-satisfaction, abasement, fear, pain and rage classed as primitive emotions (James, 1893). For

example, in self-satisfaction, extensor muscles are activated, nostrils dilate and the lips smile producing the feeling of self-satisfaction. Later in 1885, the physiologist Carl Lange independently produced a similar theory, and the theory first proposed by James was later referred to as the James-Lange theory of emotion.

In comparison to Freud, the James-Lange theory of emotion is simplistic and suggests that the experience of emotion is no more than readouts of internal body states, ignoring the psychic interpretation of emotion. The late 19th century was an era when medicine and biology had earned great respect and this too might have influenced the biological and behaviourally based theories of emotion during this time. The James-Lange theory later became important in the development of behavioural psychology but was criticised because it was incompatible with the views of psychoanalysis (Summers, Borland, & Walker, 1989; Yovell, 2000). However, James, like Freud and those after him, did again highlight the importance of the role of feedback and physiological reactions in emotion (Schlosberg, 1954) which is important to a holistic understanding of the human experience of emotion. Freud connected the physiological symptoms of hysteria to psychic trauma while James argued that physiological symptoms are interpreted as emotion.

Wilhelm Wundt

Wundt revolutionised philosophy and has been suggested to be the father of psychology. He founded the first psychological laboratory in 1879 at Leipzig University, and it has been argued that this is when psychology as a separate discipline was born (Summers, Borland & Walker, 1989). Wundt was an experimental psychologist and followed the general conventions of experimental science. He was interested in what would now be called information processing, and his research focussed on attentional processes, thought and memory (Blumenthal, 1975). He applied this theoretical orientation to a theory of emotion.

Wundt proposed a three-factor theory of affect that developed from multidimensional descriptions of sensory experience. He regarded three primary pairs of simple feelings that included pleasure and displeasure, strain and relaxation and excitement and quiescence. These three feelings combine into an affective process that is joined to ideas. The combination of affective and ideational components was called emotion and less intense and longer lasting feelings were called disposition. Like Freud, Wundt argued that pleasure and excitation were the most important dimensions of emotion but he also introduced the unique latter dimension of attention, reflecting his emphasis on information processing (Blumenthal, 1975; Rosensohn, 1963). Essentially, affect was seen as a by-product of the apperceptive process. Selective perception and consequent information processing produced affective reactions, therefore almost all experiences, including perception, thought and memory, had affective components.

Unlike James and Lange who believed that physiology produced feelings, Wundt believed that a person was more in control of their emotions because of selective and constructive attentional processes. Wundt believed that the only reality that we can be certain of is immediate experience (Blumenthal, 1975). Selective volitional attention of sensations and feelings combine to form an affective process. In this process, affect and ideational content are joined together to produce emotions (Rosensohn, 1963). In comparison, the James-Lange theory of emotion is largely based on the physiology of the body, where physiological reactions were then mentally interpreted as emotions and were not able to be controlled by the attentional process.

The James-Lange theory viewed a person as at the mercy of the environment and the events that it presented, which lead to physiological reactions and therefore, emotions. Wundt's theory of emotion is based on mental processes of volition and attention of physical sensations, which in conjunction produce emotion. While Wundt's attempt to link affect with physiological functions in the body was not well received at the beginning of the twentieth century, Schlosberg (1954) would produce results sympathetic to Wundt's theory half a century later following the introduction of factor analysis (Blumenthal, 1975).

Charles Darwin

After completing his seminal work on the theory of evolution, Darwin (1859) also contributed to developing theories of emotion in his book Expression of the Emotions in Man and Animals' (Darwin, 1872). Darwin believed that a number of emotional expressions were remnants of movements originally used in practical activities, that later became habitual and then inherited across generations. The facial expressions altered over years of evolution, were no longer associated with their original causes, and had become weaker versions of their original practical movements. For example, grief in the adult was toned down from the exaggerated crying in the infant. The vocal part of crying is the practical call for help and the facial expression an addition to it. Raising the upper lip and showing the canine teeth in anger as a remnant of practical teeth-baring in earlier evolutionary times.

Darwin touched on the bipolarity of different emotions, and also connected emotions with movement. He suggested the Principle of Antithesis, where if one emotion gives rise to a movement then the opposite emotion will give rise to the opposed movement even when the movements were no longer thought to have practical value. For example, Darwin (1872) argued for the natural development of vertically nodding for affirmation and laterally shaking the head for negation with both movement and emotions as opposites.

Activation in the experience of emotion was also emphasised by Darwin (1872). His third Principle of emotional expression suggested that some expressive states are the direct action of the nervous system on the body, are independent of will and largely habitual. For example, Darwin argued that physiological reactions

such as the trembling muscles serve no advantage and was not gained through volition but remains a habit in association with emotion.

Darwin also introduced experimental design in recognition of facial expressions and emotion. He obtained photographs that were thought to represent several emotions and asked observers for a judgment of the expressed emotion. Darwin found better agreement on some expressions than others. Experimental psychologists achieved similar results in the early nineteenth century using the same experimental design (Boring & Titchener, 1923; Buzby, 1924; Fernberger, 1928; Langfield, 1918). One problem was that actors posed expressions that the actors' thought represented specific emotions and participants in these experiments were asked to guess the emotion. Thus, a double chance for disagreement exists. Participants were also able to use synonyms when naming emotions. Both of these factors decreased the degree of concordance between expressed and identified emotion, as observed by Woodworth & Scholsberg, in 1938.

Robert Woodworth

Woodworth found that some expressions of emotions are similar and some types of emotions are described by more synonyms than others. He developed a scale of emotion after asking 100 participants to judge a collection of 86 photographs of female models posing emotional expressions. Participants classified the poses into categories suggested by Woodworth and the following scale of responses had a correlation of .92 between pose and judgement: (I) Love, Happiness and Mirth as the first category; (II) Surprise; (III) Fear and Suffering; (IV) Anger and Determination; (V) Disgust; and (VI) Contempt. These categories were judged satisfactory by Woodworth because neighbouring categories were found to be closely related, and categories further away contained emotions that were less similar. For example, when an expression was judged as Fear by the majority of participants, a minority did not place the emotion within this category. However, the minority would classify the expression of Fear as the neighbouring categories of Surprise (II) or Anger (IV) located next to Fear and Suffering (III) and rarely so different to be classified as Love (I) or Disgust (V) (Woodworth & Schlosberg, 1938). Consequently, he attempted to account for the similarities between different expressions. Woodworth referred to these categories of expressions of emotion as steps, and their order was particularly relevant. More similar emotions are located next to each other and emotions with less in common are located further apart from each other. From this Woodworth conceived a linear scale of facial expressions grouped according to similarities. This was the first step towards quantification of emotion. Later, the linear scale would be used by Schlosberg to produce a circular arrangement of the categories of facial expressions.

Harold Schlosberg

Schlosberg continued the work of Woodworth, further investigating the applicability of Wordworth's six steps or categories of emotion which were

conceived in a linear scale. Schlosberg (1941) analysed a series of 72 female poses of facial expression produced by Frois-Wittman (1930) with 24 of these poses displayed in Schlosberg (1952; p. 235). He asked 45 participants to classify the 72 poses into the Woodworth linear scale using a seventh additional category called 'scattering' for pictures that didn't fit into one of Woodworth's previous six categories. Participants sorted the 72 facial expressions three times, providing 135 judgments on each picture enabling the computation of the modal or most commonly reported category, mean scale position, and average deviation for each picture. For example, 50 participant judgements of picture 1 categorised it as (II) Surprise, while it was also categorised by 18 judgements as (III) Suffering and Fear, and 22 judgments as (IV) Anger and Determination. In comparison, only 5 participant judgements categorised it as (I) Love, Happiness and Mirth, and no judgements categorised it as (V) Disgust or (VI) Contempt. In another example, the modal number of judgements in a category for picture number 6 was (I) Love, Happiness, Mirth with additional judgements of (II) Surprise but a larger number of judgments in the last step of (VI) Contempt. This lead Schlosberg (1952) to conclude that Contempt (VI) is located next to the category of Love, Happiness, Mirth (I). Scholsberg saw similarities between the categories of emotion and the colour wheel or colour scale. In the colour wheel, colours are located in a circle with similar colours like yellow and orange located next to each other, while opposing colours which are less similar, like red and violet, are located opposite each other.

Schlosberg continued with the analogy of the colour wheel noting that with the aid of two axes, any colour could be described or located within the colour wheel model. He believed that the category of Step 6 being located next to Step 1 indicated that the scale of Steps were clearly recurrent and not linear. An unpublished honours project conducted by one of Schlosberg's students confirmed this circular arrangement with 32 pictures of facial expressions having overlap between Step 1 and 6. When the Froiss-Wittman pictures were lined up according to the six step circular scale, he suggested that the major axis was of pleasantness-unpleasantness running from step I (Love, Happiness, Mirth) to IV (Anger, Determination). The pleasantness-unpleasantness axis was considered the most basic dimension. The other axis was attention-rejection where rejection, was most clearly displayed in contempt or disgust with the shutting out of stimulation (Woodworth & Schlosberg, 1938; Schlosberg, 1952). A diagram of this model is shown in Figure 1.

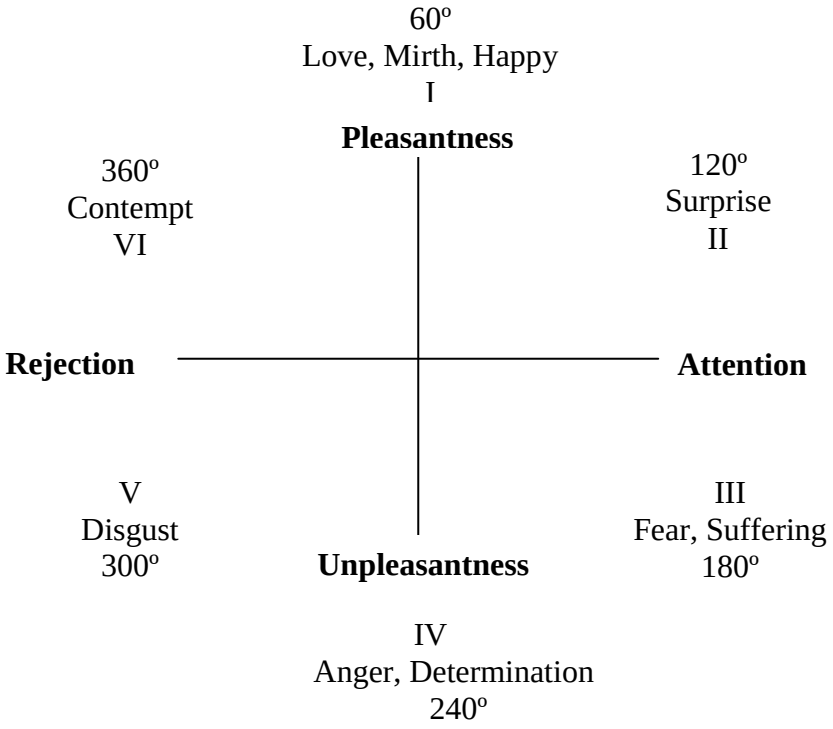


Figure 1. Facial expression model of emotion proposed by Schlosberg (1952)

Schlosberg sought to validate his model by linking the results to facial expressions, as tangible representations of expressed emotion. He conducted four experiments using pictures of facial expressions to represent the pleasantness-unpleasantness and attention-rejection axes. Participants understood the photographs described the pleasantness-unpleasantness axis but had more difficulty understanding the photographs representing the attention-rejection axis. Schlosberg settled on the photographs to represent this axis in the second experiment. The third experiment was a replication of experiment two, one year later. Experiment four replicated both experiments two and three, using the Ruckmick series of 32 photographs of female facial expressions. Responses of the circular model were then compared to the Woodworth linear scale categories.

All four experiments employed the same methodology. Schlosberg asked participants to sort the Froiss-Wittmann and Ruckmick series pictures of facial expressions according to a 1-9 scale on the pleasantness-unpleasantness dimension and a 1-9 scale on the attention-rejection dimensions. The ratings from all participants were combined and averaged, producing a single pair of values for each facial expression. The scores were then plotted across the pleasantness-unpleasantness and attention-rejection axes to produce a scatterplot. The pleasantness-unpleasantness axis was arranged at 60º and 240º corresponding to the Woodworth scale positions I (1.00) and IV (4) and the attention-rejection axis arranged at Woodworth scale positions of between II-III (2.5) and V-VI (5.5) as indicated in Figure 1. The six categories of the Woodworth scale were organised around the circumference of a 360° circle with each of the categories or

steps located at 60° intervals. The pleasantness-unpleasantness axis linked the Steps of Love, Mirth, Happiness and Anger, Determination. The activation-rejection linked Fear, Surprise, Suffering with Contempt, Disgust. Schlosberg was confident that participants could classify facial expressions using the two basic dimensions and these classifications could also be compared with the Woodworth Scale.

In order to test the model, Schlosberg employed six pictures from the Froiss-Wittmann series which acted as pictorial representation or anchors for the two pleasantness-unpleasantness and attention-rejection axes. Participants provided a score of 1-9 on each of the axes for photographs of facial expressions. The midpoint or intercept of the pleasantness-unpleasantness and attention-rejection axes was defined as a score of 5 on both axes. Participants rated each photograph by providing a 1-9 score for both of the two axes, resulting in a single pair of values for each photograph. These values were plotted onto graph paper and a piece of string was stretched from the intercept of the two axes through the location of the scatterplot point to the circumference of the circle. The location of the string on the circumference of the circle was calculated into an angle using a 360º protractor. The result was a slightly oval shape distribution with more expressions falling in the area between the attention and unpleasant dimensions. Participants appeared to have difficulties rating according to the rejection side of the attention-rejection axis.

Facial expressions that had been earlier classified according the 6 Step linear Woodworth scale were then compared with classifications made according to the pleasantness-unpleasantness and attention-rejection axes. The facial expressions classified according to the two axes correlated .92, .94 and .96 with the Woodworth scale in three independent experiments. The oval shaped model was considered a useful means of classifying emotions with the two axes considered as the basic dimensions of facial expressions. The oval shape was caused by a dominance of the pleasantness-unpleasantness axis, with more facial expressions being located towards this axis.

Later, in 1954, Schlosberg revisited this model of facial expressions and emotion and considered activation to be the missing component. When Schlosberg (1952) plotted the expressions it became obvious that the expressions increased in strength as they moved out from the radius. The Woodworth scale made no provision for this and activation was thought to be a third dimension of emotion intensity, in addition to the earlier suggested pleasantness-unpleasantness and attention-rejection axes. Schlosberg believed that activation was a good description because of the effect that emotion had on behaviour, the intensity aspect, and it corresponded to the physiological changes that accompanied emotion and had influenced earlier theories such as the James-Lange theory. Schlosberg placed strong emotion at one end of the continuum, and minimal activation, similar to sleeping, at the other end as indicated below in Figure 1.2.

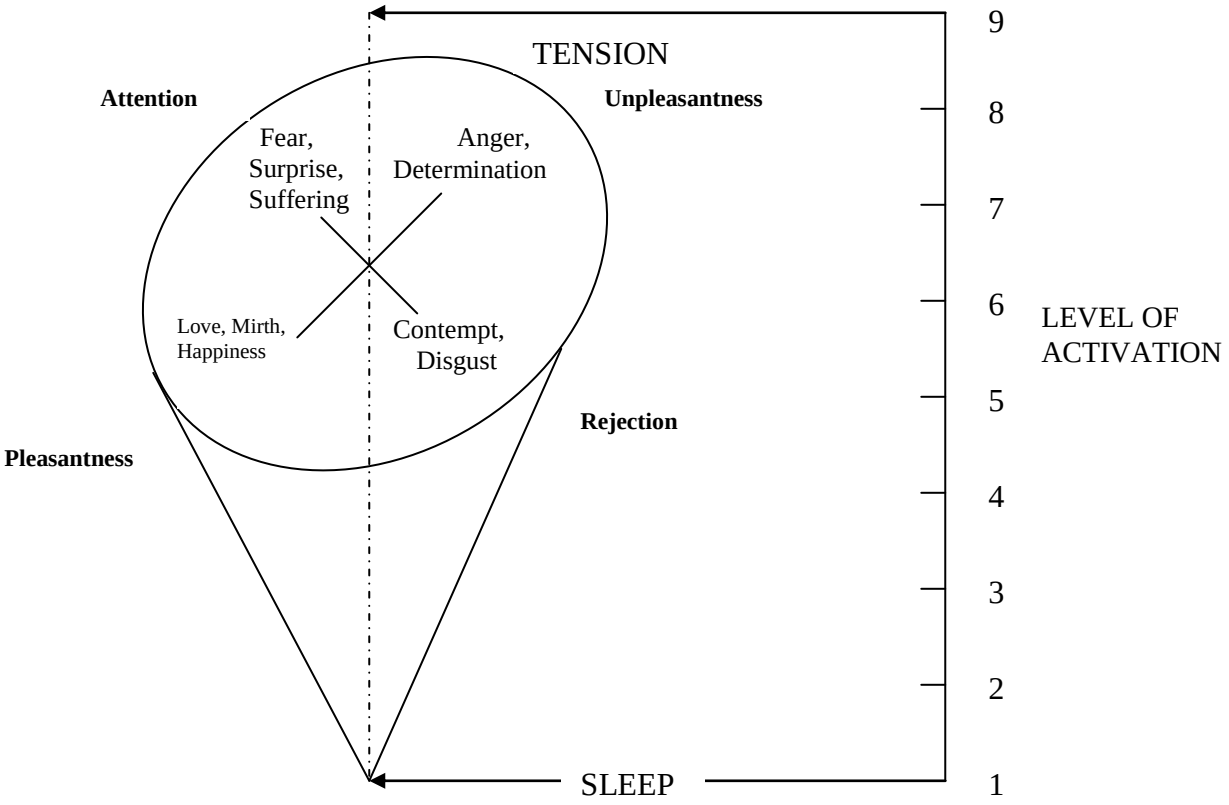


Figure 1.2: Three dimensions of emotion proposed by Schlosberg (1954)

Again, Schlosberg (1954) analogised to the colour wheel, which shows the relationship between colours and consists of primary, secondary and tertiary colours. The basic three primary colours are red, yellow and blue and considered to be the foundation colours that are used to create all colours. In a basic colour wheel, the colours red, orange, yellow, green, blue and violet are arranged in order as seven equal sections of a pie graph. Schlosberg used the analogy of the blue-yellow and red-green axes in the colour wheel as the pleasantness-unpleasantness and attention-rejection axes in his model of affect. Activation was the third level of description like that of colour brightness or intensity. Hence, the model proposed by Schlosberg was an oval model of pleasantness-unpleasantness and attention-rejection with intensity described by level of activation. This was the beginning of the circumplex model of affect.

THE CIRCUMPLEX MODEL OF AFFECT

Schlosberg's proposal was that emotions could be organised around a circle and that they were adequately explained by two bipolar axes, and a third dimension of activation. In the following decades, Schlosberg's theory declined in popularity and was subsumed by new theory. Factor analysis was used to develop a model of individual monopolar or discrete affective factors thought to be independent of

each other. The suggestion of discrete affective factors was derived from research employing measures of adjective checklists that were widely used in behavioural studies throughout the nineteenth century. The Mood Adjective Check List constructed by Nowlis & Nowlis (1956) is an example of one of the first such lists and it remains a popular tool for assessment. The Mood Adjective Check List consists of between 100-200 adjectives that are selected depending on experimental circumstances. Participants are asked to complete the sentence "I feel …" after rapidly reading a list of adjectives and indicating how well they describe their current mood. The measure was first used in research laboratories studying the effects of amphetamines, antihistamines and barbiturates on social, emotional and motivational behaviour (Nowlis, 1965).

To construct the Mood Adjective Check List, Nowlis reflected on the earlier theory of Schlosberg, and included the additional dimension of social orientation in his theory of affect. He postulated that affect consists of four bipolar dimensions, including level of activation, level of control, social orientation, and hedonic tone (Nowlis, 1965). Activation refers to readiness for action, moving and paying attention compared to the opposing readiness to rest or sleep; level of control refers to the perception of the amount of control over internal and external events, ranging from high to low control; social orientation refers to readiness for interaction with people or the opposite of readiness to hurt, reject or ignore people; and hedonic tone as the perception of pleasantness or unpleasantness. Nowlis & Green (1964) argued for bipolarity in these dimensions but factor analyses produced twelve single monopolar factors (cited in Nowlis, 1965). Other verbal self-report measures and adjective check lists of affect also produced monopolar factors that did not provide evidence for bipolarity in extracted factors (Borgatta, 1961; Cattell, 1963; McNair & Lorr, 1964).

Idiosyncrasies existed in the construction of adjective check lists like the Mood Adjective Check List and this may explain why monopolar factors resulted. For example, adjectives included in the Mood Adjective Check List were varied according to the research purpose and the subjects involved in the study. Different versions of the Mood Adjective Check List were used according to the individual experimental design and the researcher and not theory. This suggests a lack of consistency in early research measures of self-reported affect, yet their use continued across the next two decades and they are still in use today (de Moor et al., 2002; Eriksson et al., 2002; Kouzma & Kennedy, 2002; Persson & Lija, 2001; Pierce, 2002).

James Russell

In 1980, Russell revisited the work of Schlosberg and theorised that affective states are "best represented as a circle in a two dimensional space" (Russell, 1980, p.1162). The three-dimensional model proposed by Schlosberg (1952; 1954) was combined into a two dimensional model, with Schlosberg's attention-rejection axis and arousal component replaced with an arousal-sleepiness axis while retaining the pleasure-displeasure axis. Other affect terms could be

accounted for within these structures and included excitement in the northeast, and the bipolar opposite, depression, in the southwest. Distress was located in the northwest and the bipolar opposite contentment in the southeast. A diagram of the model is shown below in Figure 1.3.

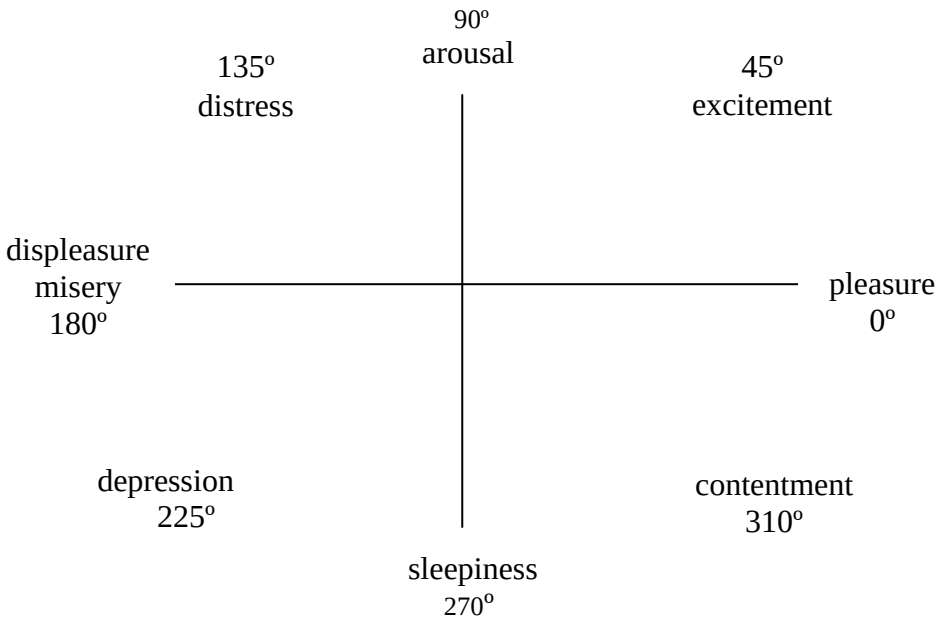


Figure 1.3: Russell's (1980) circumplex model of affect

Russell's thesis was based on the definitions of affect used by laypersons. He also argued that facial expressions and vocal expressions of emotions were interpretable in terms of the two axes (Abelson & Sermat, 1962; Cliff & Young, 1968; Royal & Hays, 1959; Schlosberg, 1952, 1954; Shepard, 1962). In early experiments with the model, Russell and Mehrabian included the additional dimension of dominance-submission in their model of affect (Mehrabian & Russell, 1974; Russell & Mehrabian, 1977). It was measured in terms of postural relaxation, including body lean and asymmetrical positioning of the limbs, that was independent of the pleasure and arousal dimensions. The dominance-submission dimension was later discontinued because of the small proportion of the variance in affect that it accounted for.

In order to gain support for his thesis, Russell (1980) completed three studies on the layman's mental map of affective space. In study 1, participants were asked to sort 28 stimulus words used to describe emotions into one of the eight categories depicted in Figure 3. The majority of stimulus words were classified according to the eight categories in which they were predicted as belonging, and the hardest word to predict with the most variance in prediction was the word sad. Some other emotion terms were placed in more than one category and lacked sharp boundaries producing "fuzziness". Despite the difficulty categorising some emotions, most emotions were able to be categorised and Russell believed that the model was an estimate of affective states and could predict most of the

emotion terms chosen. However, he failed to explain the reasoning for the inclusion of affect terms which can have substantial impact on model fit.

After completing the classification task, participants were asked to arrange the eight categories from the model in a circle. They were instructed that words opposite one another would describe opposite feelings and those adjacent would describe similar feelings. All of the eight categories were placed in a circle, with the modal responses configuring with the expected order. Russell assigned scale co-ordinates for each of the 28 affect terms based on the theoretical ordering of affect, as in Figure 3, with *pleasure* set at 0º, *excitement* at 45º, *arousal* at 90º, *distress* at 135º, *misery* at 180º, *depression* at 225º, *sleepiness* at 270º, and *contentment* at 315º. The locations of the affect terms around the circle were arbitrarily set according to his theory, and he did not adequately explain how he constructed polar co-ordinates for the 28 words. However, when plotted on to his theoretical axes a very high degree of agreement between participants resulted. The affect terms thought to be opposite from each other were located on the opposite side 180º apart, and similar terms were located nearby to one another.

In study 2 Russell asked participants to sort 28 emotion terms into groups of 4, 7, 10 and 13 terms in successive trials. These groupings were chosen because it was considered an easy and fast procedure for participants and produced a similarity measure. The emotion terms were sorted according to similar emotional states and the number of trials where a pair was placed in the same group was used as a measure of similarity. The similarity matrix was analysed using the Guttman-Lingoes multidimensional scaling procedure, which provides a geometric representation of the relationships between the 28 emotion terms. A sharp decline in stress or fit scores indicated that a two dimensional solution was the best fit of the data. The results were similar to the proposed model in Figure 2 providing support for the pleasantness and arousal axes.

In study 3 participants completed Mehrabian & Russell's (1974) state affect scales of pleasure-displeasure, degree of arousal, and dominance-submission. Each dimension was assessed by six items using a nine-point semantic differential format. As the study was part of another joint project, participants were also asked to rate how accurately an additional 482 adjectives described how they felt that day ranging from "extremely inaccurate" (1) to "extremely accurate" (8). These adjectives also included the 28 emotion terms used in studies 1 and 2. Each of the 28 items was regressed onto the main two bipolar scales of pleasure-displeasure, and degree of arousal using beta weights from the regression was used to produce co-ordinates. The results produced a very similar circumplex model to those produced in the preceding studies and chart provided in Figure 2. The terms depressed, sad and gloomy all rotated slightly towards the horizontal pleasure-displeasure axis, and were more reflections of displeasure than first thought. Correlations between the 28 terms were significant at the .001 level and ranged from .22 to .62 indicating interrelations among the emotion terms.

Additional principal components analyses were conducted and two major components emerged covering the happy-sad and tense-relaxed contrasting words, accounting for 45.8% of the variance. Three other components were produced but accounted for only 13.1% of the variance between them, and the entire model of five components accounted for 58.9% of the variance. The five-component model was orthogonally rotated and the first component produced happy-sad contrasting words including *happy*, *delighted*, and *pleased*, with *sad*, *depressed* and miserable. The second component of tense-relaxed included *tense*, *frustrated*, *relaxed*, *calm*, *tranquil* and *at ease*; and the third component was called sleepy and included only *sleepy*, *tired* and *drowsy* without polar opposites. The fourth component labelled angry consisted of *angry* and *annoyed* and was also monopolar without bipolar opposite terms. The fifth component was labelled alarmed and consisted of the positively loaded *alarmed*, *astonished* and *afraid* and negatively loaded *bored*. Bipolar opposites were found in the happy-sad and relaxed-tense components but the other components of sleepiness, angry and alarmed appeared as monopolar components on their own without bipolar opposite terms with the exception of bored.

Unlike Russell's (1980) discovery of bipolarity in study 2, the work of Nowlis (1965), Borgatta (1961), Cattell (1963), McNair & Lorr (1964), found monopolar factors that lacked bipolarity. Therefore, these authors had suggested independence in affect factors in contrast to bipolarity. In order to address this issue, Russell completed a further factor analysis in study 3 where each item was assigned to one of the five principal components to which it loaded highest. When factor analysed, these five variables produced two factors that accounted for 70% of the total variance. After orthogonal rotation the factor loadings were plotted revealing a clearly two dimensional bipolar affective space of happy-sad, and tense-relaxed. Angry and tense were located close to displeasure on the proposed horizontal pleasure-displeasure axis. Alarmed was located on the arousal end of the perpendicular arousal-sleepy axis while and sleepy was located at the opposite pole of the axis as predicted by the circumplex model. Russell concluded that these results provide further evidence of bipolarity within the circumplex model of self-reported affect.

Russell's circumplex model was unable to account for 30% of the variance in self-reported affect. He argued that measurement error and acquiescence accounted for most of this variance. Russell also questioned whether the earlier dominance-submission dimension (Mehrabian & Russell, 1974; Russell & Mehrabian, 1977) or individual differences could account for more of the variance in the results. For example, the labelling of affective terms, acquiescence in responses, statistical limitations, semantic difficulties, and the frequency of positive and negative affect terms would all influence the ability of the circumplex model to explain self-reported affect.

Russell brought affect theory back into the spotlight. He aimed to produce a theory of affect that could be used to explain all emotion. The elegant simplicity of the circumplex model is focused on two major axes of pleasantness-unpleasantness and arousal-sleepiness which corroborate with the common person's understanding of affect.

David Watson & Auke Tellegen

These authors also offered their theory of affect during the early 1980's. Watson & Tellegen (1985), much like Russell (1980) and others before them, concluded that studies of facial expressions and mood terms suggested the presence of the pleasantness-unpleasantness, and arousal-activation dimensions of mood. They noted a lack of consensus in earlier theories of self-reported mood, evidenced by previous estimates of up to more than ten factors in descriptions of self-reported mood (Borgatta, 1961; Nowlis, 1965; Thayer, 1967 Hendrick & Lilly, 1970; McNair, Lorr & Droppleman, 1971; Izard, 1972).

Watson & Tellegen reanalysed the results of six previous factor analytic studies that were considered to be representative of the literature, along with three factor analytic investigations of their own. The data chosen were restricted to published analyses of self-reported affect. This included data with 20 or more mood terms to enable adequate representation of the mood space. The studies selected for inclusion were Thayer (1967) who used 49 affect terms; Hendrick & Lilly (1970) who used 44 mood terms in normal and sleep deprived conditions; Borgatta (1961) who collected ratings on 44 affect terms pre and post completing a battery of psychological tests; McNair, Lorr & Droppleman (1971) who used 65-66 affect terms in three separate samples; Lebo & Nesselroade (1978) where five pregnant women provided daily mood reports; Russell & Rideway (1983) where sixth and seventh grade children rated 47 affect terms and a sample of third and fourth graders rated 55 affect terms; and two samples from Zevon & Tellegen (1982). The first sample of Zevon & Tellegen (1982) consisted of 23 participants who completed daily mood ratings for three months, and the second sample from an unpublished study of self-rated mood in 18 Japanese participants, with results translated into English.

Factor analysis of these data produced up to 10 factors, however two large factors accounted for half to three-quarters of the common variance in self-reported affect. The first two principal factors were rotated using a Varimax rotation, an orthogonal rotation used when underlying constructs are thought to be independent and not correlated (Tabachnick & Fidell, 1989). Watson & Tellegen did not provide correlational evidence for their choice of orthogonal rotation, simply assuming that the factors were independent of each other as suggested in their model reproduced below in Figure 3. These factors were labelled Positive Affect (PA) and Negative Affect (NA) and Watson & Tellegen (1985) concluded that self-report affect could be classified into two large orthogonal bipolar dimensions of PA and NA. In particular, PA and NA were part of a hierarchy of discrete emotion factors or categories as detailed in Figure 4 below.

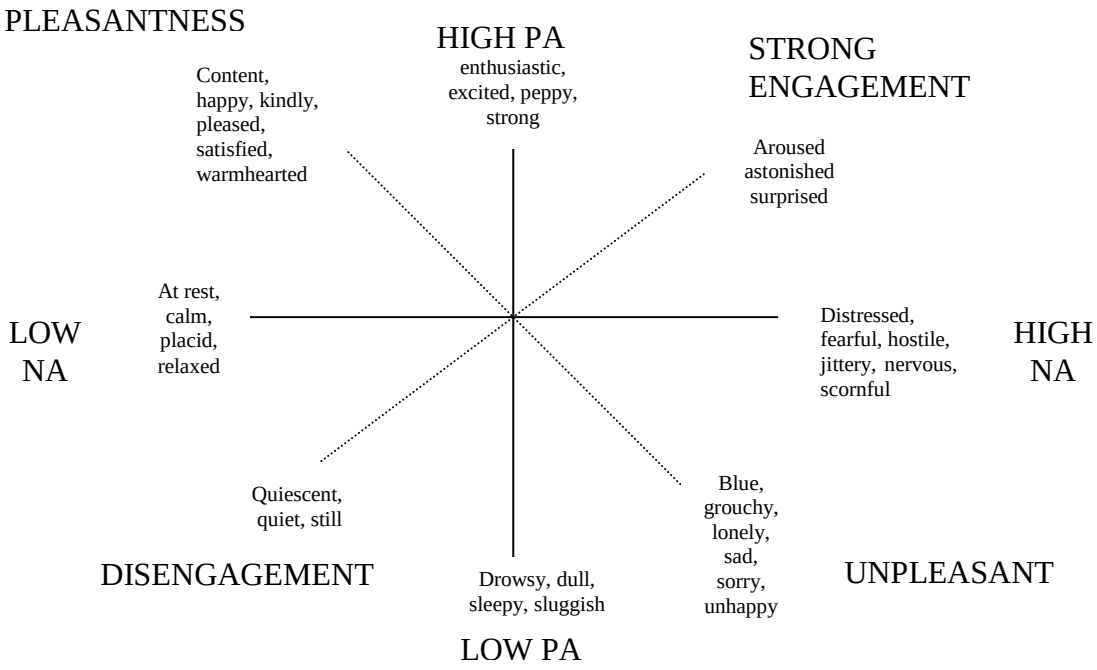


Figure 1.4: Watson & Tellegen's (1985) two-factor model of affect

In each study high PA was represented by pleasurable and highly aroused mood states *(active, elated, excited, peppy, enthusiastic)* and low PA was marked by affect terms reflecting melancholy *(sad, downhearted)*, regret *(sorry, regretful)* loneliness *(alone, lonely)* annoyance *(grouchy, irritated)* in all samples. Low PA was also represented by sluggish and tired in English but not in the Japanese sample.

High NA included negative high arousal mood states *(distressed, hostile, nervous, jittery, nervous, scornful)* and low NA reflecting disengagement *(calm, relaxed, at ease)* contentment *(satisfied, content)* sociability *(friendly, warmhearted, loving)* and joy *(happy, joyful).* Watson & Tellegen believed that some low NA markers *(e.g. happy, joyful)* also appeared as markers of high PA because these terms were located on the pleasantness octant in Figure 4.

According to the definition of axes in Watson & Tellegen's (1985) two-factor model of affect, mood terms in the same octants are highly positively correlated, while those in adjacent octants are moderately correlated. Mood terms 90º apart from each other are unrelated and those 180º apart from each other are opposites and highly negatively correlated. They also found more mood terms clustered in the high PA and high NA octants with few terms in the Strong Engagement and Disengagement octants.

PA represents zest for life and NA represents feeling upset or unpleasantly aroused. Only the end or high poles of each dimension represent a state of emotional arousal and are described as high affect. In contrast, the low end or poles of each factor represent a lack of affective involvement. Consequently, even though the PA and NA axes in Figure 4 appear to indicate opposites, they are representations of independent and uncorrelated dimensions or groupings of affect terms. The major axes of PA and NA are described by Watson & Tellegen (1985) as "descriptively bipolar but affectively unipolar dimensions" (p. 221), where the high end on each dimension represents emotional arousal and the low end represents the absence of affective involvement. PA and NA vary according to activation, and mood adjectives represent either high poles or low poles of activation. High poles for PA are represented by active, excited and strong, and high poles for NA are represented by hostile, nervous and jittery. Low poles for PA are represented by dull, sleepy and sluggish whereas low poles for NA are represented by calm, placid and relaxed. Even though the labels for the mood factors appear as opposites, they are argued to be uncorrelated and independent.

Watson & Tellegen referred to other studies of affect in support of their theory. For example, Costa & McCrae (1980) found that NA was highly related to neuroticism but not extraversion, and PA was highly related to extraversion. However, Costa & McCrae relied on Bradburn's (1969) Affect Balance Scales which assessed psychological well being as the difference between positive and negative feelings. Many of the questions included in Bradburn's scales are unrelated to specific affect terms, or focus on aspects of the pleasantness-unpleasantness octant that are not included in Watson & Tellegen's (1985) model. Bradburn was concerned with the experience of generalised pleasurable and unpleasurable experiences. Participants are asked to indicate if they have experienced a number of situations in the past few weeks including items relating to optimism (e.g. "felt that things were going your way"), and happiness (e.g. "felt on top of the world") as examples of positive feelings and depression (e.g. "felt depressed") or criticism (e.g. "felt upset because someone criticised you") as negative feelings. In 1980 Costa & McCrae assessed positive and negative feelings with a measure that was thought to be an accurate measure of affect. However, current knowledge of affect has highlighted the inaccuracy associated with such mixed scales. Other studies of self-reported affect were reanalysed by Watson & Tellegen in support of their PA and NA model, however they also relied on incomplete and biased selection of affect terms.

Differences Between Russell (1980) and Watson & Tellegen (1985)

The two major dimensions of emotional experience labelled PA and NA by Watson & Tellegen (1985) were thought to simplify affect theory. The theory also retained similarities with the circumplex model proposed by Schlosberg (1954) and Russell (1980) because it placed affect terms around the circumference of a circle. However, in contrast to circumplex theory, Watson & Tellegen sought to incorporate pleasantness and arousal into two independent and simplified terms of PA and NA. This simplification was the beginning of the battle between opposing affect theorists.

Unlike Watson & Tellegen (1985), Russell (1980) did not find a clustering of mood terms in the circumplex model. Instead he found they were relatively evenly spaced around the circumference of a circle. In comparison, the Watson & Tellegen two-factor model argued that the consistency of the two PA and NA factors across studies indicated that mood terms were presenting in organised groupings; groupings best described by the categories of PA and NA.

According to Watson & Tellegen (1985), both PA and NA consist of affect terms reflecting high pole pleasantness/unpleasantness and high arousal. NA and PA are a combination of high arousal with affect valence. The authors suggested that if PA and NA are used as the axes to describe affect, these axes are orthogonal or independent. This is because PA affect terms reflected high arousal and pleasantness (elated) whereas low PA affect terms reflected an absence of affective involvement, similar to a combination of Russell's (1980) unpleasant and low arousal affect terms (dull). NA reflected high arousal and unpleasant affect (distressed) and low NA the absence of affective involvement, similar to Russell's (1980) pleasant affect and low arousal (calm). The axes appeared independent because when compared to Russell's (1980) model, these axes were 45° apart from the valence and arousal axes first proposed by Schlosberg (1952). Thus, PA and NA axes are placed 90° apart from each other producing independence, similar to the axes of arousal and valence which are 90° apart from each other and also independent. If Watson & Tellegen had used the separate axes of pleasantness-unpleasantness and level of arousal to classify affect, as Schlosberg (1952; 1954) and Russell (1980) did, then they would also have found the pleasantness-unpleasantness axes to be negatively related. Instead PA and NA were argued by Watson & Tellegen to be independent markers of affect. Methodological, conceptual and definitional differences separate the Watson & Tellegen (1985) and Russell (1980) models of affect.

Unipolarity and Bipolarity in Affect Definitions of Watson & Tellegen (1985) & Russell (1980)

The affect dimensions of PA and NA were referred to as "affectively unipolar" by Watson & Tellegen (1985) because PA was conceived as a continuum along one dimension and NA was conceived as a continuum along one dimension. They are affectively unipolar because PA refers to a continuum of the single dimension of positive affect and NA refers to a single dimension of negative affect, and both of these unipolar dimensions are independent of each other. However, by naming their affect dimensions positive and negative (PA and NA) the independent unipolar dimensions were named according to terminology that commonly describes opposite or bipolar dimensions.

In comparison to Watson & Tellegen (1985), the circumplex model of affect proposed by Russell (1980) referred to two major bipolar axes pleasantness-unpleasantness and high-low arousal. These axes are truly bipolar with each end of an axis acting as a bipolar opposite to the other end on an axis, hence pleasant-unpleasant reflects, and describes, a bipolar opposite axis. Arousal-sleepy reflects

and describes a bipolar opposite dimension. They are bipolar opposites because the axes are considered to have two opposite dimensions.

The model of affect produced by Watson & Tellegen (1985) was based on two unipolar dimensions of affect, PA and NA that appeared to be 45° degrees from the axes of valence and arousal proposed by Schlosberg (1952) and Russell (1980). PA and NA were more similar to a combination of valence and arousal that produced the two major Varimax factors after factor analysis. The combination of valence and arousal in PA and NA lead to the model described in Figure 4 with the axes placed 90° apart producing the independence of PA and NA affect. Watson & Tellegen based a scale on this theory and it was consequently criticised because of the limited affect terms included.

The PANAS Scales

The semantic definitions of Watson & Tellegen's affect dimensions appeared to suggest mood factor opposites, yet their thesis argued that PA and NA were distinctive orthogonal aspects of affect (Watson, Clark, & Tellegen, 1988). The Positive and Negative Affect Schedule (PANAS) was developed to assess this. The PANAS was constructed from 60 mood descriptor terms selected from the factor analyses reported by Zevon & Tellegen (1982). These 60 terms included 3 representative terms for 20 mood content categories constructed by Zevon & Tellegen after completing a principal components analysis. Of these terms, Watson, Clark & Tellegen (1988) selected terms with loadings above .40 on one factor of PA or NA and less than .25 on the second orthogonal factor. 37 mood descriptors satisfied these criteria, with the highest and lowest loadings producing the 20 penultimate descriptors. The 10 PA descriptors include *attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong* and *active*. The 10 NA descriptors include *distressed, upset, hostile, irritable, scared, afraid, ashamed, guilty, nervous* and *jittery*. All of these items representing the high poles of PA and NA without the inclusion of terms from the low PA or NA poles (Carroll, Yik, Russell, & Feldman Barrett, 1999; Huelsman, Nemanick, & Munz, 1998).

Thus, the PANAS scales are constructed on two psychometric principles: that affect terms with the same valence are positively correlated and that oppositely valenced affect terms tend to be weakly negatively correlated (Watson & Clark, 1997). That is, the PA and NA axes are independent of each other. The PANAS scale has produced alpha reliabilities of .86 for PA and .87 for NA, with a correlation of -.09 between the scales and discriminant correlations between factor scores remain consistently under .20 (Watson et al., 1988). As such, the PANAS is a reliable measure of an orthogonal two-dimensional model of mood but it is not an adequate assessment of self-reported affect because of the limited range of affective states it assesses.

The PANAS vs. The Circumplex Model

Unlike the circumplex model that consist of two bipolar axes of pleasant-unpleasant and high-low arousal, PA and NA in the PANAS are thought of as independent constructs. PA is defined as pleasant and activated affect, and NA as unpleasant and activated affect. The limited selection of affect terms reflecting PA and NA has lead to a major criticism of the scale, because it does not assess low arousal states of pleasant or unpleasant affect (Carroll et al., 1999). The PANAS only assesses a section of the affect circumplex: high arousal or activated affect states. Clearly, however, a comprehensive measure of affect should include both high and low arousal states together with pleasant and unpleasant affect valence.

The circumplex model is thought to represent all affective states through the axes of valence and activation. Some clusters of affect have been found to exist within the circumplex model based on these axes (Carroll et al., 1999). In particular, affect terms tend to cluster at around 45° between the valence and arousal axes. This lead to Watson & Tellegen proposing their high activation terms of PA and NA. However, when 191 affect terms from a variety of response formats were located within a two-dimensional space, Russell & Feldman-Barrett (1999) produced the following result with a two dimensional model of unrotated principal components in Figure 1.5. The affect terms create a spread of items around the perimeter of a circle consistent with the circumplex model.

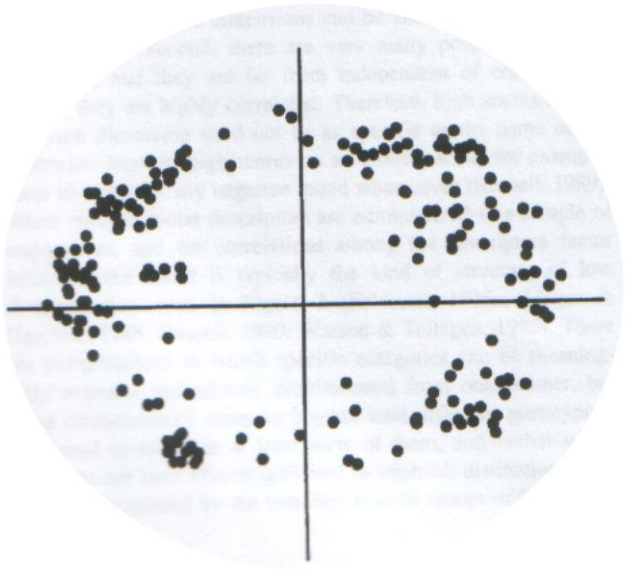


Figure 1.5: Unrotated principal components of 191 affect terms (Russell & Feldman Barrett, 1999)

Restricting the definition of affect to the two clusters PA (pleasantness/high activation) and NA (unpleasantness/high activation) in the PANAS excludes a number of states including *happiness* and *serenity.* Furthermore, correlations of up to -.92 would later be found between pleasant and unpleasant affect, measured by a multimethod response design, when random and non-random error are accounted for as detailed in a later section (Green, Goldman, & Salovey, 1993;

Green, Salovey, & Truax, 1999). These correlations suggest that PA and NA in the PANAS are not independent constructs and affect terminology and definitions are extremely influential in analyses. Affect models must incorporate a wide ranging number of affective states to provide support for theory and the restricted inclusion of states used by Watson and Tellegen produced a less conclusive and biased model.

OTHER IMPORTANT CONTRIBUTORS

Ed Diener & Randy Larsen

These authors are critical of Watson & Tellegen's (1985) model of PA and NA. Together with Carroll et al., (1999), and Huelsman, Nemanick & Munz (1998), they have argued that PA and NA, respectively, refer only to pleasantness and high activation (PA) or unpleasantness and high activation (NA) (Larsen & Diener, 1992). The high activation PA and NA fail to include medium activated affect states such as happy, pleased or sad or blue. Furthermore, Larsen & Diener (1992) argue that it is misleading to refer these highly activated concepts as the all encompassing PA and NA. This is because PA and NA reflect only two out of the eight octants on the circumplex, falling 45° to the pleasant-unpleasant and activation axes. Instead, Larsen & Diener (1992) proposed their own circumplex model of self-reported affect using straightforward labels representative of their content and their model is presented in Figure 6 below.

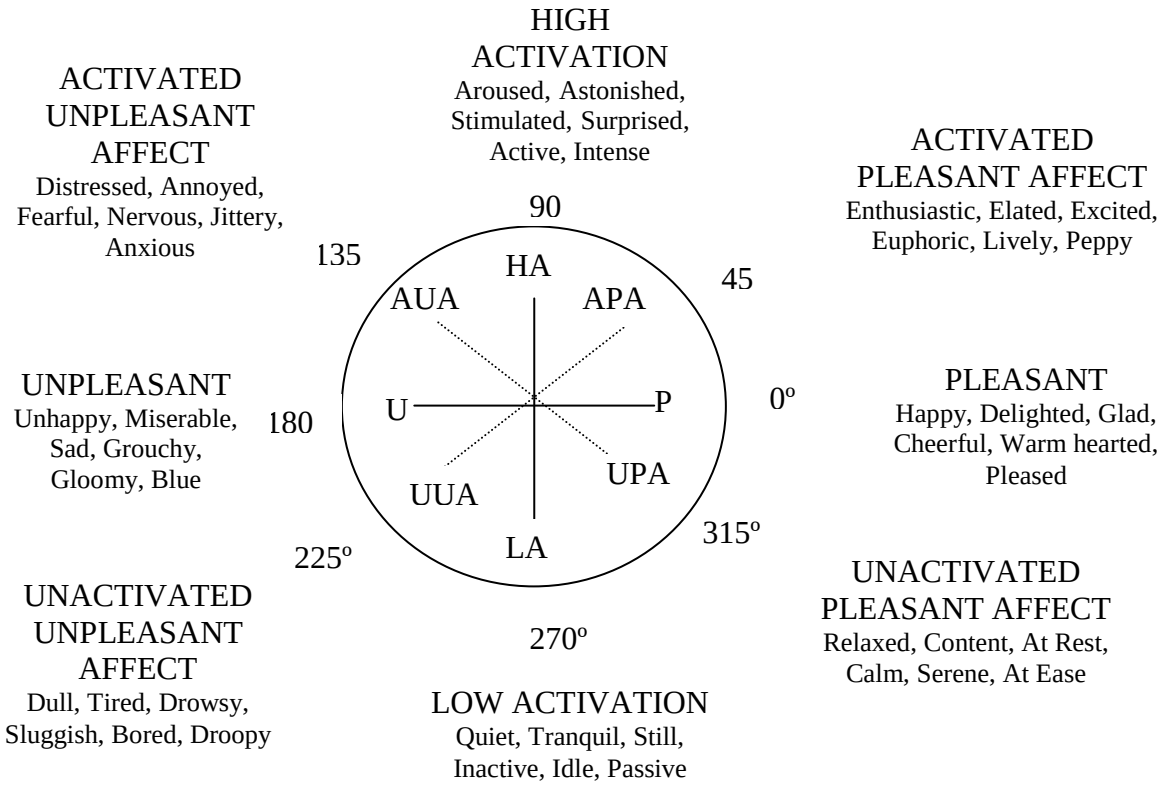


Figure 1.5: Larsen & Diener's (1992) Self-Report Affect Circumplex

Larsen & Diener renamed the axes in their model, with PA represented as Activated Pleasant Affect with a bipolar opposite of Unactivated Unpleasant Affect. NA is represented as Activated Unpleasant Affect with a bipolar opposite of Unactivated Pleasant Affect. The new labels accurately represent the affect type they describe. Larsen & Diener's (1992) model was ahead of its time and it would not be until 1999 that the value of their work would be recognised in an integrated model of self-reported affect presented by Yik, Russell & Feldman Barrett (1999).

Timothy Huelsman, Richard Nemanick & David Munz

Other proponents of the pleasantness/activation model included Huelsman, Nemanick & Munz (1998) who sought additional discrimination of affect at the high and low poles of PA and NA. Participants were asked to complete an adjective checklist of 60 items selected to represent high and low PA, and high and low NA. Items were selected from the PANAS (Watson et al., 1988), Job Affect Scale (Burke, Brief, George, Roberson, & Webster, 1989), Mood Adjective Check List (Nowlis, 1965), Activation Deactivation Adjective Check List (Thayer, 1986), and Affective Lexicon (Clore, Ortony, & Foss, 1987). The items were rated according to a 5 point Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely).

Initial exploratory factors were created using half of the data. They used an oblique rotation as Huelsman et al. (1998) hypothesised that the dimensions would be correlated. Three factors emerged in high PA and in low PA, with the first factors explaining the majority of variance at 47.5% and 54.3% respectively. The items identified from the first factor of high PA were *energetic, alert, lively, active, vigorous* and *strong*. The items identified from the low PA first factor were *exhausted, worn out, drained, fatigued, weary, spent* and *tired*. Two factors emerged in high NA and low NA with the first factors explaining most of the variance at 56.0% and 44.7%. The items identified from the high NA first factor were *agitated, upset, uptight, aggravated, distressed, irritable* and *hostile*. The items identified from the low NA first factor included *contented, relaxed, peaceful, calm, at ease, tranquil, serene, pleased* and *untroubled*.

Confirmatory Factor Analyses were performed on the remaining half of their data. Each of the models tested comprised the high PA, highest loading items, identified for the four scales in the exploratory factor analyses. For high PA, the model fit was best with the items *active, energetic, lively,* and *vigorous*. For low PA, the items *exhausted, fatigued, weary,* and *worn out*. For high NA, model fit was best with the items *aggravated, agitated, hostile, irritable, upset* and *uptight*. For low NA, *calm, peaceful, relaxed, serene* and *tranquil*. Huelsman et al. (1998) renamed high PA as positive energy, low PA as tiredness, high NA as negative arousal, and low NA as relaxation. Positive energy was only moderately related to the other scales and negatively related to tiredness. In comparison, negative arousal was strongly related to tiredness and inversely with relaxation.

Negative arousal being related to tiredness appeared logical to Huelsman, et al. (1998). They argued that in lay terms negativity and tiredness were considered different versions of "bad moods", whereas relaxation and positive energy were considered different versions of "good moods". When discussing their results with students unfamiliar with affect theory they found the commonsense approach to moods focussed more on the valence of "good" versus "bad" moods. This led the authors to conclude that people do not think of energy as part of their moods. In contrast, Thayer (1989) suggested that negative arousal and tiredness are related because of the energy used during periods of high tension or negative arousal, where emotional energy could drain the energy levels of an individual.

The models suggested by Huelsman et al. (1998) and Larsen & Diener (1992) improved the understanding of the circumplex model of affect because their descriptions of affect dimensions reflected the content that they represented. Their models suggest bipolar dimensions of valence and activation consistent with Russell (1980) and the seminal work of Schlosberg (1952, 1954), and encompass more affective states than the model proposed by Watson & Tellegen (1985). The highly activated PA and NA do not include pleasant or unpleasant affect that involve medium levels of activation, namely the most commonly referred to affective states of *happy* and *sad*. The simplified PA and NA suggested by Watson and Tellegen (1985) prevent exploration of all affective terms. The work of Larsen & Diener (1992) and Huelsman et al. (1998) provided further evidence for the classification of affect according to two axes of affect valence and arousal around the circumference of a circle, as detailed in the circumplex model.

MEASUREMENT & ASSESSMENT ISSUES IN AFFECT

Donald Green, Peter Salovey & Colleagues

Random and non-random influences of affect measurement and assessment were first proposed by Russell (1980) to explain additional variance in factor analyses of the circumplex model. He suggested that acquiescence, statistical limitations and the labels given to affect terms, all influenced the ability of the circumplex model to explain self-reported affect. Over a decade later, Green, Salovey and colleagues have made substantial contributions to current understanding of the measurement and assessment of affect, emphasising the importance of measurement error, response formats and response bias in affect research (Green et al., 1993). Essentially, Green et al. (1993) confirmed that the use of a multi-method approach to mood assessment enables the researcher to account for random and non-random response error, consequently revealing a largely bipolar affect structure.

Random measurement errors are unsystematic fluctuations in the way that questionnaires are answered including acquiescence (Bentler, 1969), extreme response style or an individual response style (Green et al., 1999). Non-random error is the standard error of measurement present in all psychological research.

It is an index of the amount of difference obtained in an individual's scores in tests presumed to be parallel. The standard error of measurement for an individual or a group can be calculated with the standard deviation for a distribution of test scores and a reliability estimate for the test employed (Cohen, Swerdlik, & Smith, 1992).

The Influence of Random and Non-Random Error

The influence of random and non-random errors is proportional to the reliabilities of measures. For example, non-random error (standard error of measurement) can be calculated by the standard deviation of the test scores, multiplied by the square root of 1 minus the reliability coefficient of a test ($\sigma_{meas} = \sigma \sqrt{1- \alpha}$). In contrast, the design of response options used in a measure can cause a measure to be more susceptible to random error such as acquiescence.

Mathematical formulae provided by Green et al. (1993) suggest that non-random error can produce correlations with incorrect sign and random error can change the size of correlations. Random response errors include acquiescence and systematic variation in respondent use and interpretation of response options, such as bias towards neutral response options. If random response errors are correlated, the correlations between two measures are biased in a positive direction. In the case of pleasant and unpleasant moods, this means that an expected negative correlation indicating bipolarity is driven closer to zero, (Green et al., 1999).

The influence of random and non-random errors has been significantly advanced with the application of Confirmatory Factor Analysis (CFA). This has been employed by Green and colleagues to isolate the independent and joint effects of these different types of errors on calculations of bipolarity. The following section provides background information on the statistical procedure of CFA before reviewing how the analysis has been used in investigations of affect bipolarity.

An Explanation of Confirmatory Factor Analysis

CFA is used to test theory about the latent processes in pleasant and unpleasant affect factors. It is the applied use of structural equation modeling. For example, latent variables hypothesized as pleasant and unpleasant affect can be measured in CFA by observed indicator variables or questionnaire items, all of which are associated with estimates of measurement error (Holmes-Smith & Coote, 2001). It is a technique that enables a large number of items to be grouped according to factors while accounting for measurement error.

CFA builds on the principles of exploratory factor analysis. Both are data reduction methods and aim to explain the correlation or covariances between observed variables using only few underlying latent variables (Bollen, 1989). The difference between CFA and exploratory factor analysis is that the number of latent variables is not specified in exploratory factor analysis. In CFA, the number of latent variables are specified according to an earlier developed theory.

As the name suggests, CFA is a confirmatory technique and is used most often to test a theory (Tabachnick & Fidell, 2001). In the general model of CFA, the observed variables are the items posed to participants and are represented on one or more latent variables. Like exploratory factor analysis, items can cross-load on a factor, and are associated with measurement error. Errors of measurement can be specified as uncorrelated or correlated with latent variables, and in repeated measure analyses, covariance of error terms are specified (Bollen, 1989). Essentially, CFA is a theory driven factor analysis driven by observed variables while accounting for non-random error.

Confirmatory Factor Analysis and Investigations of Bipolarity

CFA is useful in tests of bipolarity because a number of items can be used as observed variables and a model of specified factors created and tested for fit. For example, if happiness and sadness are the latent variables assessed in a 10 item questionnaire, 5 items might represent the observed measures of happiness, and 5 items the observed measures of sadness. If a two factor model is specified, the researcher specifies which items assess the latent variables of happiness or sadness and an estimate of non-random measurement error is associated with all items.

A CFA model employing a multi-method design was tested by Green et al. (1993) to investigate the dimensionality of mood. The design is described as multi-method because four different styles of self-report were used to measure positive and negative emotional experience. The self-report styles included a mood adjective checklist; response options format where participants indicated degree of agreement with a list of statements that were rated from 1 (strong disagreement) to 5 (strong agreement); a response option format where statements were rated from 1 (very well) to 4 (not at all) according to agreement with participants mood; and a semantic differential 7 point Likert scales of happiness and sadness.

Initially, analysis focussed on only the 10 item adjective checklist measures for happiness and sadness. A two-factor model of happiness and sadness was proposed by Green et al. (1993) and tested by CFA accounting for only random error. This was completed by creating two separate subscales for happiness and sadness to meet the statistical requirements of CFA. The result was an estimated latent correlation of -.34 between the happiness and sadness factors when only random error was accounted for. Furthermore, this CFA resulted in poor model fit.

Inter-factor correlations between happy and sad failed to improve substantially when non-random measurement error was taken into account by CFA, much to the surprise of Green et al. (1993). The authors discovered that the inclusion of redundant measures of happy and sad, assessed by four different response formats, assisted in preventing CFA model misspecification. Earlier, their results suggested that accounting for only random response error lead to an incorrect CFA model. However, the inclusion of redundant measures of happy and sad in

this wrong model increased the elements in the CFA covariance matrix that were free from non-random measurement errors. CFA calculations are based on the covariance matrix so redundancy of the mood measures also constrained non-random measurement error. Hence, the wrong model accounting for only random error with redundant measures produced a similar result to the correct model which accounted for non-random measurement error. Even though the model controlling for non-random error was better fitting statistically, the model controlling for random error adequately explained the parameters.

Using all four methods of self-report across two time points (the multi-method approach), the observed Pearson correlation between measures of happiness and sadness was -.25. In comparison, a CFA model accounting for random error estimated an inter-factor happiness and sadness correlation of -.85, while the model accounting for non-random error was -.84. Finally when both random and non-random error was accounted for in a CFA model the inter-factor correlation was -.92. Non-random measurement error and random response error is important in the assessment of bipolarity and can be buffered with redundant assessment measures.

Later, Green et al. (1999) clarified their bipolarity thesis of mood. Static bipolarity suggests that affective space is bipolar, and pleasant and unpleasant feelings are strongly negatively correlated when measurement error is accounted for. In comparison, dynamic bipolarity occurs when the affective system is activated such as through induced mood changes. In these conditions, pleasant and unpleasant feelings generally change in opposite directions and to the same extent. A simple test of dynamic bipolarity was tested by Green et al. (1999) by examining the correlations between pleasant and unpleasant moods assessed using four separate response scales. The authors reanalyzed data that had been used to measure pleasant and unpleasant affect terms over a 1-month period using three different response formats.

CFA was used to produce error corrected, inter-factor correlations between pleasant affect (factor loadings of between .68 and 1.26) and unpleasant affect (factor loadings of between .90 and 1.57). Non-significant error covariances were also assigned across the response scales because correlations in error terms between pleasant and unpleasant mood items produce positively biased correlations. The error corrected inter-factor correlation using CFA was -.87. In comparison, the raw product-moment correlations ranged from -.40 to -.73 between pleasant and unpleasant moods using the different response scales over the time period. Green et al. (1999) also compared their CFA results to the product-moment correlation produced between a simple scale of pleasant mood using adjectives of *happy*, *joyful* and *pleased* with an unpleasant scale of the adjectives *sad*, *depressed*/*blue* and *unhappy*. Product-moment correlations and the use of only one response scale does not account for measurement error or the possibility of random error in response biases like acquiescence. The mean correlation was -.51 between the pleasant and unpleasant affect adjective scales, and the mode at -.70. These correlations were significantly lower than the CFA inter-factor correlation of -.87 because of unaccounted error in product moment

correlations. In conclusion, Green et al. (1999) demonstrated that a single battery of mood questions sharing the same wording and response scale confound genuine mood variance, systematic response bias and random response error.

The theoretical orientation of Green and his colleagues supports bipolarity in affect and is consistent with the circumplex model of valence and activation suggested by Schlosberg (1952, 1954) and Russell (1980). These authors argue that the circumplex model is more easily understood by non-psychologists, and this is essential in any theory of affect. They argue that the fundamental problem in the study of mood is representing abstract concepts with common language (Green et al., 1999). Furthermore, to enhance affect understanding, and avoid data contamination with mood variance, response bias, and response error, researchers should practice multiple-measure design in the assessment of self-reported affect.

Measurement and assessment issues highlighted by Green and his colleagues further inflated debate between the circumplex model proposed by Russell (1980) and the PA and NA model proposed by Watson & Tellegen (1985). Bipolarity in affect was further supported by accounting for measurement error and response bias in affect assessment, and contradicted the argument for independence between positive and negative affect states such as happiness and sadness. Essentially, the late 1990's became an intellectual battleground for affect theorists and these arguments are reviewed in the following section.

THE DEBATE OF THE LATE 1990'S

Fierce debate in affect theory erupted in the late stages of the 1990's as theorists disputed opposing models. Watson & Clark (1997) remained focused on PA and NA, arguing that the pleasantness/activation circumplex model proposed by Russell (1980) was less influential in the self-report literature and lacked reliable measures. In comparison, they cited the PANAS as a reliable measure of their independent dimensions PA and NA, whereas a measure of the circumplex model was unavailable.

Much of the debate between the circumplex and PA/NA models has centred on independence versus bipolarity of positive and negative affective states. Bipolarity is argued to exist in PA and NA as high PA-low PA or high NA-low NA (Watson & Clark, 1997; Watson & Tellegen, 1985; Zevon & Tellegen, 1982) even though these dimensions mainly differ in terms of high and low activation. Furthermore, the dimensions of PA and NA are considered independent. Watson & Clark acknowledge that the PANAS assesses only high pole markers, or highly activated pleasant or unpleasant affective states and lack terms such as *sleepy* or *calm* (Huelsman et al., 1998; Larsen & Diener, 1992). The authors argued that the specific adjectives were selected in order to maximise convergent and discriminant validity of the PANAS. This is because descriptors selected to assess PA or NA need to produce strong loadings on one factor and close to zero loadings on the opposing factor (Watson & Clark, 1997). When terms of fatigue and serenity are included in a bipolar version of the PANAS, they produce

significant loadings on both PA and NA. A bipolar version of the PANAS was created by adding low pole markers such as *sleepy*, *drowsy*, *tired* and *sluggish* for low PA, and *at ease*, *calm* and *relaxed* for low NA to the original PANAS items. When the bipolar version of the PANAS was compared to the original unipolar version of the PANAS, both convergent and discriminant validity decreased. These data provided Watson & Clark with the rationale to use a unipolar measure to assess what they believed to be bipolar dimensions of mood.

The PANAS scales were constructed based on two psychometric principles: that affects with the same valence are positively correlated and that oppositely valenced affects tend to be weakly negatively correlated (Watson & Clark, 1997). Watson, Tellegen and Clark believe that positive and negative mood are independent of one another.

In comparison, affect valence was the focus of debate for Russell & Carroll (1999), who were interested in the pleasant and unpleasant quality of emotions. The authors believed that arguing PA was independent of NA was counterintuitive because the titles for the dimensions assume antonyms or opposites. This is also supported by Green et al. (1999) who believe that the greatest difficulty in affect is representing the abstract concepts of mood with common language. Semantics and definition must be consistent, particularly when defining affect and testing bipolarity. The PANAS is inconsistent with these principles. This is because PA is defined as activation and pleasantness, and NA is defined as activation and unpleasantness, it is only measuring opposites of affect valence and not activation. Therefore, it is impossible to test bipolarity in PA and NA when direct opposites do not exist in the measures that are used to assess them.

Bipolarity and Response Formats

Response formats are an important influence in investigations of bipolarity. However, before the influence of response format is examined, investigators need to ensure that the affect terms under investigation are opposite affect terms in theory and practice. For example, most tests of bipolarity are based on factors of positive and negative affect such as the general PA and NA. The problem is that these tests reflect factors, not specific opposite affect terms taken from everyday language and not all terms of PA reflect opposites of NA. Selecting adjectives from the PANAS, *distressed* is a marker of high NA and *excited* a marker of high PA, but neither are commonly conceived as opposites in everyday language (Russell & Carroll, 1999a).

Exact antonyms of affect need to fall 180° degrees apart to produce a bipolar linear relationship. Antonyms of affect such as *happy* and *sad* are located 180° apart on the pleasant-unpleasant axis of the circumplex model and are treated as conceptual opposites in everyday language. However, Russell & Carroll (1999a) found that unipolar or bipolar response formats are a powerful influence when testing the bipolarity of affective states 180° apart. In these investigations, a bipolar model was defined by the authors as the whole underlying bipolar

continuum or a unipolar section of the continuum. If the whole continuum is being assessed then a bipolar response format is used which extends from the most extreme negative feeling to the most extreme positive feeling. A midway score of neutral resides midway between these options. The affect terms of happy and sad were used to demonstrate this producing the following response scale that could be applied to any opposite affect terms:

-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7

(very sad) (neutral) (very happy)

In comparison, a unipolar response scale defines an item according to the targeted section of the full underlying continuum, and only one dimension is investigated. In the example of happy, a neutral item is defined as the lowest possible score when a subject is asked to answer yes/no to the question "Do you feel happy". The answer 'no' is assigned a zero, and those who answer 'yes' would be asked to describe their level of happiness using the following response scale:

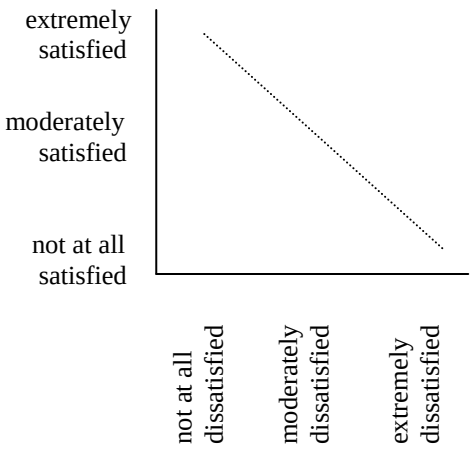
1 2 3 4 5 6 7

(slightly) (moderately) (extremely)

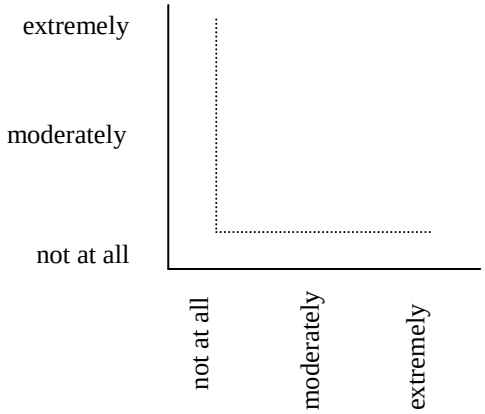
The reverse procedure would apply for assessing sadness using a bipolar scale.

Theoretical correlations for a bipolar model of affect were predicted by Russell & Carroll (1999a). In an example, the authors predicted a linear relationship between items selected for PA and NA defined as 180° apart and representing a full underlying bipolar continuum. If bipolar response formats are used the items should theoretically produce a correlation of -1.00. However, if two affect terms are 180° apart, but both are conceptually defined as exactly half of the underlying bipolar continuum separated by a median of zero as in unipolar response formats, a correlation of -.47 will result (in error-free measurement). The correlation of -.47 was proven mathematically by the authors and using formula they demonstrated this with X and Y as two mutually exclusive parts of a single continuum, with zero as the division point between them. If PA and NA are defined as parts, a non-linear relationship exists. This is because when PA and NA are defined in parts using unipolar response formats a response must fall into either the PA or NA region but not both regions. A response of PA, is a response of not-NA, where not-NA is equivalent to a score of zero using a unipolar response format.

Two unipolar scales must provide completely redundant information for a correlation of -1.00 to result when assessing a point of a bipolar continuum as in the diagram below:



However, using unipolar formats, Russell & Carroll (1999a) argue that either end of a continuum is treated as a mutually exclusive section of a single bipolar continuum. Therefore unipolar formats produce an L-shaped distribution similar to what is presented below:



This is because if an answer is given for one dimension or affect term (e.g. moderately for PA), then the answer for the opposing dimension or affect term (e.g. NA) is zero or not at all in the above example. In other words, if you feel happy you don't feel sad, or if you feel sad you don't feel happy. A correlation of -1.0 between bipolar opposites using unipolar response formats would be contradictory to bipolarity. Using unipolar response formats only one section of the continuum is assessed and the two sections of the continuum are not linearly related to the answers of the other section. Unipolar formats are important in the assessment of bipolarity because they do not enforce bipolarity on the participant. A bipolar opposite is not specified and it is left up to the participant to impose bipolarity on what the researcher believes is a unipolar response format. Thus, the thesis of bipolarity suggests that participants will reinterpret ostensibly unipolar response formats as bipolar response formats (Russell & Carroll, 1999a).

These theoretical assumptions were tested on 31 data sets and unipolar and bipolar response scales were compared by Russell & Carroll (1999a). Bipolarity was tested using pleasant and unpleasant affect terms and PANAS items of PA (pleasant and high activation) and NA (unpleasant and high activation). The data analysed were taken from Diener & Iran-Nejad (1986), Feldman Barrett & Russell (1998), Green et al. (1993), Russell (1979), and Watson et al. (1988) that asked participants to rate how they felt today, right now, since this morning or about a brief incident.

The 31 correlations between opposing affect terms were all negative ranging from -.25 to -.86, with a median correlation of -.66. The variability in the correlations was greater than expected through sampling error, and bipolar response scales produced more negative correlations. The mean correlation produced with a unipolar format was -.41, whereas the mean correlation with a bipolar format was -.75. Response formats are a significant influence of the correlations obtained between opposing affect terms, enhancing inconsistency in tests of bipolarity when different response formats are used. The results were replicated in a following study of 120 participants where different response formats were used to collect ratings of hot and cold as well as happy and sad. Bipolar formats producing the strongest correlations of -.82 and -.79 whereas unipolar formats produced correlations of -.27 and -.46.

The correlational evidence provided by Russell & Carroll (1999a) supports the bipolarity of affect and the authors proposed that bipolar response formats are justified in the assessment of affect. However, when testing for bipolarity, unipolar formats should be used and univariate and bivariate frequency distributions of affect scores compared. Unipolar response formats will not produce strong correlations between two dimensions that are argued to be theoretically antonyms, but their results can be used to support the presence of bipolarity and hence bipolar response formats. Evidence provided by Green et al. (1993) and Green et al. (1999) suggests that accounting for error in calculations can even strengthen support for bipolarity. Later that same year, Watson & Tellegen (1999) agreed that response formats, acquiescence, response bias and measurement error were important influences on correlations employed to provide evidence of bipolarity. As a result, both research teams argued for the use of unipolar response formats in investigations.

Polychoric Correlations

Conventional statistics and correlations have been used for decades in the debate of independence versus bipolarity in affect. However, greater awareness of the limitations of these procedures prompted affect research to search for new means of statistical measurement. Polychoric correlations were introduced to the study of affect by Watson & Tellegen (1999) to support their independence model of affect and bipolarity. These authors began using polychoric correlations to avoid what they believed were exaggerated product-moment correlations that disproved independence in affect.

Polychoric correlations can be used with polytomous or multiple response Likert scales. Two polytomous unipolar response scales analysed using polychoric correlation provide an estimate of the product-moment correlation between the hypothetical continuous dimensions that they target. These correlations assume two unipolar measures are at least monotonically related to their target dimensions but are not required to be linearly related. In comparison, the hypothetical continuous dimensions targeted should be linearly related to one another in a normal bivariate distribution and polychoric correlations require testing of this assumption (Russell & Carroll, 1999a). To compute these correlations Watson & Tellegen fitted the normal bivariate distribution to the observed distribution using unipolar response scales. A Pearson product-moment correlation of -.48 was calculated for the single mood terms of happy and sad which was raised to -.57 with polychoric correlation and subsequently -.85 when random and systematic error was accounted for. In contrast, delighted and scared, markers of high PA and NA respectively, produced uncorrected product moment correlation of -.04, uncorrected polychoric correlation of -.04 and corrected polychoric correlation of -.13 (Watson & Tellegen, 1999). However, as polychoric correlations require target dimensions to be linearly related, Watson & Tellegen remain cautious about their routine use within affect.

Labeling and Definitional Confusion of Affect Dimensions

Despite the introduction of polychoric correlations by Watson & Tellegen (1999) their application of the correlations to support independence highlighted another problem in affect research: labelling and definitional confusion. Difficulties arose in understanding the work of Watson & Tellegen from their original proposal of the circumplex model (Watson & Tellegen, 1985), to the development of the PANAS Scales (Watson et al., 1988) and debate in the late 1990's (Watson & Tellegen, 1999).

Initially, a circumplex model of affect was proposed by Watson & Tellegen (1985) with PA and NA as orthogonal dimensions, and consequently, the PANAS was developed to assess affect according to these dimensions. Later, PA and NA were more accurately referred to by the authors as positive activation and negative activation after acknowledging that the dimensions assessed by the PANAS are not completely independent (Watson & Tellegen, 1999). Effectively, Russell & Carroll (1999) and Watson & Tellegen (1999) were in agreement because the authors were concentrating on different sections of the affect circumplex. Russell & Carroll argue that bipolarity exists in affect states that are 180° apart from each other according to the two axes of valence and arousal and correlations close to zero expected in affect states 90° apart. In comparison, Watson & Tellegen centred their argument on PA defined as pleasant and activated affect and NA as unpleasant and activated affect. Thus, PA and NA reside at 90° apart according to the valence and arousal axes, which is consistent with independence according to Russell and colleagues. This is illustrated below in Figure 1.6:

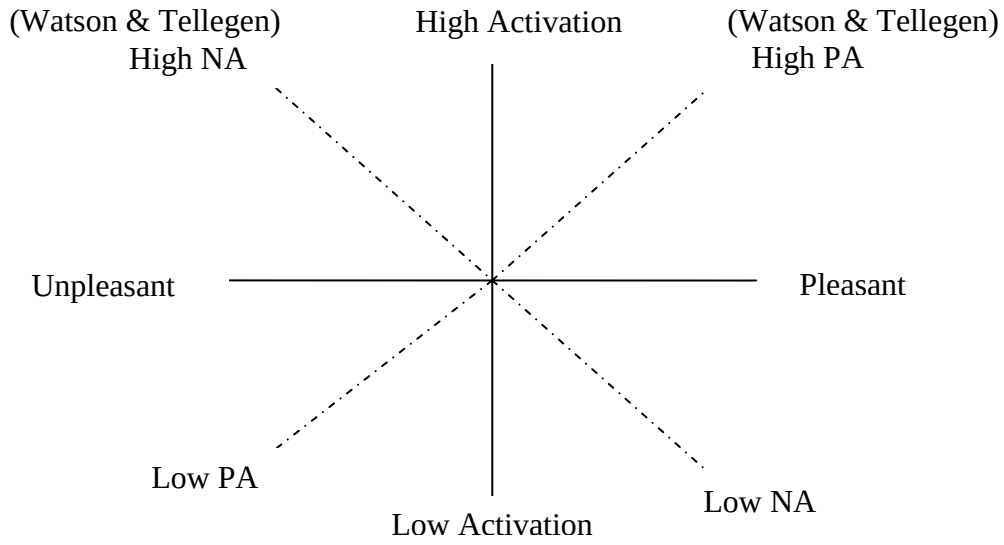


Figure 1.6: Location of Watson & Tellegen's PA and NA on Valence and Arousal Axes

The dimension of activation is captured by Watson & Tellegen (1999) in positive activation and negative activation. These correspond to Russell & Carroll's (1999) PA/High Activation and NA/High Activation respectively, with bipolar opposites of NA/Low Activation and PA/Low Activation. Historically, proponents of independence sought to prove that pleasantness was independent of unpleasantness without considering activation. In comparison, Watson & Tellegen (1999) supported the independence of positive activated affect (and its bipolar opposite of negative deactivated) from negative activated affect (and its bipolar opposite of positive deactivated) (J. Russell & Carroll, 1999b). Hence, theorists had been debating the independence and bipolarity of different aspects of affect.

Russell & Carroll also added to the confusion of inconsistencies in the naming and definitions of affect dimensions. Most notably, they used positive and pleasant interchangeably and negative and unpleasant interchangeably. Russell & Carroll (1999b) argued that PA and NA form one dimension of bipolar opposites called valence, which had been referred to by Watson & Tellegen (1999) as pleasantness-unpleasantness. Russell & Carroll's second dimension of affect is high-low activation which also forms bipolar opposites and valence and activation remain separate and independent of one another. Confusion in labelling and definitions arose when these authors referred to the same names of PA and NA using different definitions according to the axes of affect valence and activation.

Initially, Watson & Tellegen (1985) had based the dimensions of PA and NA on the valence aspect of affect but these dimensions were only defined by pleasantness/unpleasantness and high activation. Consequently, Feldman Barrett & Russell (1998) suggested the dimensions would be more accurately renamed positive and negative activation and their opponent theorists agreed. (Watson & Tellegen, 1999; Watson, Wiese, Vaidya, & Tellegen, 1999).

In 1999, Feldman Barrett & Russell summarised their stance on the four major controversies in affect research: the number of affect dimensions, bipolarity of the dimensions, the circumplex structure and activation. They argued for two major dimensions of pleasantness and activation as proposed by Russell (1980), as core components in mood and emotion. The dimensions of pleasantness and unpleasantness form bipolar opposites when defined as semantic opposites, located 180° from each other, measured as current feeling states and measurement error is accounted for. They are highly negatively correlated at around -.90 but unpleasant and pleasant affect observed correlations are less than -1.0 due to semantics, time span sampled, role of random and systematic error, response format and difficulty specifying precise semantic bipolar opposites (e.g. happy and sad). In comparison, independence is produced through definition by Watson & Tellegen (1985) who define their axes to produce independence. With PA as pleasantness and activation, and NA as unpleasantness and activation, correlations close to zero will occur because they are 90º from each other. These dimensions are not semantic or affective opposites and are not expected to behave as bipolar opposites. Feldman Barrett and Russell (1999) suggested that to measure affect simple pleasure and activation scales with different response formats should be used.

HOW DO THE MODELS OF AFFECT COMPARE?

Affect theory became a period of confusion, argument and rebuttal in the late 1990's. The similarities and differences of the most influential theorists are compared by Yik, Russell & Feldman Barrett (1999) producing a useful summary of more than a decade of debate.

All of the affect models were characterised by Yik et al. (1999) to an approach focussing on activation or arousal alone, valence or pleasure-displeasure alone or a combination of activation and valence. As reviewed in the previous section, the leading research teams in affect of Russell et al. and Watson et al. both agreed that activation and arousal are the most important dimensions of affect. The argument up until this point was about how these dimensions were organised within a theory.

Activation and valence were accepted as the necessary dimensions of affect, and Yik et al. (1999) compared the models proposed by Russell (1980) and Feldman Barrett & Russell (1998), Watson & Tellegen (1985), Larsen & Diener (1992) and Thayer (1989). All four models are placed within the same two-dimensional space with 45º between dimensions. It is based on the pleasantness-

unpleasantness and activation deactivation axes taken from Larsen & Diener (1992) and incorporates the circular ordering first suggested by Schlosberg (1952; 1954). In this model 45º separate all dimensions and each of the four dimensions have another bipolar opposite dimension. The results are shown in Figure 1.7 below.

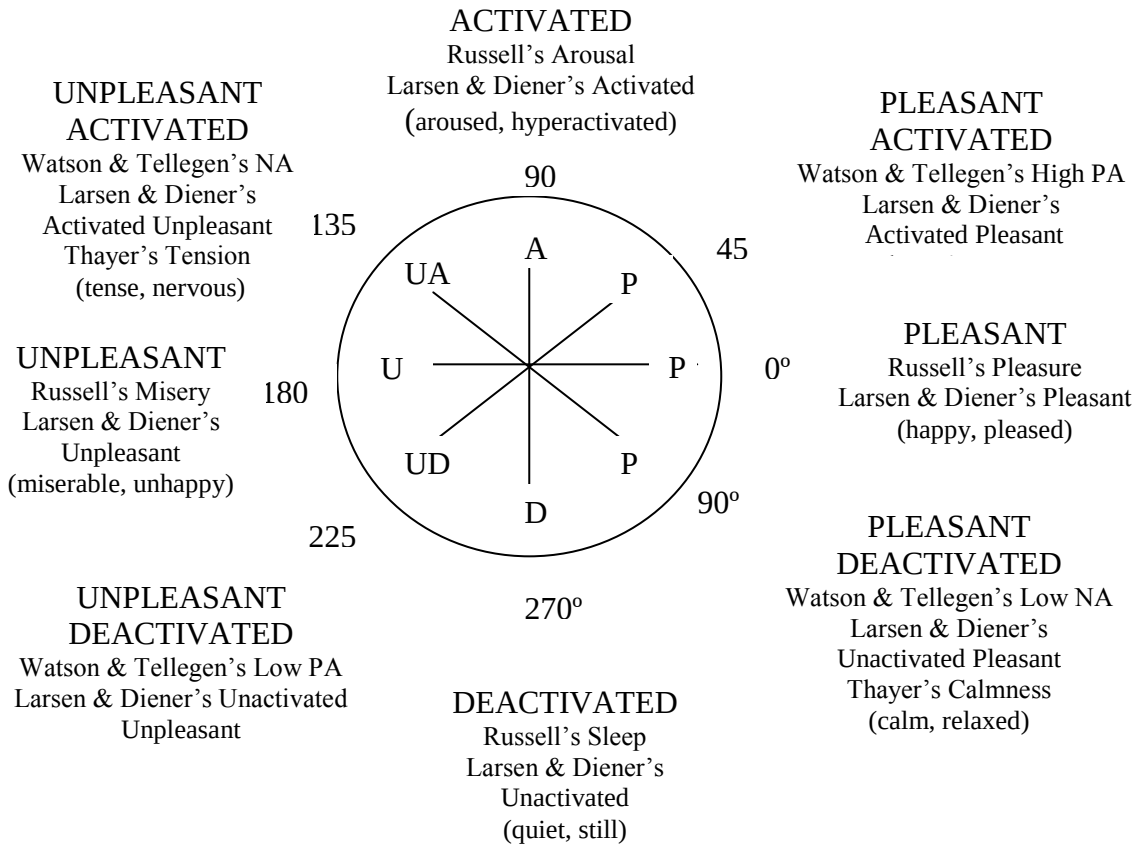


Figure 1.7: Yik, Russell & Feldman Barrett's (1999) 45° rotation hypothesis

Undergraduate students were used in the assessment of the model. Again, like most research in affect, the use of students in testing affect theory is a concern because of the lack of generalisability. This is particularly important considering the lower subjective wellbeing that they report (Cummins, 2000b). Participants completed a three-part affect questionnaire that corresponded to three different response formats. The first section was an adjective check list using a Likert scale ranging from not at all to extremely (1-5). The second section was a list of statements that participants indicated agreement with these rating from strongly agree to disagree (1-5). The third section was a list of statements for which they indicated how well it describes their feelings ranging from not at all to very well (1-4). Other measures completed included the Current Mood Questionnaire (Feldman Barrett & Russell, 1998), PANAS (Watson et al., 1988), and adjectives taken from Larsen & Diener (1992) and Thayer (1989) rated using agree and describe rating scales.

The structures suggested by Watson & Tellegen (1985) Larsen & Diener (1992) Thayer (1989) and Feldman Barrett & Russell (1998) are all highly interrelated and appeared as alternative descriptions of the same two-dimensional space. This was particularly clear when latent constructs and not variables were analysed using structural equation modelling. Yik et al. used structural equation modelling to estimate correlations between pairs of affect terms while accounting for error and data skew and the authors were satisfied that bipolarity existed in all models. The inter-factor correlations ranged from -.52 in Larsen & Diener's (1992) model between activated-pleasant and unactivated-unpleasant, and up to -.92 in Russell's (1980) model between pleasant and unpleasant affect. They conceded that the result did not indicate perfectly bipolarity but followed the trend expected of bipolar opposites.

The four theoretical models proposed by the original authors were compared using structural equation modelling and in every case a model that proposed four unipolar orthogonal factors fit the data less well than a model with correlated factors. Yik et al (1999) also conducted separate analyses on Watson & Tellegen's four unipolar constructs of high and low PA, and high and low NA. As expected, high PA was positively related to the pleasant-unpleasant and activated-deactivated axes with variance disturbance of .10. This is equivalent to stating that that 90% of the latent content variance was explained by the pleasant-unpleasant and activated-deactivated axes. Furthermore, the two axes could explain all unipolar constructs, with the variance explained ranging from 79% to 90% with a mean variance of 87% with the results supporting the model presented in Figure 8 above. Similarly, when the same analyses were performed on Larsen & Diener's scale the mean variance explained was 66% with four unipolar constructs and 82% when bipolar dimensions were used. Thayer's constructs produced a mean variance of 64% when unipolar dimensions were used and 77% when bipolar dimensions were used. All of the models proposed by Watson & Tellegen (1985), Larsen & Diener (1992), Thayer (1989) and Feldman Barrett & Russell (1998) were highly interrelated supporting the thesis that they are alternative descriptions of the same model in a two-dimensional space.

Empirical evidence also supported the approximate location of the 12 affect constructs from the four models within an evenly spaced two-dimensional space using the pleasant-unpleasant and activated-deactivated axes. The constructs were defined by two exogenous latent constructs that represented the horizontal and vertical axes. Factor loadings for exogenous constructs were taken from an earlier model where the correlation between the two axes was fixed to zero. 12 separate analyses were conducted, and each time 1 of the 12 remaining unipolar constructs was treated as the endogenous latent construct by its three response formats. Regression coefficients were calculated between the exogenous and endogenous constructs as in indication of relationship to the rest of the constructs. This enabled creation of two coordinates that could be plotted on the two dimensional space. When plotted most of the constructs differed from the exact angles expected from evenly spaced clusters 45° from their axes but were close to those expected by the model. For example, Watson & Tellegen's (1985) high

Positive Affect and high Negative Affect were located at 116° between each other instead of 90°

The CIRCUM structural equation modelling program was used by Yik et al. (1999) to test the circumplex structure of the models. In a circumplex, all variables are located in a circular fashion within a two-dimensional model but are not required to be 45° apart. A z -score was created from the three response formats for each unipolar construct and a correlation matrix computed. The location of pleasant was fixed to 0º so that the location of the variables would be relative to this construct.

Two separate circumplex models were tested. The first model included pleasant, unpleasant, activated, deactivated and Watson & Tellegen's (1985) PA, NA, low PA and low NA producing a moderate model fit (RMSEA = .13). The second model included all of the 12 constructs including pleasant, unpleasant, activated, deactivated, Larsen & Diener's (1992) activated pleasant, unactivated unpleasant, activated unpleasant, unactivated pleasant and Thayer's (1989) energy, tension, tiredness and calmness. This also fit the data moderately well (RMSEA = .12). CIRCUM estimated the angles on a circle for each variable and when plotted, differences of up to 19º occurred in comparison to where they would be located according to the evenly spaced 45º model. The largest differences were in the unpleasant deactivated quadrant with most between Thayer's (1989) and Watson & Tellegen's (1985) models. Thayer's (1989) dimensions were closer to the vertical activation axis. Watson & Tellegen's (1985) and Larsen & Diener's (1992) models were closer to the horizontal pleasantness axis. Feldman-Barrett & Russell's (1998) model was closely located to their predicted locations of pleasant, unpleasant, activated and deactivated. The data producing a moderate fit to the circumplex and the 45 º model with two independent and bipolar principal axes of pleasantness and activation.

Further Assessment of the Circumplex

Broad acceptance of the circumplex model and a concern about limitations in statistical assessment procedures lead to a re-examination of the circumplex by Remington, Fabrigar & Visser (2000). These authors were concerned about the techniques used to provide evidence for the circumplex model which consisted of mainly two approaches. The first approach relied on extracting factors and plotting affective states graphically while using factor loadings as coordinates. The second approach using multidimensional scaling analysis of similar affective states or facial expressions of emotions where a two-dimensional plot is created and the results examined for a circular pattern. Remington et al. (2000) argued that neither analysis provided quantitative evidence for the circumplex. In particular, difficulties arise when factor analyses produce more than two factors and results produced by these methods constrict data to a two-dimensional model.

A covariance structure model was used by Remington et al. (2000) to assess the structure of the circumplex. The authors investigated the fit of the circular stochastic process model with a Fourier series (CSPMF; Browne, 1992) to 47

correlation matrices of self-reported affective states. CSPMF assumes that variance in scores can be divided into common score and unique score and assumes that common scores on variables can be located on a circle. This is produced by one common point acting as a reference point with polar angles from the reference variable deciding the location of common score variables. The model also assesses bipolarity in the circumplex through an estimate of the minimum common score correlation (MCSC), which is the correlation between variables 180° apart which results in opposing sides of the circumplex as negatively related to one another. These correlation matrices were collected from nine previously published journal articles testing the circumplex model of affect.

Data selected for inclusion in the study included 47 correlation matrices drawn from 14 articles (Borgatta, 1961; Diener, Smith, & Fujita, 1995; Feldman, 1995b; Howarth & Young, 1986; Kercher, 1992; Mayer & Gaschke, 1988; Mayer, Mamberg, & Volanth, 1988; Russell & Mehrabian, 1977; Russell & Pratt, 1980; Rusting & Larsen, 1995; Sjoberg, Svensson, & Persson, 1979; Watson & Tellegen, 1985). Remington et al, (2000) found that when CSPMF was fitted to each of the 47 correlation matrices to assess circumplex model fit, 9 correlation matrices had good model fit, 20 had acceptable model fit, 7 had marginal model fit and 11 had poor model fit. The median RMSEA for the 47 matrices was within the acceptable level and ranged from .000 to .242 with a median fit of .073. The Minimum Common Score Correlations between affective states predicted to be 180º apart also showed great variation ranging from -1.00 to .266 with a median MCSC of -.66 indicating a strong negative correlation between opposing affective states.

The authors found that affective states in positive-evaluation/no-arousal octant or negative-evaluation/no-arousal octant conformed to the theoretical expectations of the circumplex model. Likewise, affective states in the negative-evaluation/high-arousal, negative-evaluation/low-arousal, or positive-evaluation/low-arousal behave as predicted by the circumplex model. There was less accuracy in the positive-evaluation/high-arousal and no-evaluation areas. Remington et al. (2000) argued that the results suggested that the evaluation component of affect was stronger than expected, and is the more important aspect of affect. In comparing the individual data sets involved in analyses they also found that time frame of judgments, multiple items versus single item measures, and the inclusion of theoretically ambiguous affective all influenced the fit of the circumplex model.

SUMMARY OF CURRENT AFFECT THEORY

The literature review presented suggests that affect is comprised of two dimensions: pleasantness-unpleasantness and activation-deactivation and considerable evidence has been provided supporting the circumplex model first proposed by Schlosberg (1952, 1954) and later Russell (1980).

Significant progress has been made in the understanding of affect, particularly with an increase in the sophistication of statistical techniques. When the circumplex structure was first proposed by Schlosberg (1952) techniques such as structural equation modelling did not exist and factor analysis only recently introduced. For approximately thirty years after Schlosberg's (1952, 1954) seminal work on the circumplex, affect research became dependent on factor analyses and monopolar aspects of affect were studied beginning with Nowlis (1956; Nowlis & Nowlis, 1965). Later understanding increased with the application of structural equation modelling techniques as measurement error and response bias were understood, particularly their influence on correlations (Green et al., 1993). Response formats have also proven to be an important influence of bipolarity (Russell & Carroll, 1999a). Bipolar response formats should only be used once the existence of bipolarity has been confirmed and unipolar formats should be used to test bipolarity even though it is argued that they produce lower correlations between opposite affect constructs. Finally, the essential but most difficult aspect to ensure in affect research, is to adequately represent the abstract concepts of affect with common language that also make semantic sense. The importance of this has been emphasised following the debate in the affect literature in the late 1990's.

It is my thesis that emotion consists of the major bipolar axes of pleasantness-unpleasantness and activation-deactivation similar to the models proposed by Russell (1980), Russell & Carroll (1999), Russell & Feldman Barrett (1999) and Yik, Russell & Feldman Barrett (1999). However, it is argued that the salience of the pleasantness axis is considerably greater than what has been previously suggested. More recent research has postulated that further development in affect theory might result if more attention is paid to this area. Affect terms have been found to conform more accurately with the valence axis of the circumplex model than the activation-deactivation axis (Remington, Fabrigar, & Visser, 2000). When the layperson speaks of emotion the dominant or most important aspect of the description is contained in the hedonic aspect of pleasantness or unpleasantness. The primary aspect of affect is contained in pleasantness or unpleasantness and activation is an additional or secondary description.

According to the circumplex model first proposed by Russell (1980), pleasantness and unpleasantness are thought to be bipolar opposites. Thus, a person cannot feel happy and sad at the same time. Diener & Iran-Nejad (1986) investigated the experience of different affect and found that people do not experience positive and negative affect when either are at intense levels but can experience both if one type of affect is at low levels. Diener & Iran-Nejad (1986) hypothesised that positive and negative feelings might become more mutually exclusive as intensity increases and considered the notion of dominant emotions.

The mutual exclusivity of happiness and sadness has been more recently investigated by Larsen, McGraw & Cacioppo (2001). In three separate studies, over 500 participants completed unipolar measures of emotion used to assess the co-occurrence of emotions terms that lay approximately 180° apart on the circumplex model of affect. The terms included calm-tense, relaxed-stressed,

happy-sad, pleased-displeased, excited-depressed, and bittersweet and ambivalent for emotional co-activation. In study 1, participants were asked to complete the unipolar assessments of the first five adjective pairs both before and after watching the humorous and tragic film "Life is Beautiful". Only 10% of participants felt both happy and sad before watching the film, whereas 44% felt both afterwards. The authors arguing that the results provide evidence for the co-occurrence of emotions in emotionally complex situations, even though few participants felt both pleased and displeased after watching the film. Similar results were replicated in their next two other studies involving undergraduates who rated their mood on the day they moved out of college dormitories, and graduate students who rated their mood on graduation day. However, participants were not likely to endorse both members of other pairs of opposite emotion terms. The authors concluded that participants were more likely to report feeling happy and sad than in everyday situations. Yet the lack of endorsement of other opposite emotion terms in the majority of the data, supports the circumplex theory that polar opposite emotions are mutually exclusively experienced.

Perhaps pleasantness and unpleasantness most often appear as mutually exclusive bipolar opposites because of salience or domination in affect. For example, if pleasant affect is more salient, it will dominate and prevent the experience of unpleasant affect. Alternatively, if unpleasant affect were more salient, it would dominate and prevent the experience of pleasant affect. Little attention has been paid to dominance in models of affect and only few theorists have considered this aspect (Diener & Iran-Nejad, 1986), particularly in relation to valence. The present study focuses on the pleasant-unpleasant aspect of affect, which is argued to be the most commonly understood and important aspect of affect.

Everyday people use cognitive strategies to categorise people, events, places, and colours. People categorise most emotions into the two major categories of pleasantness and unpleasantness. These categories are not only semantic representations but also cognitive representations. Pleasantness and unpleasantness are commonly understood and are obvious discrete categories of affect terms. For example terms like happy and sad are commonly used in everyday language. The words have commonly understood opposites or antonyms that fit with the circumplex model of affect and are commonly understood by the majority of people. The word satisfied is also commonly understood and has a direct antonym in the word dissatisfied. If these words are located on the pleasant-unpleasant axis of the circumplex model, then answers based on satisfaction and dissatisfaction in subjective wellbeing and life satisfaction are proposed to produce close to opposite answers. The following section will provide evidence that satisfaction and dissatisfaction represent the pleasant-unpleasant axis.

Where Is Satisfaction Located On The Circumplex Model?

The earliest circumplex model of affect was proposed by Schlosberg (1952) based on facial expressions and proposed the pleasantness-unpleasantness axes but unfortunately, his model did not include the terms satisfied or satisfaction. Russell (1980) who expanded Schlosberg's model did include these terms and found that satisfied was located with other terms such as happy and glad, which were located very close to the pleasant end of the pleasantness-unpleasantness axis. Similarly, Watson & Tellegen (1985) also placed satisfied on the pleasant pole of their pleasantness-unpleasantness axis opposite terms like blue, grouchy, lonely, sad, sorry and unhappy. Despite the debate between the research teams, all agreed on the presence of satisfaction as a good indicator of pleasantness on the pleasant-unpleasant axis.

Stability in the location of satisfaction was also found by Remington, Fabrigar & Visser (2001) in their reinvestigation of the circumplex model. In their review of ten correlation matrices of self-reported affective states, satisfied fell within 14º of the term happiness on the pleasantness axis in all but one of the matrices.

These results support the argument that satisfaction and dissatisfaction provide appropriate affective descriptors of the pleasantness and unpleasantness axis of the circumplex model of affect. When applied to the area of subjective wellbeing and life satisfaction they are predicted to behave as bipolar opposites as they have in studies of affect. Even more importantly, an examination of the bipolarity in life satisfaction and life dissatisfaction also provides an examination of the affective component of subjective wellbeing.

CHAPTER 2: SUBJECTIVE WELLBEING

THE HISTORY OF SUBJECTIVE WELLBEING

> **"**We hold these Truths to be self-evident, that all Men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the Pursuit of Happiness -- That to secure these Rights, Governments are instituted among Men, deriving their just Powers from the Consent of the Governed, that whenever any Form of Government becomes destructive of these Ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying its Foundation on such Principles, and organizing its Powers in such Form, as to them shall seem most likely to effect their Safety and Happiness". (Jefferson, 1776)

Happiness is a right accorded to all Americans, so much so, that the United States of America included the pursuit of happiness in their country's constitution. The Declaration of Independence does not guarantee happiness, but states that happiness is a right that all Americans are entitled to pursue. Despite this, research into happiness, or more generally subjective wellbeing (SWB) did not begin until some 200 years later.

It seems fitting that SWB research began in North America. The first major study of quality of life experience and national mental health was completed by Gurin, Veroff & Feld (1960), and was followed by Bradburn & Caplovitz (1965). These early studies of national mental health employed questions relating to happiness and lead Bradburn (1969) to his Theory of Affect Balance. Bradburn's theory proposes that the difference between positive and negative feelings provide an indicator of psychological wellbeing. Gurin, Veroff & Feld (1960) and Bradburn & Caplovitz (1965) asked the same question of wellbeing. Participants were asked "Taking all things together, how would you say things are these days – would you say you are very happy, pretty happy, or not too happy these days?" (Bradburn, 1969, p.55).

During the following decade, Andrews & Withey (1976) and Campbell, Converse & Rodgers (1976), completed two of the most comprehensive investigations of life satisfaction in North America. Like those before them, both research teams were interested in perceptions of wellbeing and quality of life experience but chose to assess this in different ways. Campbell, et al. (1976) preferred to assess wellbeing by asking people about their 'satisfaction' with their life as a whole and not about their 'happiness' with their life. They preferred to use the term 'satisfaction' because of the difficulties associated with defining 'happiness' which has greater variation in meaning and understanding. Campbell et al. argued that even though 'happiness' is often used as a synonym to 'satisfaction', it seems to suggest feelings of "gaiety and elation" (1976, pg.8). It refers more to

state affective traits rather than the combination of cognitive judgement and affective responses required to make an assessment of life satisfaction.

The wellbeing of Americans was assessed by Andrews & Withey (1976) using a global question of life satisfaction, similar to Campbell et al. (1976), with participants asked to describe how they feel about their life as a whole. Initially participants were asked to answer according to the response possibilities of "very happy", "pretty happy" or "not too happy" which was later replaced with a satisfaction scale and finally their Delighted-Terrible scale. This scale named each of seven response choices as: "delighted, pleased, mostly satisfied, mixed (about equally satisfied and dissatisfied), mostly dissatisfied, unhappy and terrible". Andrews & Withey's Delighted-Terrible scale also includes 'satisfaction' and 'dissatisfaction' and was found to permit more discrimination at the positive end of their global 'life as a whole' question than the three response choice scale.

The Reliability of Global Measures of Subjective Wellbeing

The global measures of life satisfaction (satisfaction with life as a whole) used by Andrews & Withey (1976) and Campbell et al. (1976), have been found to be reliable (Larsen, Diener, & Emmons, 1985), proven to be particularly consistent in western countries (Cummins, 1995), and are useful ways of gaining a valid overall rating of life satisfaction. Global measures of life satisfaction can also be influenced by other factors including the influence of item order, accessible information, mood, the time frame of questions, and even climate (Strack, Argyle, & Schwarz, 1991). However, the influence of these factors can be minimised for the purposes of measuring population SWB if a self-report measure with few items is completed by a large sample of participants across all climatic regions. Furthermore, if a self-report measure is mailed to participants, it is reasonable to assume that there will be great variation in the time of day that the measure is completed and all of these factors will improve the validity of life satisfaction assessment.

SWB refers to an individual's subjective experience of life. The concept includes more than affect alone, and is influenced by personality, values, expectations and goals (Cummins, Gullone, & Lau, 2002; Michalos, 1985). SWB is comprised of cognitive evaluations in addition to affective reactions. Thus, it is the product of cognitive evaluations of life experience set on an affective background.

Early research relied on the assessment of SWB as a unitary concept. Later, this global concept was deconstructed into specific constructs or discrete domains. Each of these domains can be individually investigated and numerous domains have been suggested. One commonly suggested domain is that of affective status. In a review of 27 definitions, Cummins (1996) found that 85% included some form of emotional wellbeing. Consistent with this understanding, Diener, Suh, Lucas & Smith (1999) define SWB as a scientific research area that can be separated into four major divisions and their associated subdivisions. One major division is into domains of work, family, leisure, health, finances, self and one's

group. Another division is life satisfaction consisting of desire to change life, satisfaction with current life, past, future and significant others' view of one's life. The remaining two divisions relate to pleasant and unpleasant affect. SWB consists of affect and cognitions that are classified into seven major domains.

Cognition and Subjective Wellbeing

The cognitive judgement component of SWB is based on comparisons of current circumstances with self-imposed standards (Diener, Emmons, Larsen, & Griffin, 1985). This is described in more detail by Michalos (1985) in Multiple Discrepancies Theory. Here, satisfaction is described as a function of the discrepancy between what one deserves and needs, has and wants, what relevant others have, the best one has had in the past, expected to have in the past, and expect to have in the future. The theory is the most comprehensive hypothesis of discrepancy. Desired circumstances and self-standards are a reflection of individual differences of personality and life experience. Consequently, discrepancies between these aspects can differ greatly from one person to another.

Affect and Subjective Wellbeing

Affect is the other component of SWB. Affect is associated with cognition, and a motivating force directing attention, interest and purpose in the assessment of discrepancies (Michalos, 1985). Feelings of happiness may result when an individual assesses little difference between their current, past and future needs and aspirations. In this situation the resultant affect is an associated by-product of cognitive evaluation. However, cognitive perceptions of discrepancies may also be influenced by affect. For example, a depressed individual might be more likely to perceive greater discrepancy between self-standards and desired circumstances than an individual who is not depressed.

Satisfaction is synonymous with happiness, contentment, fulfilment, joy and pleasure. All of these describe affective reactions; hence it has been argued that the object of satisfaction or dissatisfaction is happiness or unhappiness (Tatarkiewicz, 1976). This makes intuitive sense, as less discrepancy between needs, wants and standards lead to greater satisfaction, and therefore, happiness. When conceived in this manner, the achievement of satisfaction and happiness are simplified. There is no specific formula that creates satisfaction or happiness because of the individual differences in self-standards, values, goals, expectations and personality which all drive SWB. A formula can be created to increase an individual's chance of satisfaction and happiness based on Michalos' (1985) Multiple Discrepancies Theory. It suggests that one should aim to decrease discrepancy between what one has and wants, choose a realistic reference group, and remain optimistic without being too reminiscent of the past. It is a simple formula but in this modern age it is difficult to follow. The values of today's society, together with clever advertising and marketing campaigns encourage people to want more and compare themselves to those who have more.

The Interaction of Affect and Cognition in Subjective Wellbeing

Studies that have examined the contribution of affective and cognitive components in SWB have found that life satisfaction and affect are separable. Even in the very early days of SWB research, Andrews & Withey (1974) found that affect and life satisfaction formed separate factors. More recently, Lucas, Diener & Suh (1996) found that none of positive affect, negative affect, optimism or self-esteem could entirely account for measures of life satisfaction, even though these scores were all highly correlated. Clearly, the cognitive and affective components of SWB are interrelated but the exact nature of the relationship is unknown.

Cognitive and affective components of SWB may also be important in assisting with satisfaction maintenance. For example, Campbell et al. (1976) argue that, in making cognitive judgments, an individual assesses the discrepancy between current situation and aspirations. If aspirations are expended in prosperity and constricted in adversity, then satisfaction can be maintained. Aspirations are cognitive representations of dreams; they are goals that an individual hopes to aspire to. These cognitions are associated with pleasant affect and energy, perhaps an evolutionary derivative necessary for goal directed action. In terms of Multiple Discrepancies Theory (Michalos, 1985), aspirations are standards that are compared to current circumstances and are a persuasive influence on affect and SWB.

The current understanding of the cognitive and affective components of SWB has built on the theory of pioneers such as Andrews & Withey (1974) and Campbell, et al. (1976) who were influenced by Bradburn's theory of happiness. This was pivotal in the lead up to the study of overall life satisfaction and SWB. Happiness was considered a purely affective assessment of life satisfaction without cognitive judgement. The word happiness is used in everyday language. It describes a person's affective state and has been defined as the balance between positive and negative affect in Affect Balance Theory (Bradburn, 1969) or a predominance of positive affect over negative affect (Diener, Sandvik, & Pavot, 1991). In their happiness studies, Bradburn & Caplovitz (1965) suggested that happiness consists of pleasant and unpleasant affect forming two independent dimensions. Measures of affect such as the Affect Balance Scale (Bradburn, 1969) and later the Positive and Negative Affect Schedule (Watson et al., 1988) have been included in numerous studies to assess the affective component of SWB.

It is argued that earlier studies of SWB have relied on inconsistent definition and measurement of affect. Current understanding of SWB has been influenced by this research because SWB consists of cognitive and affective components. A comprehensive understanding of SWB requires that both of these aspects are accurately assessed using consensual definition, with assessments completed by the general community. Over the last two decades, considerable debate has surrounded affect theory, particularly the definition of positive and negative affect, as detailed in the previous literature review. Unfortunately, much of this

research has mainly been based on studies of university students, when student populations report low levels of life satisfaction (Cummins, 2000a). Greater understanding of SWB requires an understanding of the current circumplex model of affect and examination of the affective component of SWB in the general population.

AFFECT AND SUBJECTIVE WELLBEING

The Circumplex Model, Happiness and Life Satisfaction

The circumplex model of affect should also apply to life satisfaction. An assessment of life satisfaction involves cognitive judgments that are made on an affective background. The cognitive judgments that are involved are well described as discrepancies, detailed in Multiple Discrepancies Theory (Michalos, 1985). Michalos (1985) was able to show that perceived discrepancies explained 49% of the variance in ratings of happiness and 53% of the variance in global life satisfaction. This demonstrates the complex relationship between cognitive evaluations of desired outcomes and needs and affective reactions of happiness and life satisfaction.

It is not surprising that similarity exists in judgments of happiness and life satisfaction given the location of happiness and satisfaction on the circumplex model (see Chapter 1). Questions of life satisfaction and happiness produce congruent answers and it is not surprising to find that happiness and life satisfaction appear to co-exist. One of the most common and reliable assessments of life satisfaction is the global item "how satisfied are you with your life as a whole" which is included in the Australian Unity Wellbeing Index. The Index is completed by 2000 Australians and comprises of 7 aspects of personal life as the domains of standard of living, health, achievements in life, personal relationships, community connectedness, safety and future security. When these personal domains are regressed on the global "life as a whole" item 53% of the variance is explained. When people are asked to rate their satisfaction with their happiness an additional 5% of variance is explained. More importantly, in the latter regression of "life as a whole", satisfaction with happiness contributes 35% of the unique variance in ratings of satisfaction with life as a whole (Cummins, Eckersley, Lo, Okerstrom, & Davern, 2002), clearly indicating an affective component in life satisfaction. Judgments of life satisfaction involve cognitive processes and these judgments are made upon an affective background: cognition influences the affective processes and affect influences the cognitive judgments.

The Affective Component of Life Satisfaction

The affective component of SWB and life satisfaction has not been comprehensively investigated. Larsen & Diener (1992) are the only authors to have contributed to the current understanding of the circumplex model and SWB, providing their own version of the circumplex model as detailed in Chapter 1.

One of the most popular measures of affect included in numerous studies of SWB is Watson & Tellegen's (1987) Positive and Negative Affect Schedule (PANAS). As described in Chapter 1, the PANAS was developed according to a two factor model of affect: these factors are labelled Positive Affect (PA) and Negative Affect (NA). Unlike the circumplex model that consist of two bipolar axes of pleasant-unpleasant and high-low arousal, PA and NA in the PANAS are thought of as independent constructs. The major criticism of the scale is that it does not assess low arousal states of pleasant or unpleasant affect (Carroll et al., 1999) and only assesses high arousal or activated affect states. Positive affect and negative affect should include both high and low arousal states and pleasant and unpleasant affect valence.

The PANAS is most often the measure of choice when PA and NA are being investigated. Many researchers are unaware of the limitations of the measure and lack knowledge of the circumplex model of affect. Earlier investigations of the affective component of SWB that have relied on the PANAS (Watson et al., 1988), Mood Adjective Check List (Nowlis, 1965), Activated Deactivated Adjective Check List (Thayer, 1986), Affective Lexicon (Clore et al., 1987), Profile of Mood States (McNair & Lorr, 1964) or other similar measures are incongruent with current understanding of the affect circumplex. An examination of the affective component of SWB based on current understanding of affect including the psychometric issues that influence it will provide a clearer understanding of SWB.

Rationale for Item Selection

This study seeks to evaluate a psychometric aspect of life satisfaction in terms of the circumplex model of affect: is life satisfaction the bipolar opposite to life dissatisfaction? To evaluate this question, scales must be anchored by the terms 'satisfied' and 'dissatisfied', to measure the opposing concepts of life satisfaction and life dissatisfaction, with these terms acting as obvious opposites or antonyms. Terms that are obvious antonyms are most likely to produce bipolar opposites because they are commonly conceptualised as representing either end of a scale. If terminology confuses the issue by using items other than antonyms, measurement of bipolarity becomes confounded by language. Indeed, much debate continues in the affect literature about whether or not 'happiness' and 'sadness' are true antonyms. For example, Russell (1980) asked participants to sort 28 stimulus words according to the circumplex model and found the most variation in classification of the term 'sad' on the pleasantness-unpleasantness axis. Less variation was found with the location of the term 'happiness', which was judged by participants to represent the pleasant pole of the axis, but more

variation in the location of 'sad' suggesting that the two terms are not direct opposites of bipolarity even though they are commonly thought of as antonyms.

Watson & Tellegen (1985) also incorporate pleasantness-unpleasantness in their model of PA and NA. However they did not include the terms 'happiness' and 'sadness' in their Positive and Negative Affect Schedule because they found only moderate negative correlations of -.28 to -.52 between a happiness and sadness scale. Their happiness scale consisted of cheerful, delighted, happy and joyful and their sadness scale of alone, blue, downhearted, lonely and sad (Watson & Clark, 1997). The moderate correlation coefficients do not support a bipolar relationship between the 'happiness' and 'sadness' scales, even though they had been hypothesised to behave as bipolar opposites. It appears that research participants do not conceive 'happiness' and 'sadness' or similar terms as direct antonyms. Thus, alternative terms need to be used for assessing the pleasant-unpleasant axis of the circumplex model.

Satisfaction and Dissatisfaction as Bipolar Opposites

As described earlier, Campbell et al. (1976) avoided the terms like 'happiness' in preference to 'satisfaction' because of definitional ambiguity and a lack of consensual understanding of the term. This may also explain Watson & Clark's (1997) result of low correlation between their happiness and sadness scale. In comparison, 'satisfied' and 'dissatisfied' are more clearly defined alternatives of bipolar opposites on the pleasantness-unpleasantness axis of the affect circumplex. The term 'satisfied' is included in both Russell's (1980) circumplex model and Watson & Tellegen's (1985) model of PA and NA. In both models it is located at the pleasantness pole of the pleasantness-unpleasantness axis and similar results have also been found by Remington, Fabrigar & Vissar (2001) in their re-examination of the circumplex model of affect. Furthermore, the inclusion of the prefix "dis-" meaning not, or the reverse of, indicates a definitive linguistic antonym that can be tested as a bipolar axis of pleasantness-unpleasantness. Given the location of 'satisfied' and 'dissatisfied', together with the affective landscape judgments of life satisfaction are made, I propose that life satisfaction and dissatisfaction should also behave as bipolar opposites.

Items Chosen For Assessment Of Bipolarity

Two questionnaires were constructed to compare life satisfaction and dissatisfaction. Both questionnaires contain 15 items of global, personal and national life satisfaction. Each questionnaire also has a section dedicated to life dissatisfaction where participants are asked how <u>dissatisfied</u> they are with the same 15 items. The only differences between the two questionnaires are the response scales. One questionnaire contains a bipolar response scale ranging from "very dissatisfied" to "very satisfied" and an example of this response scale is presented below:

	Very Dissatisfied										Very Satisfied
Thinking about your own life right now, how satisfied are you with your life as a whole?	0	1	2	3	4	5	6	7	8	9	10

The second questionnaire contains unipolar response scales of either satisfaction or dissatisfaction. For example:

	Not at all Satisfied										Very Satisfied
Thinking about your own life right now, how satisfied are you with your life as a whole?	0	1	2	3	4	5	6	7	8	9	10

The items included in both questionnaires were taken from the Australian Unity Wellbeing Index, which contains two subscales. The Personal Wellbeing Index comprises of seven aspects of personal life and the National Wellbeing Index comprises of the six aspects of national life. The personal items are standard of living, health, achievements in life, personal relationships, community connectedness, safety and future security. Two global questions are also routinely asked. These are satisfaction with life as a whole, and satisfaction with life in Australia. The first of these is similar to the original measure of overall life satisfaction proposed by Campbell et al. (1976) and asks: "Thinking about your own life right now, how satisfied are you with your life as a whole". This item has been included because of the stability and reliability in the assessment of life satisfaction in western countries (Cummins, 1995, 1998; Larsen et al., 1985). Considering this, the global item of satisfaction with Australian life is also argued to provide a reliable estimate of satisfaction with national life.

A regression of the personal domains of the Australian Unity Wellbeing Index on the global question of satisfaction with life explained 52% of the variance in the answers of satisfaction with life as whole. In comparison, when the national domain items were regressed on satisfaction with Life in Australia, the national domain items explained only 21% of the variance in answers of satisfaction with life in Australia (Cummins, Eckersley, Pallant, Okerstrom, & Davern, 2002). Considering the poorer performance of the National Wellbeing Index it was not included in the assessment of bipolarity of life satisfaction and dissatisfaction. However, the six national wellbeing domains were included in the items of life satisfaction in order to collate data for a separate longitudinal survey relating to the Australian Unity Wellbeing Index.

Life Satisfaction and Dissatisfaction Items

In both questionnaires 1 and 2, participants are asked to answer the global life satisfaction item followed by seven items on personal life satisfaction and eight items of national life satisfaction. In the following section, participants are asked to answer how dissatisfied they are with their lives by answering the global item and the seven personal domains. All responses are answered according to a variation of the 0-10 Likert scale and the only difference between questionnaire 1 and questionnaire 2 is the response format of the Likert scale. Half of the participants will be mailed questionnaire 1 and the remaining half mailed questionnaire 2. An additional global item of life satisfaction has also been included in both questionnaires asking participants to indicate their level of agreement with the statement "I am satisfied with my life as a whole" based upon a 0-10 Likert scale. The item is also asked in relation to life dissatisfaction.

Two items employing a different response scale have also been included in both questionnaires to assess the bipolarity of life satisfaction and dissatisfaction. These are assessed using a agree-disagree response option ranging from 0-10 and were adapted from the Satisfaction With Life Scale (Diener, Emmons et al., 1985). It has been included in the questionnaires to account for the possibility of random error in response biases when the same response format is used for all assessments (Green et al., 1993; Green et al., 1999). The items will provide an alternative measure to assess bipolarity of life satisfaction.

In questionnaire 1, a bipolar response scale is used ranging from "very dissatisfied" (0) to "very satisfied" (10) for the life satisfaction and dissatisfaction items.

Questionnaire 1

The life satisfaction items and bipolar response scale in questionnaire 1 are presented below:

SECTION A QUALITY OF LIFE	**Completely Dissatisfied**										**Completely Satisfied**
Thinking about your own life right now, how satisfied are you with your life as a whole?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your standard of living?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your health?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with what you achieve in life?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your personal relationships?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with how safe you feel?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with feeling part of your community?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your future security?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your own happiness?	0	1	2	3	4	5	6	7	8	9	10

Turning now to life in Australia…

How satisfied are you with life in Australia as a whole?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with the economic situation in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with the state of the natural environment?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with the social conditions in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with Government in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with business in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with national security in Australia?	0	1	2	3	4	5	6	7	8	9	10

Thinking about your own life and personal circumstances, describe your agreement with the following statement:

	Completely Disagree										**Completely Agree**
"I am satisfied with my life as a whole"	0	1	2	3	4	5	6	7	8	9	10

The life dissatisfaction items in questionnaire 1 are presented below:

SECTION B LIFE DISSATISFACTION	**Completely Dissatisfied**										**Completely Satisfied**
Thinking about your own life right now, how **dissatisfied** are you with your life as a whole?	0	1	2	3	4	5	6	7	8	9	10
How **dissatisfied** are you with your standard of living?	0	1	2	3	4	5	6	7	8	9	10
How **dissatisfied** are you with your health?	0	1	2	3	4	5	6	7	8	9	10
How **dissatisfied** are you with what you achieve in life?	0	1	2	3	4	5	6	7	8	9	10
How **dissatisfied** are you with your personal relationships?	0	1	2	3	4	5	6	7	8	9	10
How **dissatisfied** are you with how safe you feel?	0	1	2	3	4	5	6	7	8	9	10
How **dissatisfied** are you with feeling part of your community?	0	1	2	3	4	5	6	7	8	9	10
How **dissatisfied** are you with your future security?	0	1	2	3	4	5	6	7	8	9	10

Thinking about your own life and personal circumstances, describe your agreement with the following statement:

	Completely Disagree										**Completely Agree**
"I am **dissatisfied** with my life as a whole"	0	1	2	3	4	5	6	7	8	9	10

In questionnaire 2, two unipolar response scales are provided: a unipolar-satisfied response set is provided for the life satisfaction items, ranging from "not at all satisfied" (0) to "very satisfied" (10); and a unipolar dissatisfied response set is provided for the life dissatisfaction items ranging from "not at all dissatisfied" (0) to "very dissatisfied" (10).

Questionnaire 2

The life satisfaction items and unipolar-satisfaction response scale in questionnaire 2 are presented below:

SECTION A QUALITY OF LIFE	**Not at all Satisfied**										**Completely Satisfied**
Thinking about your own life right now, how satisfied are you with your life as a whole?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your standard of living?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your health?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with what you achieve in life?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your personal relationships?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with how safe you feel?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with feeling part of your community?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your future security?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with your own happiness	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with life in Australia as a whole?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with the economic situation in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with the state of the natural environment?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with the social conditions in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with Government in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with business in Australia?	0	1	2	3	4	5	6	7	8	9	10
How satisfied are you with national security in Australia?	0	1	2	3	4	5	6	7	8	9	10

Thinking about your own life and personal circumstances, describe your agreement with the following statement:

	Completely Disagree										**Completely Agree**
"I am satisfied with my life as a whole"	0	1	2	3	4	5	6	7	8	9	10

The life dissatisfaction items and unipolar-dissatisfaction response scale in questionnaire 2 are presented below:

	Not at all <u>Dissatisfied</u>										**Completely <u>Dissatisfied</u>**
Thinking about your own life right now, how **<u>dissatisfied</u>** are you with your life as a whole?	0	1	2	3	4	5	6	7	8	9	10
How **<u>dissatisfied</u>** are you with your standard of living?	0	1	2	3	4	5	6	7	8	9	10
How **<u>dissatisfied</u>** are you with your health?	0	1	2	3	4	5	6	7	8	9	10
How **<u>dissatisfied</u>** are you with what you achieve in life?	0	1	2	3	4	5	6	7	8	9	10
How **<u>dissatisfied</u>** are you with your personal relationships?	0	1	2	3	4	5	6	7	8	9	10
How **<u>dissatisfied</u>** are you with how safe you feel?	0	1	2	3	4	5	6	7	8	9	10
How **<u>dissatisfied</u>** are you with feeling part of your community?	0	1	2	3	4	5	6	7	8	9	10
How **<u>dissatisfied</u>** are you with your future security?	0	1	2	3	4	5	6	7	8	9	10

Thinking about your own life and personal circumstances, describe your agreement with the following statement:

	Completely Disagree										**Completely Agree**
"I am **<u>dissatisfied</u>** with my life as a whole"	0	1	2	3	4	5	6	7	8	9	10

Four additional measures were also included in both questionnaires 1 and 2 in order to further investigate life satisfaction and dissatisfaction. The Neuroticism and Extraversion subscales of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992); the Depression Anxiety Stress Scales (Lovibond & Lovibond, 1995; Lovibond & Lovibond, 1995), the Self-Esteem Scale (Rosenberg, 1965) and the Life Orientation Test-Revised (Scheier, Carver, & Bridges, 1994). The following sections will provide the rationale and justification for the inclusion of these additional measures.

Neuroticism and Life Satisfaction

Neuroticism is included as a domain of the Five Factor Model of personality which is commonly assessed by the NEO-PI-R. Neuroticism, or negative emotionality, is one of the five factors assessed by the NEO-PI-R and is broken down into six lower-order facets including anxiety, depression, angry hostility, self-consciousness, impulsivity and vulnerability to stress. These aspects of personality combine to produce an indication of emotional stability and are important to SWB.

Vitterso (2001) investigated the influence of the Five Factor Model of personality on SWB in a sample of nearly 500 university students across two studies. SWB measured by the Satisfaction With Life Scale (Diener et al., 1985) correlated .39 in study 1 and .43 in study 2 with emotional stability or neuroticism. Vitterso found a reduced relationship between extraversion and SWB with correlations ranging from .22 to .11 across the same studies. Neuroticism or emotional stability is more important to SWB than extraversion and this has been replicated by Cummins, Gullone & Lau (2002) in a review of the Five Factor model of personality and SWB.

Depression and Life Satisfaction

Depression consistently produces moderate negative correlations with life satisfaction at approximately -.50, with higher correlations in western countries (Chang, 1998; Cheung & Bagley, 1998; Headey, Kelley, & Wearing, 1993; Lewis, Dorahy, & Schumaker, 1999; Simpson, Schumaker, Dorahy, & Shrestha, 1996). Furthermore, life dissatisfaction has been found to produce a long-term effect on the risk of suicide, independent of health and gender, in a 20-year longitudinal study of nearly 30,000 adults from the Finnish Twin Cohort (Koivumaa-Honkanen et al., 2001). This study, which began in 1975, tracked the participants for 20 years with life satisfaction measures completed in 1975, 1981 and 1991. The cumulative incidence of suicide over the time period was 1.04% for men and .22% for women and suicide victims were significantly more likely to be grouped in the dissatisfied category of low life satisfaction (31.8%) than were other participants (18.1%). The most dissatisfied men with extremely low scores of life satisfaction had 25 times the risk of suicide than men who were satisfied with their lives. The results of the longitudinal study concur with cross sectional studies of life satisfaction, and unhappiness assessed as depression is strongly negatively correlated with life satisfaction.

Comparing life satisfaction and dissatisfaction with measures of depression, stress and anxiety, will provide evidence of concurrent validity in the subjective wellbeing measure. Concurrent validity is indicated if life satisfaction and dissatisfaction scores could be used to estimate depression, anxiety and stress (Cohen et al., 1992). According to the circumplex model of affect, dissatisfaction is located within the unpleasant valence axis of the model. Depression is also located within the unpleasant axis, as are anxiety and stress even though they are more activated affect terms. As life dissatisfaction and depression are more closely located within the same area of the circumplex a stronger relationship is expected between depression and life dissatisfaction. In comparison to life dissatisfaction and depression, anxiety and stress are more activated negative affective states. Accordingly, the relationship between life dissatisfaction, anxiety and stress is expected to be weaker. Nonetheless, the relationships between life dissatisfaction, depression, stress and anxiety are expected to be stronger than the relationship between life satisfaction, depression, anxiety and stress. This is because it is hypothesised that life satisfaction refers to the pleasant aspect of the valence axis and not the closely located unpleasant aspect of the valence where the other four concepts are located.

Anxiety and Life Satisfaction

The relationship between anxiety and SWB has been widely reported in the SWB literature, yet strength of correlation varies. A correlation of -.70 has been found between trait anxiety and Diener et al.'s (1985) Satisfaction With Life Scale (Seibel & Johnson, 2001), while data from the fourth wave of the longitudinal Australian Quality of Life Panel conducted by Headey et al. (1993) revealed a correlation of -.30 between state anxiety and life satisfaction. In comparison, Rogalski & Paisley (1987) found that anxiety explained 38.9% of the variance in life satisfaction in 120 retired adults. In their study, Rogalski & Paisley assessed trait and state anxiety using the State Trait Anxiety Inventory (Spielberger, Gorsuch, Luschene, Vagg, & Jacobs, 1983) and life satisfaction by the Life Satisfaction Index (Neugarten, Havinghurst & Tobin, 1961).

It is important to include both anxiety and depression in SWB investigations because they are common disorders that often occur simultaneously, with symptoms of worry often related to depressed mood. In 1997, an Australian National Survey of Mental Health and Wellbeing of Adults found that one in three Australians with an anxiety disorder also had an affective disorder (Australian Bureau of Statistics, 1997). Consequently, the overlap in anxiety and depression makes it difficult to create measures that are able to discriminate between the disorders. For example, Clark & Watson (1991) analysed convergent and discriminant validity of the most commonly used self-report depression and anxiety scales in a review of over 4000 clinical and non-clinical samples. Both anxiety and depression scales showed reasonably high convergent validity with other measures, however, average correlations between anxiety and depression measures ranged between .60 and .70. Convergent validity is expected with measures of related constructs but the high correlations suggest

overlap in the measures of anxiety and depression. These finding lead to Clark & Watson's (1991) proposal of the Tripartite Model of anxiety and depression, consisting of general distress, physiological hyperarousal (specific anxiety), and anhedonia (specific depression).

Despite the overlap in symptoms of anxiety and depression, both disorders are prevalent in the general population. It has even been suggested that these common neuroses should be included in all investigations where SWB is used to provide an indicator of mental health (Headey et al., 1993). Consequently, these dimensions of mental health were included in the current study as predictors of life satisfaction and dissatisfaction.

Depression Anxiety Stress Scales (DASS)

The DASS was designed by Lovibond & Lovibond (1995) to provide a self-report measure of depression, anxiety and stress that enabled maximum discrimination between the three constructs. The development of the scale was stimulated by the poor ability of previous instruments in separately assessing depression and anxiety.

During 1979-1990, Lovibond & Lovibond (1995) tested 30 samples in their construction of the DASS. The authors developed two subscales that discriminated between anxiety and depression but also found a general factor of non-discriminating anxiety and depression items, which they labelled stress. The stress scale refers to items of difficulty relaxing, nervous tension, irritability and agitation. Principal components analysis and structural equation modelling has reproduced the three scales and has accounted for up to 60% of the variance in a three-factor solution (Antony, Bieling, Cox, Enns, & Swinson, 1998; Clara, Cox, & Enns, 2001; Lovibond & Lovibond, 1995). Furthermore, Lovibond & Lovibond (1995) found greater overlap in the commonly used Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988), while the stress and depression factors in the DASS correlated at .39, stress and anxiety at .46, and anxiety and depression at .42. Similar correlations have also been replicated in other studies (Antony et al., 1998).

In reviewing studies of factor analysis of depression scales, items that specifically ask about depressed mood and cognitive symptoms of depression demonstrate the highest factor loadings in depression scales (Cheung & Bagley, 1998; Dunbar, Ford, Hunt, & Derr, 2000; Giambra, 1977; Hare & Davis, 1996; Helmes & Nielson, 1997; Joiner & Rudd, 1996; Joseph & Lewis, 1995; Steer, Ball, Ranieri, & Beck, 1999; Ward, 1997; Watson et al., 1995). This was demonstrated in the Beck Depression Inventory I and II (Beck et al., 1988; Beck et al., 1961), the Self-Rating Depression Scale (Zung, 1965), the Cardiac Depression Scale (Hare & R, 1996), and Centre for Epidemiology Studies Depression scale (Beck, Steer, & Brown, 1996). The DASS was chosen as a measure of depression, anxiety and stress because depression items refer to cognitive symptoms of depression rather than physical symptoms which produce low factor loadings. The stress and

anxiety scales of the DASS relate to physical symptoms of anxiety and mental symptoms of stress such as autonomic arousal and difficulty in relaxing respectively. It is anticipated that by asking about cognitive symptoms of depression in the DASS, it should strengthen the separation of depression, anxiety and stress symptoms. This will enable separate comparisons between depression, anxiety and stress with life satisfaction and dissatisfaction.

In completing the DASS, participants are asked to use a 4-point severity/frequency scale to rate the extent that they experienced each state over the past week. The DASS-21 is an abbreviated form of the original 42-item DASS and has been shown to be effective in discriminating between depression, anxiety and stress despite the shortened length (Antony et al., 1998; Lovibond & Lovibond, 1995).

Self-Esteem and Life Satisfaction

Self-esteem and life satisfaction are both strongly related, with the two concepts usually correlating at close to .50 (Cummins, Eckersley, Pallant, Misajon, & Davern, 2001; Diener & Diener, 1995; Diener, Suh, Lucas, & Smith, 1999; Lucas, Diener, & Suh, 1996). Self-evaluations are strongly related to the experience of SWB and happy people are more likely to report satisfaction with the self, whereas unhappy people are more likely to report low satisfaction with the self (Diener, Lucas, Oishi, & Suh, 2002). Participants were asked by Diener et al. to rate their happiness and eight domains including health, finances, family, friends, recreation, religion, self and education. Those who were happiest rated "self" as their best domain in contrast to unhappy people who rated "self" as their worst domain. The authors also found that happy people are inclined to weight the best domains in their lives more heavily than unhappy people, perhaps optimistically focusing on the better aspects of their lives. In comparison, unhappy people weighted their worst domains more heavily, and focused on the negative aspects of their lives.

If self-esteem is conceptualised as an aspect of personality, then self-esteem is also important in the maintenance of SWB. For example, Headey & Wearing (1989, 1992) have suggested a dynamic equilibrium model of SWB where each person is thought to have their own normal equilibrium level of SWB and favourable or adverse life events. These levels of equilibrium are held steady by very stable personality characteristics and only when exogenous life events deviate from their usual expected patterns does SWB alter. When these events occur, and changes to SWB result, they are only temporary because stable personality characteristics ensure a return to the usual expected life events and SWB returns to equilibrium levels. Cummins (2000) and colleagues (Cummins, Gullone et al., 2002) support a similar model of SWB homeostasis as explanation for the stability of mean scores of SWB in western countries (Cummins, 1995, 1996, 1998). This theory argues for a three level system of processing. The first level as a the unconscious processes of habituation and adaptation, the second level of conscious awareness of met and unmet needs, and the third level of cognitive buffers which act on need states to maintain steady SWB. Personality

is thought to be a strong influence on both the second and third levels, impacting on judgments of met and unmet needs and the cognitive buffers which impact on decisions of need. Hence, self-esteem as a personality characteristic is important to the maintenance of SWB.

In view of the strong relationship between measures of life satisfaction and self-esteem, a measure of self-esteem was included to investigate the correlation between life satisfaction, dissatisfaction and self-esteem.

Rosenberg Self-Esteem Scale

Developed by Rosenberg (1965), the Self-Esteem Scale was chosen to assess self-esteem because it is a consistently reliable measure with high internal reliability and validity (Rosenberg, 1989; Wrightsman, Robinson, Andrews, & Shaver, 1991). The widely used measure consists of 10 items that ask about global attitudes towards the self and participants are asked to rate on a 4 point Likert scale from 'strongly agree' (1) to 'strongly disagree' (4).

Optimism and Life Satisfaction

Feeling good about oneself logically seems related to a positive outlook on life. For example, as human beings we constantly make mistakes and learn from experience and it is as though we need to be optimistic to maintain high levels of self esteem considering the trials and tribulations provided by everyday life. In feeling good and remaining optimistic about the future, there is more chance of avoiding depression, and feeling good also aids in the formation of social alliances and the acquisition of resources (Cummins, 2000).

Life satisfaction consistently correlates with optimism, generally between .40 and .77 (Chang, 1998; Chang & Farrehi, 2001; Cummins et al., 2001; Diener et al., 1999; Lucas et al., 1996; Olason & Roger, 2001). A positive outlook on life, and mechanisms of self-satisfaction, are important to the generation of life satisfaction where self-beliefs act as buffers to reality Cummins et al., (2001). These self-beliefs are a form of positive cognitive bias relating to the actual possibilities occurring within everyday life and are difficult to test because of the lack of objective measures that they can be measured against. Others have shown a decrease in positive cognitive biases in dysthymic or depressed populations (e.g. Lewinsohn et al., 1980; Tabachnik et al., 1983). Likewise, Ackerman & DeRubeis (1991) postulated that depression is a breakdown of self-esteem and positive biases whereby the maintenance of positive cognitions requires energy or motivation.

If self-esteem and optimism are important personality characteristics of people with high levels of SWB then self-esteem should be an important predictor of life satisfaction. In contrast, low self-worth and a negative outlook on life should be related to life dissatisfaction and the failure of the homeostatic maintenance of SWB.

Life Orientation Test

The Life Orientation Test (LOT) was developed by Scheier & Carver (1985) and is an 8 item self-report assessment of positive and negative expectancies, and item scores are totalled to yield an overall optimism score. Participants are asked to indicate their level of agreement with statements on a 5 point Likert scale ranging from 'strongly disagree' to 'strongly agree', with 4 statements worded in a positive direction and 4 statements worded in a negative direction.

Overlap between measures of neuroticism and the LOT suggested of a lack of discriminant validity in the test. When the effect of neuroticism was controlled for, the relationships between optimism, problem-solving coping and symptom reporting disappeared (Smith, Pope, Rhodewalt, & Poulton, 1989). Others have suggested bi-dimensionality in the scale, which was originally designed as a uni-dimensional assessment of optimism. Factor analysis of the LOT has suggested the emergence of two factors that were defined by items worded positively and negatively (Lai, 1994). When the predictive power of these positively and negatively worded items were investigated by Lai (1994), he found that only the positively worded items predicted physical symptoms while the negatively framed items did not.

Following these criticisms of the LOT, Scheier, Carver & Bridges (1994) completed a re-examination of the predictive validity of the scale. The LOT was compared with measures of neuroticism, self-mastery, self-esteem, trait anxiety, depression, coping, physical symptoms and symptom intensity. Moderate correlations resulted between the LOT and the predictor variables, though the correlation between symptom intensity was non-significant if the predictor variables were statistically controlled. Scheier et el., also determined that two items on the LOT referred more to coping styles than expectations of positive and negative expectations which the measure intended to assess. Two items were removed from the LOT because they did not refer to an expectation of positive or negative outcomes. Instead these items referred to coping or a way of reacting to stress which contradicted earlier results of Scheier & Carver (1992) where coping was discovered to be an important mediator of stress. Therefore the two items referring to coping style were removed and the measure was renamed the revised Life Orientation Test Revised (or LOT-R). Two models of the LOT-R items were produced by confirmatory factor analytic procedures; one of positively and negatively framed items loading on separate factors and another with all items loading on a single factor. Initially, the two-factor model appeared slightly superior in fit, however when correlated error among the positively framed items was controlled for, the differences between the one or two factor models were non-significant. Cronbach's alpha for the LOT-R was .78 with acceptable internal consistency and test-retest correlations ranged between .56 and .79 over 2 years period and were reasonably stable across time.

When all items of the LOT-R are summed, answers negatively correlate with depression at -.52. However, factor analysis of the LOT-R produces separate factors according positively and negatively worded items which are also referred

to as optimistic or pessimistic items. If only the negatively worded or pessimistic items of the LOT-R are compared to a measure of depression, the resultant correlation is .40 (Chang, 1998; Chang & Farrehi, 2001). In comparison, the positively worded or optimistic items correlate at about the same magnitude in the opposite direction at -.36 (Chang & Farrehi, 2001). Given this, it was deemed important to include the LOT-R to investigate the relationship between positive and negative expectancies and life satisfaction in comparison with life dissatisfaction. Negatively worded items of the LOT-R are positively related to depression and if dissatisfaction conforms to the pleasantness-unpleasantness axis of the affect circumplex, and depression or sadness is also located close to this axis, life dissatisfaction should also correlate with the pessimistic negatively worded items. Similarly, the optimistic positively framed items are expected to be more positively related to life satisfaction.

Hypotheses for Study 1

1. *After accounting for measurement error using CFA, life satisfaction will be highly negatively correlated with life dissatisfaction using a unipolar response scale.*

   This hypothesis will be tested using a CFA model used to create two factors of life satisfaction and dissatisfaction based on items referring to satisfaction and dissatisfaction. The CFA model will control for non-random error allowing more accurate correlation between the life satisfaction and dissatisfaction factors.

2. *CFA will produce more negative inter-factor correlations between life satisfaction and dissatisfaction employing a bipolar response scale in comparison to a unipolar response scale.*

   Exploratory factor analyses will initially be performed to confirm the factor structure of life satisfaction and dissatisfaction. Following this, inter-factor correlations of life satisfaction and dissatisfaction will be compared according to separate CFA models of unipolar and bipolar response scales. Initially bipolarity needs to be confirmed by unipolar response scales so that responses are not constrained by bipolar response scales. Once bipolarity is confirmed using unipolar response scales, higher inter-factor correlations are expected with bipolar response scales.

3. *Life dissatisfaction will be a better predictor of depression, stress and anxiety than life satisfaction.*

   Relationships can be tested through a multivariate analysis of variance (MANOVA) with life satisfaction and dissatisfaction as dependent variables and depression, stress, and anxiety as independent variables. Separate multiple regression analyses will also be used to examine the contribution of depression, anxiety, stress, optimism and self-esteem as predictors of life satisfaction and dissatisfaction.

CHAPTER 3: STUDY 1 METHODOLOGY

Participants

The sample was drawn from the 4th Survey of the Australian Unity Wellbeing Index which is a quarterly telephone survey conducted in August 2002. The Australian Unity of Wellbeing Index measures how Australians feel about life and incorporates personal and national aspects of life. Every three months, a random sample of 2000 Australians is selected from the public telephone directory and invited to participate in the survey. Telephone numbers are selected according to a proportional sample of the Australian population including urban and rural areas, with the majority of participants residing in major capital cities. During each telephone survey, all participants are asked if they would like to remain involved in the study by completing another survey in a few months time. 89% of those surveyed indicated that they would like to complete a further survey and provided a contact name for mailing purposes. Postal addresses were available in the public telephone directory. Names, telephone numbers and addresses remained with Australian Unity. A unique identifier was used to code the demographics of participants of the telephone survey to match those who completed the mailed survey which contains no identifiable information.

In total 1774 questionnaires were mailed to the survey participants. Of the surveys mailed, 50% were Questionnaire 1 and 50% Questionnaire 2 enabling comparison of the unipolar and bipolar response scales. In total, 518 questionnaires were returned. These included 221 of the bipolar response scale in Questionnaire 1 and 297 of the unipolar response scale in Questionnaire 2 resulting in a total sample of 518 participants (29%). The sample comprises 43.5% males and 56.5% females and their mean age was between 46-55 years with a minimum age of 18 years.

Materials and Procedure

Two questionnaires were sent to participants and were described thoroughly in Chapter 2. Questionnaire 1 employed a bipolar response scale for life satisfaction and dissatisfaction items and Questionnaire 2 employed a unipolar response scale for life satisfaction and dissatisfaction items. Both questionnaires also contained the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the Depression Anxiety and Stress Scale (Lovibond & Lovibond, 1995) and the Life Orientation Scale Revised (Scheier, Carver & Bridges, 1994). Altogether, the questionnaires contained a total of 62 items.

Life satisfaction was assessed by the Personal Wellbeing Index of the Australian Unity Wellbeing Index. The Personal Wellbeing Index measures subjective wellbeing and is designed as the first level deconstruction of 'satisfaction with life as a whole'. It comprises seven life domains as Standard of living, Health, Achievements in life, Personal relationships, Community connectedness, Safety and Future security. The Personal Wellbeing Index is an aggregate average score

across the seven domains. It is available on the web (Cummins et al., 2003) and its psychometric properties have been extensively examined (Cummins, Eckersley, Lo, Okerstrom, Davern and Hunter, 2003).

In its usual format, each domain is rated on a bipolar 11-point scale (0-10) end-defined scale (Jones and Thurstone, 1955), with the scale anchors of 'completely dissatisfied' (0) and 'completely satisfied' (10). However, for the purpose of this study, the response scale was modified in two ways: (i) a dissatisfaction scale was created in addition to the standard satisfaction scale; and (ii) both scales were assessed using bipolar and unipolar response formats.

Items of life dissatisfaction were included in addition to the usual satisfaction items in both Questionnaires. Dissatisfaction was assessed in the same manner as life satisfaction using an 11-point scale (0-10) allowing direct comparison between satisfaction and dissatisfaction answers. All satisfaction items were constructed as dissatisfaction items, and presented in the questionnaires after the satisfaction section. The items assessed included dissatisfaction with life as a whole and all seven life domains. A Personal Dissatisfaction Index was calculated from the aggregate average of dissatisfaction scores across all seven dissatisfaction domains.

Questionnaire 1 employed bipolar response formats and Questionnaire 2 employed unipolar response formats to test for response differences between unipolar and bipolar response options. Questionnaire 1 used a two-way bipolar response format for all satisfaction and dissatisfaction items. The bipolar response format used to assess satisfaction ranged from "completely dissatisfied" to "completely satisfied". The bipolar response format used to assess dissatisfaction ranged from "completely dissatisfied" to "completely satisfied".

Questionnaire 2 used a one-way unipolar response format for all satisfaction and dissatisfaction items. Satisfaction was assessed according to anchors of "not at all" to "completely satisfied" and dissatisfaction was assessed according to anchors of "not at all" to "completely dissatisfied".

An alternative response scale was also included in both questionnaires 1 and 2. Participants were asked to rate global items of life satisfaction and life dissatisfaction according to an agree-disagree response scale where "0 = completely disagree" and "10 = completely agree".

CHAPTER 4: STUDY 1 RESULTS

All scores of life satisfaction and dissatisfaction are presented according to Percentage of Scale Maximum scores (%SM). When a scale is scored 0-X, %SM is calculated through the formula [(score) x 100/(number of scale points - 1)]. In comparison, the formula would become [(score-1) x 100/(number of scale points - 1)] if a scale scoring starts from the number one (Cummins, 1995). %SM scores have been calculated for all Personal Wellbeing results to assist with ease in understanding scores and comparison with other data. Results are presented in a number of sections beginning with an investigation of bipolarity and gender differences, then continuing with analyses of depression, anxiety and stress concluding with an investigation of the psychometric properties of the Depression Anxiety Stress Scales.

The assumption of normality has been relaxed for the statistical analyses of Analysis of Variance, Multivariate Analysis of Variance and multiple regressions because all SWB data are subject to positive skew (Cummins, 1995; 1998; 2000). As the data skew is theoretically justified in the maintenance of homeostasis, slight violation of normality are accepted in the data (Tabachnick & Fidell, 2001).

4.1 MEANS AND STANDARD DEVIATIONS

The means for life satisfaction and dissatisfaction are presented below in Table 4.1 and Table 4.2 according to unipolar and bipolar response scales. The data presented in Table 4.1 employing a unipolar response scale, clearly indicates bipolarity in satisfaction and dissatisfaction values. Mean satisfaction scores are approximately the reverse of mean dissatisfaction scores with both scores totaling approximately 100. Exact opposite %SM scores would be expected to total to 100.

Table 4.1: <u>UNIPOLAR</u> Response Scale Means and Standard Deviations (N = 297)

Satisfaction Variable	Mean	SD	Dissatisfaction Variable	Mean	SD	Total
Life as a whole	72.63	17.72	Life as a whole	27.16	21.10	99.79
Standard of living	74.38	18.41	Standard of living	25.85	20.40	100.23
Health	70.82	20.14	Health	31.02	23.10	101.84
Achieve in life	72.42	18.14	Achieve in life	28.63	20.41	101.05
Personal relationships	74.98	22.56	Personal relationships	26.64	24.02	101.62
Safety	72.69	19.64	Safety	29.93	20.94	102.62
Community connectedness	70.74	20.80	Community connectedness	27.70	20.74	98.44
Future security	66.68	21.06	Future security	36.37	23.46	103.05
Personal Wellbeing Index	71.84	14.20	Personal Dissat. Index	29.57	15.63	101.41
			Average Total	101.12		
Life Satisfaction (agree)	74.81	18.34	Life Dissatisfaction (agree)	23.94	22.21	98.75

Table 4.2: BIPOLAR Response Scale Means and Standard Deviations (N = 221)

Satisfaction Variable	Mean	SD	Dissatisfaction Variable	Mean	SD	Total
Life as a whole	73.67	15.74	Life as a whole	65.21	24.71	138.88
Standard of living	75.75	16.73	Standard of living	66.58	23.53	142.33
Health	70.27	18.40	Health	62.24	24.02	132.51
Achieve in life	71.93	16.93	Achieve in life	65.41	23.34	137.34
Personal relationships	75.11	21.27	Personal relationships	65.25	27.42	140.36
Safety	73.67	17.68	Safety	65.19	21.82	138.86
Community connectedness	70.87	18.31	Community connectedness	63.99	23.28	134.86
Future security	67.82	19.32	Future security	59.77	23.67	127.59
Personal Wellbeing Index	72.14	12.81	Personal Dissatisfaction Index	64.42	19.86	136.56
			Average Total			136.58
Life Satisfaction (agree)	75.87	15.80	Life Dissatisfaction (agree)	33.13	29.07	109.00

The data obtained from a bipolar response scale are presented in Table 4.2. In comparison to the unipolar data, the bipolar data do not approach bipolar opposites, though dissatisfaction scores are rated lower than satisfaction scores. Higher standard deviations are also present in the bipolar dissatisfaction data compared to the unipolar dissatisfaction data. Greater spread in the distribution of the data might be associated with different interpretations of the bipolar response scale.

Figure 4.1: Bipolarity in Life as a Whole Satisfaction and Dissatisfaction Scores

In comparison to the unipolar data, the bipolar data presented in Table 4.2 do not support bipolarity. Dissatisfaction scores are approximately 10% lower than satisfaction scores and do not total close to 100. The greatest mean difference reported between satisfaction and dissatisfaction was on the domain of Personal Relationships with a total of 140.36.

A response scale of Agree-Disagree was also used to measure life satisfaction and dissatisfaction according to the item "I am satisfied/dissatisfied with my life". The unipolar data indicate bipolarity with a total of 98.75. In comparison, the total of 109 in the bipolar data is less suggestive of bipolarity but remains the lowest total in Table 4.2.

The satisfaction data were also analysed to test for differences between the unipolar and bipolar response scales. T-tests were conducted between all variables in Tables 4.1 and 4.2. All t-tests between the unipolar and bipolar response scale satisfaction scores were non-significant and means and standard deviations are presented in Table 4.3 below.

Table 4.3: Unipolar and Bipolar Satisfaction T-Tests (N = 518)

Satisfaction Variable	Response	Mean	SD	t	p
Life as a whole	Unipolar	72.63	17.72	-.70	.49
	Bipolar	73.67	15.74		
Standard of living	Unipolar	74.38	18.41	-.88	.39
	Bipolar	75.75	16.73		
Health	Unipolar	70.82	20.14	.32	.75
	Bipolar	70.27	18.40		
Achieve in life	Unipolar	72.42	18.14	.32	.75
	Bipolar	71.93	16.93		
Personal relationships	Unipolar	74.98	22.56	-.07	.95
	Bipolar	75.11	21.27		
Safety	Unipolar	72.69	19.64	-.59	.55
	Bipolar	73.67	17.68		
Community connectedness	Unipolar	70.74	20.80	-.07	.94
	Bipolar	70.87	18.31		
Future security	Unipolar	66.68	21.06	-.64	.52
	Bipolar	67.82	19.32		
Personal Wellbeing Index	Unipolar	71.84	14.20	-.25	.80
	Bipolar	72.14	12.81		
Life Satisfaction (agree)	Unipolar	74.81	18.34	-.69	.49
	Bipolar	75.87	15.80		

The dissatisfaction data were also analyzed to test for differences between the unipolar and bipolar response scales. Not surprisingly, t-tests between the response scales indicated significant differences between all variables as shown in Table 4.4 below.

Table 4.4: Unipolar and Bipolar Dissatisfaction T-Tests (N = 514)

Dissatisfaction Variable	Response	Mean	SD	t	p
Life as a whole	Unipolar	27.16	21.10	-18.32	.000
	Bipolar	65.21	24.71		
Standard of living	Unipolar	25.85	20.40	-20.51	.000
	Bipolar	66.58	23.53		
Health	Unipolar	31.02	23.10	-14.80	.000
	Bipolar	62.24	24.02		
Achieve in life	Unipolar	28.63	20.41	-18.56	.000
	Bipolar	65.41	23.34		
Personal relationships	Unipolar	26.64	24.02	-16.63	.000
	Bipolar	65.25	27.42		
Safety	Unipolar	29.93	20.94	-18.33	.000
	Bipolar	65.19	21.82		
Community connectedness	Unipolar	27.70	20.74	-18.28	.000
	Bipolar	63.99	23.28		
Future security	Unipolar	36.37	23.46	-11.08	.000
	Bipolar	59.77	23.67		
Personal Dissat. Index	Unipolar	29.57	15.63	-21.15	.000
	Bipolar	64.42	19.86		
Life Dissatisfaction (agree)	Unipolar	23.94	22.21	-3.86	.000
	Bipolar	33.13	29.07		

In summary, bipolarity can be most convincingly demonstrated using a unipolar response scale. In this situation, dissatisfaction scores reflect the opposite of satisfaction scores. There were no significant differences in the satisfaction scores obtained using bipolar or unipolar response scales. Significant differences are present in dissatisfaction scores collected using unipolar and bipolar response scales. Bipolarity was not demonstrated using a bipolar response scale and greater variation was present in dissatisfaction scores using this response scale.

4.2 CORRELATIONS

Correlations between satisfaction and dissatisfaction were calculated to further investigate the relationship of the scores derived from each type of response scale (Table 4.5). The Personal Wellbeing Index is the average of the seven domains and a Personal Dissatisfaction Index was also calculated.

Strong negative correlations are evident in both the satisfaction and dissatisfaction domains using a unipolar response scale. The correlations presented in Table 4.5 are consistent with Table 4.1 and indicate that a bipolar relationship exists between satisfaction and dissatisfaction when assessed using assessed using a unipolar response scale.

When the bipolar scales are correlated, the degree of correlation is reduced somewhat. When asked to express their level of dissatisfaction using a bipolar response scale, they actually express a discounted level of satisfaction, rather than their level of dissatisfaction. It is evident that this dissatisfaction scale has yielded invalid data.

Difficulty in rating dissatisfaction could also be explained by cognitive conceptions of satisfaction and dissatisfaction. For example, participants might conceive life satisfaction and dissatisfaction as unipolar constructs. In this situation, a bipolar response scale might be interpreted as a unipolar scale. The right side anchor indicates the maximum of an assessed dimension, and the left side indicates the absence of this dimension. When dissatisfaction was rated according to dissatisfied-satisfied, the rating scale was interpreted as not at all satisfied, a unipolar scale. Hence, items of dissatisfaction became an assessment of satisfaction and not dissatisfaction.

One bipolar response scale resulted in a negative correlation (-.34). This occurred when the scale was anchored by *Completely Disagree* to *Completely Agree*. The negative correlation obtained can be explained by the response scale. The negative correlation can be explained as follows. This item followed other satisfaction items which all scored in the top third of the 0-10 scale. Thus, respondents have become familiar with the location of *Completely Satisfied* as the right anchor, such that when they encountered *Completely Disagree- Completely Agree* they responded as they would have done to the satisfaction scales.

When dissatisfaction was assessed using a bipolar response scale participants indicated satisfaction rather than dissatisfaction. Their response pattern to satisfaction and dissatisfaction items lead to a bias towards the right anchor of *Completely Satisfied*. This might suggest that the right side of a response scale is interpreted as a maximum score.

After these items participants rated dissatisfaction according to anchors of *Completely Disagree - Completely Agree*. Despite previous bias towards the right anchor, most participants disagreed with the statement using the left anchor. Thus, earlier response patterns ceased with different response anchors, producing a negative correlation between life satisfaction and dissatisfaction.

Table 4.5: Pearson Product-Moment Correlations Between Satisfaction and Dissatisfaction Items for Unipolar Response Scales (N =297) and Bipolar Response Scales (N = 221)

Unipolar Response Scale Variables	**Correlation**	**p**
Life as a whole	-.69	.000
Standard of living	-.75	.000
Health	-.76	.000
Achieve in life	-.67	.000
Personal relationships	-.86	.000
Safety	-.67	.000
Community connectedness	-.74	.000
Future security	-.76	.000
Personal Wellbeing Index and Personal Dissatisfaction Index	-.85	.000
Life Satisfaction (agree) and Life Dissatisfaction (agree)	-.57	.000
Bipolar Response Scale Variables	**Correlation**	**p**
Life as a whole	.48	.000
Standard of living	.44	.000
Health	.51	.000
Achieve in life	.45	.000
Personal relationships	.51	.000
Safety	.45	.000
Community connectedness	.44	.000
Future security	.42	.000
Personal Wellbeing Index and Personal Dissatisfaction Index	.41	.000
Life Satisfaction (agree) and Life Dissatisfaction (agree)	-.34	.000

Strong negative correlations are evident in all domains of life satisfaction and dissatisfaction using a unipolar scale, confirming bipolarity (Table 4.5). Furthermore, all correlations were statistically different when compared as *z* values and observed *z* scores. Observed z scores that do not fall between the confidence intervals of -1.96 and +1.96 confirm the rejection of the null hypothesis (Pallant, 2001).

Bipolarity is produced by the 'not at all-completely' response scale. The maximum response of 'completely' means little without context gained from reading the question being asked. In contrast, a bipolar response scale with a maximum response of *Completely Satisfied* encourages acquiescence and set response patterns. This is because being "satisfied" is a socially desired feeling. Furthermore, a bipolar scale of dissatisfied-satisfied allows only a 5-10 spread of responses indicating satisfaction and predetermines bipolar opposites without testing for them first.

In summary, cognitive representations of satisfaction and dissatisfaction are unipolar and form bipolar opposites when assessed with a unipolar response scale. Bipolarity is also produced when disagree-agree response scale but further testing is required to confirm resistance to acquiescence and response patterns. A

unipolar response scale the preferred response scale, followed by a disagree-agree scale, and a bipolar response scale is not recommended for the assessment of bipolarity.

4.3 GENDER DIFFERENCES

Significant gender effects have appeared in the wellbeing of Australians, with females reporting higher levels of wellbeing across a number of domains (Cummins, Eckersley, Lo, Okerstrom, Hunter & Davern, 2003). These previous differences were discovered when using a bipolar response format. It is therefore of interest to investigate whether these gender differences are retained using both unipolar and bipolar scales.

Tables 4.6 and 4.7 provide the means and standard deviations for males and females according to gender and a unipolar response scale.

Table 4.6: Unipolar Satisfaction Means and Standard Deviations - Males (N = 126) & Females (N = 161)

Satisfaction - Males	Mean	SD	Satisfaction - Females	Mean	SD	Difference
Life as a whole	71.11	18.30	Life as a whole	74.16	16.57	-3.05
Standard of living	73.89	18.07	Standard of living	75.09	18.54	-1.20
Health	69.52	19.46	Health	70.94	20.83	-1.42
Achieve in life	72.38	17.91	Achieve in life	72.30	18.35	.08
Personal relationships	70.71	24.79	Personal relationships	79.25	19.28	-8.54
Safety	73.28	19.17	Safety	72.14	19.63	-1.14
Community connectedness	68.48	20.64	Community connectedness	73.23	20.78	-4.75
Future security	66.35	21.08	Future security	66.94	21.16	-.59
Personal Wellbeing Index	70.81	13.60	Personal Dissat. Index	72.77	14.56	-1.96
Life Satisfaction (agree)	71.86	19.26	Life Dissatisfaction (agree)	77.42	16.31	-5.56

Table 4.7: Unipolar Dissatisfaction Means and Standard Deviations – Males (N = 126) & Females (N=161)

Dissatisfaction - Males	Mean	SD	Dissatisfaction - Females	Mean	SD	Difference
Life as a whole	30.40	22.39	Life as a whole	24.18	18.66	6.22
Standard of living	27.44	20.04	Standard of living	24.28	20.30	3.16
Health	32.56	23.65	Health	30.00	22.45	2.56
Achieve in life	28.95	20.87	Achieve in life	28.10	19.49	.85
Personal relationships	31.05	27.10	Personal relationships	22.73	20.71	8.32
Safety	29.84	21.75	Safety	30.50	20.68	-.66
Community connectedness	30.08	21.12	Community connectedness	25.34	20.53	4.74
Future security	36.24	23.37	Future security	36.38	23.94	-.14
Personal Wellbeing Index	30.80	15.65	Personal Dissatisfaction Index	28.42	15.60	2.38
Life Satisfaction (agree)	27.89	22.84	Life Dissatisfaction (agree)	21.28	21.63	6.61

Slightly greater bipolarity is indicated in the responses provided by males. Significant differences exist between males and females on Satisfaction with Personal relationships $t(283) = -3.18$, $p<.005$, Life satisfaction using the Agree-Disagree Likert scale $t(271) = -2.52$, $p<.05$, and Life Dissatisfaction using the Agree-Disagree Likert Scale $t(277)=2.45$, $p<.05$. In general, females report higher satisfaction and lower dissatisfaction than males which is consistent with previous gender differences found in the Australian Unity Wellbeing Index (Cummins, et al., 2003). Females are more expressive of their satisfaction and dissatisfaction than males suggesting gender differences in affect reactivity.

These gender differences are further substantiated by the correlations presented in Table 4.8 below. Male and female Satisfaction and dissatisfaction correlations were converted into *z* values and observed *z* scores. Observed z scores not between -1.96 and +1.96 confirm the rejection of the null hypothesis and statistical difference between two correlations (Pallant, 2001). This confirmed that gender differences exist in the bipolarity of Life as a whole, Standard of living, Achievements in life, Personal relationships and Safety.

Table 4.8: Male and Female Satisfaction and Dissatisfaction Item Correlations

Variable	Males (N=126)	Z Score	Females (N=161)	Z Score	Observed Z Score
Life as a whole	-.74	-.950	-.60	-.693	-2.14
Standard of living	-.81	-1.127	-.69	-.848	-2.32
Health	-.78	-1.045	-.80	-1.099	0.45
Achieve in life	-.80	-1.099	-.64	-.758	-2.84
Personal relationships	-.92	-1.589	-.79	-1.071	-4.31
Safety	-.59	-.678	-.74	-.950	2.26
Community connectedness	-.73	-.929	-.74	-.950	0.17
Future security	-.71	-.887	-.79	-1.071	1.53
Personal Wellbeing & Personal Dissat. Index	-.86	-1.293	-.84	-1.221	-0.60
Life Satisfaction (agree) & Life Dissatisfaction (agree)	-.64	-.758	-.53	-.590	-1.40

In summary, bipolarity in life satisfaction and dissatisfaction is similar in males and females using a unipolar response scale. However, greater bipolarity was reported by males on five domains of life. This may be representative of male and female differences in conception and expression of affect and wellbeing.

4.4 DEPRESSION

It is hypothesised that life dissatisfaction is a better predictor of depression than life satisfaction. Therefore unipolar data were subjected to Multivariate Analysis of Variance, Analysis of Variance and Multiple Regression. The bipolar response scale data were not included because participants were not able to validly rate life dissatisfaction using this scale.

4.4.1 Multivariate Analysis of Variance for Depression

A one-way between groups MANOVA was performed on the seven domains of life satisfaction and dissatisfaction. The independent variable was the presence or absence of depression (DASS depression score > 9). A score of less than 10 on the DASS was found to represent up to the 78th percentile while a score of more than 10 represented the highest 22 percentiles (Lovibond & Lovibond, 1995). Total N of 297 was reduced to 273 due to missing data. With the use of Wilks' Lambda = .29, the combined dependent variables were significantly effected by depression: $F(14, 249) = 7.37$, $p < .001$; partial eta squared = .29. When the dependent variables were considered separately, all reached statistical significance using a Bonferroni adjusted alpha level of .004. An inspection of the mean scores, presented in Table 4.9 below, indicates that depressed participants reported lower levels of satisfaction and higher dissatisfaction with their lives. As expected, the Personal Wellbeing Index was also lower in depressed participants ($M=59.76$, $SD=15.40$), ($M=75.23$, $SD=11.49$), $t(283)=8.54$, $p<.001$.

Non-depressed individuals rated their dissatisfaction within a mean range of 20-30, with the exception of future security (M=32.36). Their satisfaction is higher than depressed participants with most scores ranging from 70-80, with future security the lowest score (M=71.86). Depressed participants recorded greater variation in their satisfaction scores with all mean dissatisfaction scores greater than 30. Satisfaction scores ranged from a high on safety (M=64.18) and low on future security (M=52.73). Their lowest mean score was on dissatisfaction with community connectedness (M=36.00). Dissatisfaction scores were approximately the reverse of satisfaction scores in both depressed and non-depressed individuals. This was pictorially represented in Figure 4.1 in an earlier section.

Strength of association measured by partial eta squared assesses the proportion of variance in scores of participants explained by the domains of life satisfaction and dissatisfaction. A partial eta squared of .01 describes a small effect, .06 a moderate effect and .14 a large effect (Pallant, 2001). Depression is best explained by the Satisfaction and Dissatisfaction domains of "Standard of living" and "Achieve in life" which have large effect sizes. In comparison, Satisfaction and Dissatisfaction with "Health" and Dissatisfaction with "Safety" and "Community Connectedness" have medium effect sizes. In general, similar satisfaction and dissatisfaction effect sizes suggest that both aspects are important to the prediction of depression as would be expected with bipolar constructs.

Table 4.9: Multivariate Analysis of Variance for Depression (N = 273)

Satisfaction Domains	Partial Eta Squared	Group	Mean	SD	p	N
Standard of living	.18	not depressed depressed	78.25 60.18	14.71 20.05	.000	218 55
Health	.05	not depressed depressed	73.39 63.27	17.64 22.53	.000	218 55
Achieve in life	.15	not depressed depressed	75.87 59.09	13.96 22.96	.000	218 55
Personal relationships	.09	not depressed depressed	78.12 61.27	18.83 28.61	.000	218 55
Safety	.06	not depressed depressed	75.32 64.18	17.73 20.34	.000	218 55
Community connectedness	.08	not depressed depressed	73.62 59.27	18.96 22.51	.000	218 55
Future security	.13	not depressed depressed	71.86 52.73	18.57 20.59	.000	218 55

Table 4.9: Multivariate Analysis of Variance for Depression (continued)

Dissatisfaction Domains	Partial Eta Squared	Group	Mean	SD	p	N
Standard of living	.20	not depressed	21.33	16.05	.000	218
		depressed	43.82	24.07		55
Health	.05	not depressed	27.75	20.50	.000	218
		depressed	40.55	25.92		55
Achieve in life	.19	not depressed	24.04	15.98	.000	218
		depressed	45.27	23.95		55
Personal relationships	.10	not depressed	23.21	20.92	.000	218
		depressed	42.36	29.63		55
Safety	.04	not depressed	27.52	19.45	.000	218
		depressed	38.18	21.70		55
Community connectedness	.04	not depressed	25.87	19.94	.001	218
		depressed	36.00	22.16		55
Future security	.07	not depressed	32.36	22.25	.000	218
		depressed	49.09	23.75		55

In summary, satisfaction and dissatisfaction with standard of living, and achievements in life produced the strongest association with the presence or absence of depression. In particular, it was dissatisfaction with these domains that had the greatest association with depression as hypothesized. Standard of living and achievements in life can be summarised as needs and aspirations or wants, and the results suggest that being dissatisfied with these aspects of life are the most important influences of the presence or absence of depression.

4.4.2 Standard Multiple Regression Analysis Predicting Depression by Dissatisfaction

Multivariate Analysis of Variance suggested the importance of the dissatisfaction domains in predicting depression. To further investigate the predictive power of the dissatisfaction domains a standard multiple regression was performed. This involved the dissatisfaction domains of standard of living, health, achieve in life, personal relationships, safety, community connectedness, future security, community connectedness and future security which were assessed as predictors of depression.

Table 4.10 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (7, 280) = 16.43, $p < .001$. Only two of the independent variables contributed significantly to prediction of depression scores, dissatisfaction with standard of living ($sr^2 = .18$) and dissatisfaction with achievements in life ($sr^2 = .17$). The seven independent variables in combination contributed another .23 in shared variability. Altogether, 29% (27% adjusted) of the variability in depression scores was predicted by knowing scores on these seven independent variables of dissatisfaction with life.

Although the correlation between depression and dissatisfaction with personal relationships was .36, it did not contribute significantly to regression. Post hoc evaluation of the correlation revealed that it was significantly different from zero $\underline{F}$ (7, 280) = 6.04, $p < .001$. Apparently, the relationship between depression and dissatisfaction with personal relationships is mediated by the relationships between depression, dissatisfaction with standard of living, and dissatisfaction with achievements in life.

Table 4.10: Standard Multiple Regression Analysis Predicting Depression by Dissatisfaction (N = 293)

Variable	Depression	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Standard of living	.47							-.09**	.27	.18
2. Health	.28	.52						-.01	.04	.03
3. Achieve in life	.45	.57	.38					-.07*	.22	.17
4. Personal rel/ships	.36	.40	.19	.49				-.04	.13	.11
5. Safety	.26	.52	.43	.43	.23			-.02	-.06	-.04
6. Comm. Connect	.27	.46	.33	.41	.43	.48		-.07	-.02	-.02
7. Future security	.34	.59	.35	.43	.38	.63	.45	.02	07	.05

* p<.005; ** p<.001 $R^2 = .29^a$
[a]Unique variability = .06; shared variability = .23 Adjusted $R^2 = .27$

This regression is consistent with the MANOVA where dissatisfaction with standard of living and achievements in life provide the greatest contribution to explaining depression. The results suggest that dissatisfaction with standard of living and achievements in life are extremely important and also highly correlated at .57. Being dissatisfied with these major aspects of life is an important predictor of depression. Following this analysis, a second multiple regression was performed to compare the prediction of depression by satisfaction.

4.4.3 Standard Multiple Regression Analysis Predicting Depression By Satisfaction

Four domains contribute significantly to the prediction of depression scores. These are satisfaction with achievements in life ($sr^2 = -.16$), personal relationships ($sr^2 = -.14$), standard of living ($sr^2 = -.11$) and future security ($sr^2 = -.11$). The seven independent variables in combination contributed another .23 in shared variability. Altogether, 30% (28% adjusted) of the variability in depression scores was predicted by knowing scores on these seven independent variables as presented in Table 4.11 below.

Table 4.11: Standard Multiple Regression Analysis for Variables Predicting Depression By Satisfaction (N = 293)

Variable	Depression	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Standard of living	-.44							-.06*	-.15	-.11
2. Health	-.28	.41						-.02	-.07	-.06
3. Achieve in life	-.46	.58	.37					-.08**	-.21	-.16
4. Personal rel/ships	-.36	.32	.12	.43				-.05**	-.17	-.14
5. Safety	-.27	.49	.40	.31	.20			.01	.03	.02
6. Comm. connect	-.30	.45	.28	.40	.43	.43		.01	.04	.03
7. Future security	-.43	.62	.43	.49	.61	.61	.59	-.06*	-.18	-.11

* p<.05; ** p<.005 $R^2 = .30^a$

[a]Unique variability = .07; shared variability = .23 Adjusted $R^2 = .28$

When dissatisfaction and satisfaction regressions are compared, semi-partial correlations are lower in the satisfaction regression. However, the satisfaction regression also indicates the importance of future security and personal relationships. The variance explained by the satisfaction and dissatisfaction regressions are approximately equal at 30% and 29%, yet the variance explained in the satisfaction regression occurs across more domains.

4.4.4 Standard Multiple Regression Analysis Predicting Depression By Satisfaction & Happiness

An additional exploratory investigation was conducted to investigate the influence of an affect item in the prediction of depression. A third multiple regression was conducted predicting depression scores by the independent variables of satisfaction with happiness in addition to the satisfaction domains.

Only two of the independent variables contributed significantly to prediction of depression scores: satisfaction with happiness (sr^2 = -.21) and satisfaction with achievements in life (sr^2 = -.17). Satisfaction with standard of living was no longer significant following the inclusion of satisfaction with happiness. The eight independent variables in combination contributed another .25 in shared variability. Altogether, 34% (32% adjusted) of the variability in depression scores was predicted by knowing scores on these eight independent variables as indicated in Table 4.12 below.

Although the correlation between depression and standard of living was -.43, and the correlation between depression and future security was -.41, neither standard of living or future security contributed significantly to regression. Post hoc evaluation of the correlation between depression and standard of living revealed that it was significantly different from zero $\underline{F}$ (8, 272) = 7.95, p < .001. Post hoc evaluation of the correlation between depression and future security also revealed that it was significantly different from zero $\underline{F}$ (8, 272) = 7.78, p < .001. Apparently, the relationship between depression and standard of living and

depression and future security is mediated by the relationships between satisfaction with achievements in life, happiness, and depression.

Table 4.12: Standard Multiple Regression Analysis for Variables Predicting Depression By Satisfaction and Happiness (N = 281)

Variable	Depression	1.	2.	3.	4.	5.	6.	7.	B	β	sr^2
1. Standard of living	-.43								-.04	-.11	-.08
2. Health	-.31	.43							-.03	-.08	-.08
3. Achieve in life	-.48	.59	.36						-.08**	-.23	-.17
4. Personal rel/ships	-.33	.30	.14	.44					.03	.09	.06
5. Safety	-.26	.47	.42	.33	.18				.01	.02	.02
6. Comm. connect	-.28	.43	.31	.41	.42	.42			.01	.05	.04
7. Future security	-.41	.61	.44	.50	.37	.61	.58		-.03	-.09	-.05
8. Happiness	-.49	.45	.28	.51	.75	.30	.44	.53	-.13***	-.35	-.21

** p<.005; *** p<.001 $R^2 = .34^a$

[a]Unique variability = .07; shared variability = .24 Adjusted $R^2 = .32$

In summary, satisfaction with happiness is the single strongest predictor of depression and explains the greatest unique variance in depression scores. This variable mediates the relationship between depression and satisfaction with standard of living and future security. This provides further support for the earlier dissatisfaction regression which found standard of living to be an important predictor of depression. Satisfaction with standard of living is related to happiness, and dissatisfaction with standard of living is an important predictor of depression. When happiness was included in a regression of depression scores, only satisfaction with happiness and achievements in life explained unique variance. Even though the majority of variance was explained by happiness, these domains explained less unique variance in depression scores than the satisfaction domains alone. The contribution of future security, standard of living and personal relationships is lessened when the affective term of happiness is included.

4.4.5 Analysis Of Variance Of Personal Wellbeing According To Depression Scores

SWB homeostasis suggests that Personal Wellbeing scores should remain at within a range of 70-80%SM, with an average of approximately 75.0 and standard deviation of 2.5 (Cummins, 1995, 1998, 2000a; Cummins, Gullone et al., 2002). Homeostasis of wellbeing is similar to the homeostasis of blood pressure, and is biologically controlled to remain within a biologically determined safe level to prevent disease such as stroke. Similarly, when homeostasis is activated, SWB or Personal Wellbeing is controlled within a safe level of 70-80 and extrinsic factors have little influence. However, if the homeostatic model faces defeat, then extrinsic conditions become a dominating force, defeat homeostasis and control Personal Wellbeing. Only in extreme conditions will such objective changes produce changes in Personal Wellbeing otherwise homeostasis remains active. Severe depression is argued as being such an

extreme influence of Personal Wellbeing and Analysis of Variance was conducted to investigate this theory.

As explained earlier in Section 4.4.1, Lovibond & Lovibond (1995) found that in their normative data, a DASS depression score of less than 10 represented up to the 78th percentile, while a score of more than 10 represented the highest 22 percentiles. A depression severity rating of 0-9 is described as normal, 10-13 as mild, 14-20 as moderate, 21-27 as severe, and 28 or greater as extremely severe. Considering that the bulk of responses are expected to fall below a score of 10, five depression score categories were created according to severity of depression and include those with a score of 0, 1-5, 6-10, 11-15 and 16 or greater. Frequencies for the categories and means and standard deviations for Personal Wellbeing are presented in Table 4.13 below.

Table 4.13: Personal Wellbeing Mean Scores According to DASS Depression Scores (N=285)

Depression Scores	PWB Mean Score	PWB SD	N
0	79.37	13.39	64
1-5	74.51	10.19	121
6-10	69.23	11.45	56
11-15	67.81	11.68	15
16+	53.00	15.10	29

A one-way between groups analysis of variance was conducted to explore the impact of DASS depression scores on levels of Personal Wellbeing. There was a statistically significant difference at the $p<.001$ level in Personal Wellbeing scores for the five depression groups according to the Welch statistic [Welch (4, 280) = 18.64, $p = .000$]. The Welch statistic is preferable to the F statistic when the assumption of equal variances does not hold. Post-hoc comparisons using the Dunnett T3 indicated that the mean score for those with depression scores of 16 ($p<.001$) or greater were significantly different from all other depression score groups. In addition, those with depression scores ranging from 6-10 ($p<.001$) and 11-15 ($p<.05$) were also significantly different from those with depression scores of 0.

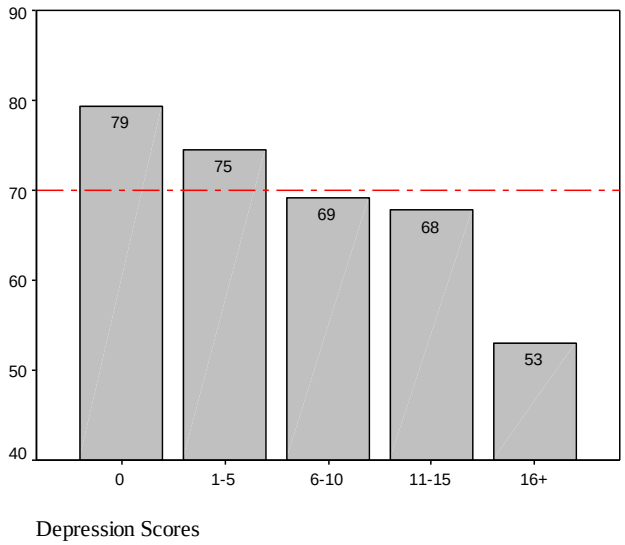


Figure 4.2: Personal Wellbeing and Depression Scores In Reference to Homeostasis

Presenting the Personal Wellbeing means according to depression scores in Figure 4.2 indicates an inability for severely depressed individuals to maintain SWB homeostasis. The dotted reference line indicates the approximate Personal Wellbeing homeostasis point of 70 suggested by Cummins (1995; 1998; 2000) and Cummins, Gullone & Lau (2002) and the group mean for depression scores greater than 6 indicates a struggle to maintain Personal Wellbeing homeostasis. Frequencies for these DASS depression scores within the depression categories are presented below in Table 4.14.

Table 4.14: Frequencies of DASS Depression Scores (N=293)

Depression Category	% of Total N	DASS Depression Scores	N
0	22.9	0	67
1-5	42.3	2	78
		4	46
6-10	19.5	6	29
		8	13
		10	15
11-15	5.1	12	7
		14	8
16+	12.3	16	6
		18	3
		20	3
		22	8
		24	2
		26	4
		28	1
		30	1
		32	1
		34	1
		36	6

DASS depression scores represent a continuum of depression severity. A score of 10 or more represents mild depression, and a score greater than 6 is above the mean for all age groups in normative data (Lovibond & Lovibond, 1995). Homeostasis is struggling to be maintained, with low DASS depression scores indicative of low to moderate levels of depression. Personal Wellbeing is close to 70 in this group, the lower end of the proposed homeostasis range. Thus, it appears that homeostasis is acting to prevent further falls in wellbeing despite low to moderate depression. This is supported by the data because Personal Wellbeing scores are similar in those with depression scores of between 6-10 (M= 69.23) and 11-15 (M=67.81).

A depression score of 16 or more on the DASS represents moderate to severe depression and high levels of depression are an important predictor of homeostasis failure in Personal Wellbeing. The homeostatic mechanism cannot withstand high levels of depression and the buffers of habituation and personality are unable to safeguard against the effects of moderate to severe depression, resulting in a dramatic decline of Personal Wellbeing. Furthermore, the distributions of Personal Wellbeing scores are flatter in the middle three categories of participants (depression scores of 1-5, 6-10 and 11-15) than those with the highest or lowest depression scores. This is explained by the range of the scores in the categories and is presented below in Table 4.15 according to percentages above and below Personal Wellbeing scores of 65. The table suggests that there is greater variability in the Personal Wellbeing scores of those with low to moderate levels of depression, presumably when greatest struggle begins in maintaining homeostasis. Less variability is evident in the group without depression as only a small percent of participants report low Personal Wellbeing. Similarly, in the category with high depression scores of greater than 16, few participants are able to maintain a Personal Wellbeing score greater than 65. All of these factors result in greater variation in the highest and lowest groups while less variation exists in the low to moderately depressed groups.

Table 4.15: DASS Depression Group Categories According to a 65 Point Cut Off (N=293)

Depression Scores	% Within Category of <65 PWB	% Within Category of >65 PWB
0	11.9	88.1
1-5	14.0	86.0
6-10	28.6	71.4
11-15	33.3	66.6
16+	75.9	24.1

Table 4.15 also reveals that 11.9% of individuals report low Personal Wellbeing (<65) yet have not reported any symptoms of depression. Likewise, 24.1% report high Personal Wellbeing (>65) while reporting moderate to severe depression. These results suggest that even though the marker of Personal Wellbeing homeostasis generally remains within the range of 70-80, individual differences do emerge within group data. That is, the set point of homeostasis for some

individuals may differ from the majority of the population. Regardless of the Personal Wellbeing homeostatic set point level, a significant decrease from the usual set point will cause an increase in depressive symptomatology.

Average levels of Personal Wellbeing within an approximate 70-80 range can be maintained in the absence, or with low levels, of depressive symptomatology. Once Personal Wellbeing falls below 70, homeostatic devices act to prevent further falls. Scores of those with high levels of depression have significantly lower Personal Wellbeing with a mean of 53.00. These results suggest that Personal Wellbeing homeostasis can withstand low to moderate levels of depression but fails with high levels of depression causing a rapid decrease in Personal Wellbeing.

4.4.6 Depression, Self-Esteem, Pessimism, Optimism and Personal Wellbeing

Homeostasis of Personal Wellbeing is strongly influenced by depression. However, little is known about the relationships between depression and Personal Wellbeing, with pessimism, optimism and self-esteem. An exploratory regression was conducted to investigate the relationships between these variables.

Table 4.16 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, $F(4, 269) = 32.23$, $p < .001$. Three of the independent variables contributed significantly to prediction of Personal Wellbeing scores, depression ($sr^2 = -.31$) pessimism ($sr^2 = -.17$) and optimism ($sr^2 = .18$). Self-esteem was not an important predictor of Personal Wellbeing and the four independent variables in combination contributed another .16 in shared variability. Altogether, 32% (31% adjusted) of the variability in Personal Wellbeing scores was predicted by knowing scores on these independent variables.

Table 4.16: Standard Multiple Regression Analysis Predicting Personal Wellbeing by Self-Esteem, Optimism, Pessimism and Depression (N = 273)

Variable	Personal Wellbeing	1.	2.	3.	B	β	sr^2
1. Self-Esteem	-.11				.04	.01	.01
2. Optimism	.34	-.01			1.20**	.16	.15
3. Pessimism	-.34	.17	-.24		-.68*	-.12	-.11
4. Depression	-.53	.10	-.19	.34	-.87***	-.43	-.38

* p<.01; ** p<.005; *** p<.001 $R^2 = .32^a$

[a]Unique variability = .05; shared variability = .21 Adjusted $R^2 = .31$

Depression is a more powerful predictor of Personal Wellbeing than pessimism and optimism, and self-esteem contributes little towards the prediction of Personal Wellbeing. The oppositely signed correlations between optimism and pessimism with Personal Wellbeing support the suggestion by Lai (1994) of positive and negative subscales in the Life Orientation Test. Even though a

moderate correlation exists between depression and pessimism, depression is the best predictor of Personal Wellbeing and the inclusion of optimism, pessimism, and self-esteem, provides little more information.

In summary, depression severity is as an important influence of Personal Wellbeing homeostasis. Considering the negative thought patterns associated with depression it is not surprising that depression and pessimism are moderately correlated. However, in comparison to depression, pessimism, optimism and self-esteem are less important in the prediction of Personal Wellbeing. In general, Personal Wellbeing homeostasis can be maintained with low levels of depressive symptomatology, but is likely to fail with moderate to severe levels of depression. Population Personal Wellbeing homeostasis generally remains within an approximate range of 70-80 set point, but individual differences exist. In general, a dramatic decrease from the 70-80 range is suggested with high levels of depression. However, depression might also be associated with any major decrease in Personal Wellbeing regardless of an individual's personal set point but longitudinal data is necessary to confirm this. Thus, a miserable person needs to become more miserable to report depressive symptomatology, even though their original Personal Wellbeing score may fall below 65. In contrast, a very happy person may report depressive symptomatology with a Personal Wellbeing score of 70 because it resulted with a dramatic decline from their usual Personal Wellbeing score of 85.

4.5 ANXIETY

To further investigate the relationship between negative affect, life satisfaction and dissatisfaction, additional analyses were conducted on the prediction of anxiety. It is hypothesised that life dissatisfaction is a better predictor of anxiety than life satisfaction.

4.5.1 Multivariate Analysis Of Variance Of Anxiety

A one-way between groups MANOVA was performed on seven domains of life satisfaction and life dissatisfaction. The independent variable was the presence or absence of anxiety (DASS anxiety score > 7). A DASS anxiety score of 8-9 indicates the presence of at least mild anxiety, while scores greater than 10 indicate moderate to severe anxiety (Lovibond & Lovibond, 1995). Total N of 297 was reduced to 270 due to missing data. With the use of Pillai's Trace = .23, the combined dependent variables were significantly effected by anxiety: $\underline{F}(14, 255) = 5.31$, $\underline{p} < .001$; partial eta squared = .23. When the dependent variables were considered separately, all reached statistical significance using a Bonferroni adjusted alpha level of .004. An inspection of the mean scores indicates that anxious participants reported lower levels of satisfaction and higher dissatisfaction with their lives.

Anxiety is best explained by the Satisfaction and Dissatisfaction domains of "Standard of living", and Dissatisfaction with "Health" which suggest a moderate to large effect size as indicated by the partial eta squared values in Table 4.17.

Table 4.17: Multivariate Analysis of Variance for Anxiety (N = 270)

Satisfaction domains	**Partial Eta Squared**	**Group**	**Mean**	**SD**	**p**	**N**
Standard of living	.13	not anxious	77.23	15.52	.000	231
		anxious	58.97	20.62		39
Health	.12	not anxious	74.16	17.12	.000	231
		anxious	55.64	22.92		39
Achieve in life	.07	not anxious	74.37	15.59	.000	231
		anxious	61.03	23.15		39
Personal relationships	.03	not anxious	76.23	20.87	.000	231
		anxious	65.13	27.52		39
Safety	.08	not anxious	75.19	18.08	.000	231
		anxious	60.26	18.42		39
Community connectedness	.07	not anxious	72.94	19.80	.000	231
		anxious	57.18	20.25		39
Future security	.12	not anxious	70.26	18.79	.000	231
		anxious	50.26	21.09		39

Dissatisfaction domains	**Partial Eta Squared**	**Group**	**Mean**	**SD**	**p**	**N**
Standard of living	.15	not anxious	22.64	17.65	.000	231
		anxious	44.36	22.80		39
Health	.13	not anxious	27.10	20.40	.000	231
		anxious	49.49	24.06		39
Achieve in life	.09	not anxious	25.97	18.41	.000	231
		anxious	42.82	21.64		39
Personal relationships	.05	not anxious	24.98	22.69	.004	231
		anxious	40.51	20.74		39
Safety	.10	not anxious	27.06	19.20	.000	231
		anxious	45.13	20.63		39
Community connectedness	.10	not anxious	25.37	19.20	.000	231
		anxious	44.10	22.91		39
Future security	.10	not anxious	33.55	22.23	.000	231
		anxious	54.62	22.81		39

Satisfaction and dissatisfaction with standard of living, and health and satisfaction with future security produced the strongest association with the presence or absence of anxiety. Strength of association for the dissatisfaction domains of standard of living and health were slightly greater than the strength of association for the satisfaction domains. Once again dissatisfaction with standard of living was a predictor of anxiety as well as depression in Section 4.4. Dissatisfaction with standard of living might be an important domain because if an individual is less satisfied with their immediate and everyday environment it heightens their level of worry.

4.5.2 Standard Multiple Regression Analysis Predicting Anxiety By Satisfaction

Multivariate Analysis of Variance suggested the importance of standard of living, health and future security in predicting anxiety. To further investigate the predictive power of the satisfaction domains a standard multiple regression was performed. This involved the satisfaction domains of standard of living, health, achieve in life, personal relationships, safety, community connectedness and future security, which were assessed as predictors of anxiety.

Table 4.18 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (7, 276) = 14.02, p < .001. Only two of the independent variables contributed significantly to prediction of anxiety scores, satisfaction with standard of living (sr^2 = -.14) and health (sr^2 = -.17). The seven independent variables in combination contributed another .21 in shared variability. Altogether, 26% (24% adjusted) of the variability in anxiety scores was predicted by knowing scores on these seven independent variables of dissatisfaction with life.

Although the correlation between anxiety and satisfaction with future security was -.40, yet it did not contribute significantly to the regression. Post hoc evaluation of the revealed that it was significantly different from zero F (7, 273) = 6.57, p < .001. Apparently, the relationship between anxiety and future security is mediated by the other domains of satisfaction.

Table 4.18: Standard Multiple Regression Analysis Predicting Anxiety by Satisfaction (N = 284)

Variable	Anxiety	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Standard of living	-.44							.06*	-.21	-.14
2. Health	-.39	.42						.05**	-.20	-.17
3. Achieve in life	-.34	.60	.37					.03	-.09	-.06
4. Personal rel/ships	-.13	.33	.12	.43				.02	.07	.06
5. Safety	-.35	.50	.40	.32	.21			.02	-.07	-.06
6. Comm. Connect	-.29	.46	.28	.40	.43	.44		.01	-.04	-.03
7. Future security	-.40	.64	.43	.50	.38	.60	.60	.03	-.10	-.06

* p<.01; ** p<..005 R^2 = .26[a]

[a]Unique variability = .05; shared variability = .21 Adjusted R^2 = .24

This regression is consistent with the previous anxiety of MANOVA where satisfaction with health and standard of living were found to be the best predictors of anxiety. Satisfaction with future security was not a significant predictor of anxiety even though MANOVA suggested the importance of the domain.

An earlier regression found that satisfaction with happiness was the best predictor of depression scores. Considering this, a further exploratory regression was

conducted including the affect item of happiness in addition to the satisfaction domains in Table 4.18 to investigate the ability of the affect term to predict anxiety scores.

4.5.3 Standard Multiple Regression Analysis Predicting Anxiety By Satisfaction & Happiness

Table 4.19 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (8, 273) = 12.38, $p < .001$. Only two of the independent variables contributed significantly to prediction of anxiety scores, satisfaction with standard of living (sr^2 = -.13.) and health (sr^2 = -.16). Satisfaction with happiness was not a significant predictor of anxiety. The eight independent variables in combination contributed another .22 in shared variability. Altogether, 26% (25% adjusted) of the variability in anxiety scores was predicted by knowing scores on these eight independent variables.

Once more, the correlation between anxiety and satisfaction with future security was -.40, but did not contribute significantly to the regression. Post hoc evaluation revealed that future security was significantly different from zero F (8, 273) = 6.50, $p < .001$, and it appears that the relationship between anxiety and future security is mediated or redundant to the variance explained by the other domains of satisfaction.

Table 4.19: Standard Multiple Regression Analysis for Variables Predicting Anxiety By Satisfaction and Happiness (N = 282)

Variable	Anxiety	1.	2.	3.	4.	5.	6.	7.	B	β	sr^2
1. Standard of living	-.44								-.06*	-.20	-.13
2. Health	-.39	.42							-.05**	-.18	-.16
3. Achieve in life	-.31	.60	.37						-.02	-.08	-.06
4. Personal rel/ships	-.12	.33	.11	.43					.04	.16	.09
5. Safety	-.34	.50	.40	.32	.20				-.02	-.07	.06
6. Comm. connect	-.29	.46	.28	.40	.43	.44			-.01	-.04	.03
7. Future security	-.40	.63	.43	.50	.38	.60	.60		-.02	-.08	-.05
8. Happiness	-.27	.49	.26	.50	.78	.31	.31	.54	-.03	-.12	-.07

** p<..005; *** p<.05 $R^2 = .26^a$

[a]Unique variability = .04; shared variability = .22 Adjusted $R^2 = .25$

Anxiety scores were best predicted by satisfaction with health and standard of living. Despite the ability of satisfaction with happiness to be an important predictor of depression, it was not an important predictor of anxiety.

4.5.4 Standard Multiple Regression Analysis Predicting Anxiety By Dissatisfaction

Finally, the dissatisfaction domains were investigated as predictors of anxiety. Table 4.20 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (7, 281) = 11.57, p < .001. Only two of the independent variables contributed significantly to prediction of depression scores, dissatisfaction with standard of living (sr^2 = .13) and dissatisfaction with health (sr^2 = .14). The seven independent variables in combination contributed another .19 in shared variability. Altogether, 23% (21% adjusted) of the variability in anxiety scores was predicted by knowing scores on these seven independent variables of dissatisfaction with life.

Although the correlation between depression and dissatisfaction with achievements in life was .36, it did not contribute significantly to regression. Post hoc evaluation of the correlation revealed that it was significantly different from zero F (7, 280) = 5.76, p < .001. Apparently, the relationship between anxiety and dissatisfaction with achievements in life is mediated by the relationships between anxiety and the other dissatisfaction variables.

Table 4.20: Standard Multiple Regression Analysis Predicting Anxiety by Dissatisfaction (N = 279)

Variable	Anxiety	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Standard of living	.42							.05*	.19	.13
2. Health	.37	.53						.04**	.17	.14
3. Achieve in life	.36	.63	.40					.02	.09	.07
4. Personal rel/ships	.24	.42	.22	.51				.06	.03	.02
5. Safety	.32	.53	.47	.41	.23			.01	.05	.03
6. Comm. Connect	.32	.50	.34	.45	.43	.52		.02	.08	.06
7. Future security	.31	.58	.38	.46	.38	.63	.47	.03	.02	.01

* p<.05; ** p<..01 R^2 = .23[a]

[a]Unique variability = .04; shared variability = .23 Adjusted R^2 = .21

Anxious individuals reported lower levels of satisfaction and were considerably more dissatisfied with their lives than those who were not anxious. Satisfaction and dissatisfaction with health and standard of living were the best predictors of anxiety symptomatology. Satisfaction with happiness was not an important predictor of anxiety.

4.5.5 Analysis Of Variance Of Personal Wellbeing According To Anxiety Scores

In section 4.3.4, evidence was provided for the theory of SWB homeostasis (Cummins, 1995, 1998, 2000a; Cummins, Gullone et al., 2002). Personal Wellbeing was maintained with low levels of depression but dramatically decreased with moderate to high levels of depression. Analysis of variance of Personal Wellbeing according to anxiety scores was also completed to investigate the influence of anxiety on SWB homeostasis.

Normative values of anxiety were calculated by Lovibond & Lovibond (1995) through the use of Z scores. DASS anxiety scores ranging from 0-7 indicate normal levels of anxiety, 8-9 mild, 10-14 moderate, 15-19 severe and 20 or greater extremely severe. Anxiety levels were categorised into the same severity ratings as depression scores to assist with comparison of the depression and anxiety results and frequencies are presented below in Table 4.21.

Table 4.21: Personal Wellbeing Mean Scores According to DASS Anxiety Scores (N=293)

Anxiety Scores	PWB Mean Score	PWB SD	N
0	76.12	13.71	112
1-5	73.81	9.96	108
6-10	65.93	12.41	43
11-15	63.52	11.88	16
16+	48.47	21.96	14

An increase in anxiety symptomatology is associated with a decrease in Personal Wellbeing. A statistically significant difference is indicated at the $p<.001$ level in Personal Wellbeing scores for the five anxiety groups according to the Welch statistic [Welch (4, 279) = 11.04, $\underline{p}$ = .000]. Post-hoc comparisons using the Dunnett T3 indicated that the mean score for those with anxiety scores of 0 or 1-5 were significantly different from those with scores of 6-10, 11-15 or 16 or greater ($\underline{p}<.001$).

A higher standard deviation is present in Personal Wellbeing scores of those with anxiety scores of 16 or greater. This is because three individuals within this group rated their Personal Wellbeing as above 65 despite high levels of anxiety and highlights the individuality of responses within group data. Thus, homeostasis of SWB is subject to individual difference and the homeostasis cut off point of 70 is only estimation within group data. The increased variation of Personal Wellbeing scores in this group also helps to explain why post hoc analyses do indicate significant difference between the groups reporting anxiety within the 11-15 and 16 or greater categories, particularly with smaller sample sizes.

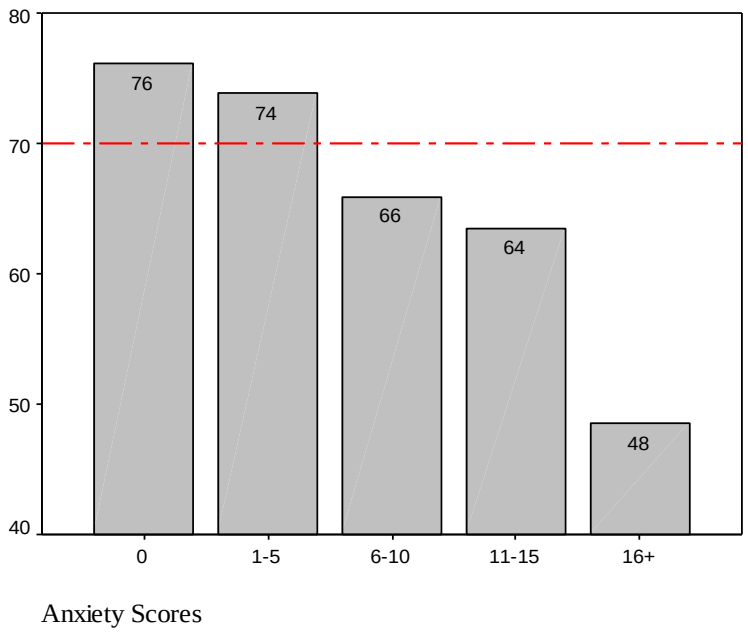


Figure 4.3: Personal Wellbeing and Anxiety Scores In Reference to Homeostasis

Presenting Personal Wellbeing mean scores according to anxiety in Figure 4.3 indicates an inability for severely anxious individuals to maintain SWB homeostasis. The dotted reference line indicates the approximate Personal Wellbeing homeostasis point of 70 suggested by Cummins (1995; 1998; 2000). Personal Wellbeing mean scores decrease slowly with mild to moderate anxiety but remain within approximate homeostasis. A marked decrease in Personal Wellbeing occurs with severe anxiety in the 16 or greater category and homeostasis fails for the majority (79%) of individuals within this category. A similar trend exists in the depression results presented in Figure 3.2 and homeostasis is maintained with low levels of depression, but cannot withstand high and severe levels of depression.

4.5.6 Anxiety, Self-Esteem, Pessimism, Optimism and Personal Wellbeing

The above results suggest that anxiety is an important influence of Personal Wellbeing homeostasis. To further investigate the predictive ability of anxiety, additional independent variables of self-esteem, pessimism and optimism were included in a regression. Earlier results in Section 4.4.5 suggested strong correlation between depression and pessimism. If anxious individuals worry, they too, may have a pessimistic view on life. To test this, an exploratory regression was conducted to investigate the relationships between a Personal Wellbeing, anxiety, optimism, pessimism and self-esteem.

Table 4.22 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (4, 276) = 28.56, $p < .001$. Three of the independent variables contributed significantly to prediction of Personal Wellbeing scores, anxiety (sr^2 = -.34) pessimism (sr^2 = -.19) and optimism (sr^2 = .16). Self-esteem was not an important predictor of Personal Wellbeing and the four independent variables in combination contributed another .12 in shared variability. Altogether, 29% (28% adjusted) of the variability in Personal Wellbeing scores was predicted by knowing scores on these independent variables.

Table 4.22: Standard Multiple Regression Analysis Predicting Personal Wellbeing by Self-Esteem, Optimism, Pessimism and Anxiety (N = 280)

Variable	Personal Wellbeing	1.	2.	3.	B	β	Sr^2
1. Self-Esteem	-.12				-.23	-.05	.05
2. Optimism	.27	.00			1.23**	.16	.16
3. Pessimism	-.37	.16	-.24		-1.13*	-.20	-.18
4. Anxiety	-.46	.10	-.17	.33	-.95*	-.36	-.34

* p< .001; ** p<.005 R^2 = .29[a]
[a]Unique variability = .17; shared variability = .12 Adjusted R^2 = .28

Anxiety is a more powerful predictor of Personal Wellbeing than pessimism, optimism and self-esteem. Again, the oppositely signed correlations between optimism and pessimism with Personal Wellbeing support Lai's (1994) argument for positive and negative subscales in the Life Orientation Test. Even though anxiety and pessimism correlate reasonably strongly at .33, anxiety is the best predictor of Personal Wellbeing. The inclusion of optimism, pessimism, and self-esteem, provide little more information for the prediction of Personal Wellbeing.

In summary, anxious individuals reported lower levels of satisfaction and were considerably more dissatisfied with their lives than those who were not anxious. The domains of satisfaction and dissatisfaction with standard of living and health are the most important predictors of anxiety. Satisfaction with happiness was not a significant predictor of anxiety despite the importance of the domain in the prediction of depression. Self-esteem, optimism and pessimism were also less important than anxiety in predicting Personal Wellbeing. Furthermore, moderate to severe levels of anxiety are associated with the failure of Personal Wellbeing homeostasis, though such wellbeing can be maintained with low levels of anxiety.

4.6 STRESS

Section 4.4 and 4.5 indicate that anxiety and depression are associated with decreased satisfaction and increased dissatisfaction in Personal Wellbeing. It is also hypothesised that life dissatisfaction is a better predictor of stress than life satisfaction. This hypothesis was investigated through the use of the Multivariate Analysis of Variance below.

4.6.1 Multivariate Analysis Of Variance Of Stress

A one-way between groups multivariate analysis of variance was performed on seven domains of life satisfaction and seven domains of life dissatisfaction. The independent variable was the presence or absence of stress (DASS stress score > 14). A DASS stress score of 15-18 indicates the presence of at least mild stress, 19-25 moderate, 26-33 severe, and 34 or greater indicate extremely severe stress (Lovibond & Lovibond, 1995). Total N of 287 was reduced to 270 due to missing data. With the use of Pillai's Trace = .22, the combined dependent variables were significantly effected by stress: $F(14, 255) = 5.26$, $p < .001$; partial eta squared = .22. When the results for the dependent variables were considered separately, all dependent variables reached statistical significance using a Bonferroni adjusted alpha level of .004, with the exception of Satisfaction with "Health". An inspection of the mean scores indicated that stressed participants reported lower levels of satisfaction and higher dissatisfaction with their lives.

Stress is best explained by the dissatisfaction and satisfaction domain of "Standard of living" with a strong to moderately strong effect size.

Table 4.23: Multivariate Analysis of Variance for Stress (N = 270)

Satisfaction domains	Partial Eta Squared	Group	Mean	SD	p	N
Standard of living	.12	not stressed	77.54	15.35	.002	224
		stressed	61.52	20.87		46
Health	.02	not stressed	72.68	18.22	.013	224
		stressed	65.00	22.68		46
Achieve in life	.07	not stressed	74.64	15.24	.000	224
		stressed	62.83	23.16		46
Personal relationships	.10	not stressed	77.95	19.71	.000	224
		stressed	59.78	26.71		46
Safety	.09	not stressed	75.80	17.13	.000	224
		stressed	60.65	21.44		46
Community connectedness	.07	not stressed	73.30	18.91	.000	224
		stressed	58.48	23.66		46
Future security	.10	not stressed	70.36	18.84	.000	224
		stressed	53.48	21.52		46

Table 4.23: Multivariate Analysis of Variance for Stress (continued)

Dissatisfaction domains	Partial Eta Squared	Group	Mean	SD	p	N
Standard of living	.16	not stressed	22.19	16.94	.000	224
		stressed	43.04	24.39		46
Health	.04	not stressed	28.26	21.16	.001	224
		stressed	40.65	25.33		46
Achieve in life	.11	not stressed	25.22	17.41	.000	224
		stressed	42.17	23.56		46
Personal relationships	.10	not stressed	23.44	21.87	.000	224
		stressed	43.48	26.85		46
Safety	.06	not stressed	27.23	19.21	.000	224
		stressed	40.65	22.05		46
Community connectedness	.04	not stressed	25.98	19.73	.001	224
		stressed	36.96	23.46		46
Future security	.07	not stressed	33.53	22.34	.000	224
		stressed	50.00	23.85		46

Stressed individuals are more dissatisfied and less satisfied with all the domains of their lives. Dissatisfaction and satisfaction with standard of living produced the strongest association with the presence or absence of stress. A particularly strong association exists between dissatisfaction with standard of living and stress, and the same domain had the strongest association with depression and anxiety in the earlier analyses presented in Sections 4.4 and 4.5.

4.6.2 Standard Multiple Regression Analysis Predicting Anxiety By Satisfaction

Multivariate Analysis of Variance suggested the importance of satisfaction and dissatisfaction with the domains of standard of living. To further investigate the predictive power of the satisfaction domains a standard multiple regression was performed. This involved the satisfaction domains of standard of living, health, achieve in life, personal relationships, safety, community connectedness, future security which were assessed as predictors of stress.

Table 4.24 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (7, 275) = 9.88, $p < .001$. Only one of the independent variables contributed significantly to prediction of stress scores, satisfaction with standard of living (sr^2 = -.13). The seven independent variables in combination contributed another .18 in shared variability. Altogether, 20% (18% adjusted) of the variability in stress scores was predicted by knowing scores on these seven independent variables of satisfaction with life.

Although the correlation between stress and satisfaction with future security was -.35, yet it did not contribute significantly to the regression. Post hoc evaluation of the revealed that it was significantly different from zero $\underline{F}$ (7, 283) = 5.34, p < .001. Apparently, the relationship between stress and future security is mediated by the other domains of satisfaction.

Table 4.24: Standard Multiple Regression Analysis Predicting Stress by Satisfaction (N = 283)

Variable	Stress	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Standard of living	-.38							-.07*	-.18	.13-
2. Health	-.25	.43						-.02	-.04	-.04
3. Achieve in life	-.31	.59	.38					-.03	-.07	-.05
4. Personal rel/ships	-.26	.31	.13	.42				-.03	-.09	-.08
5. Safety	-.32	.49	.43	.31	.20			-.04	-.12	-.09
6. Comm. Connect	-.32	.45	.28	.39	.42	.44		-.03	-.10	-.08
7. Future security	-.35	.64	.42	.49	.39	.61	.60	-.04	-.01	-.01

* p<.05 R^2 = .20[a]

[a]Unique variability = .02; shared variability = .18 Adjusted R^2 = .18

This regression is consistent with the previous stress MANOVA indicating the importance of satisfaction with standard of living and the presence or absence of stress.

Earlier analyses investigated the predictive ability of the affect item satisfaction with happiness as a predictor of depression and anxiety. Happiness was important in the prediction of depression scores but not in the prediction of anxiety scores. Considering this, a further exploratory regression was conducted including the affect item of happiness in addition to the satisfaction domains above.

4.6.3 Standard Multiple Regression Analysis Predicting Stress By Satisfaction & Happiness

Table 4.25 displays the unstandardised regression coefficients ($\underline{B}$) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and $\underline{R}^2$ and adjusted $\underline{R}^2$. The $\underline{R}$ for the regression was significantly different from zero, $\underline{F}$ (8, 272) = 9.96, p < .001. Only satisfaction with happiness contributed significantly to the prediction of stress scores (sr^2 = -.16). The eight independent variables in combination contributed another .20 in shared variability. Altogether, 23% (20% adjusted) of the variability in anxiety scores was predicted by knowing scores on these eight independent variables.

The correlation between stress and satisfaction with standard of living was -.39, however, it did not contribute significantly to the regression. Post hoc evaluation of the revealed that it was significantly different from zero $\underline{F}$ (8, 273) = 6.50, p < .001 and it appears that the relationship between stress and standard of living is mediated or redundant to the variance explained by the other domains of satisfaction.

Table 4.25: Standard Multiple Regression Analysis for Variables Predicting Stress By Satisfaction and Happiness (N = 282)

Variable	Stress	1.	2.	3.	4.	5.	6.	7.	B	β	sr^2
1. Standard of living	-.39								-.06	-.15	-.10
2. Health	-.24	.43							-.01	-.03	-.02
3. Achieve in life	-.31	.59	.38						-.02	-.05	-.04
4. Personal rel/ships	-.25	.32	.13	.42					.03	.11	.06
5. Safety	-.32	.49	.42	.31	.20				-.04	-.12	-.09
6. Comm. connect	-.32	.46	.28	.39	.43	.44			-.04	-.10	-.08
7. Future security	-.35	.63	.42	.49	.39	.61	.60		-.01	.03	.02
8. Happiness	-.38	.49	.25	.49	.78	.32	.46	.53	-.11*	-.29	-.16

* p<.005 $R^2 = .23^a$

[a]Unique variability = .03; shared variability = .20 Adjusted $R^2 = .20$

Of all the satisfaction domains, stress was best predicted by satisfaction with standard of living. However, when satisfaction with happiness was included in this regression, standard of living was not longer significant and satisfaction with happiness was the best predictor of stress scores. Furthermore, including happiness explained an additional 3% of the variance in stress scores.

4.6.4 Standard Multiple Regression Analysis Predicting Stress By Dissatisfaction

Finally, the dissatisfaction domains were investigated as predictors of stress. Table 4.26 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (7, 272) = 11.06, p < .001. Only one of the independent variables contributed significantly to prediction of stress scores, dissatisfaction with standard of living (sr^2 = .18). The seven independent variables in combination contributed another .19 in shared variability. Altogether, 22% (20% adjusted) of the variability in stress scores was predicted by knowing scores on these seven independent variables of dissatisfaction with life.

Table 4.26: Standard Multiple Regression Analysis Predicting Stress by Dissatisfaction (N = 280)

Variable	Stress	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Standard of living	.43							.09	.26	.18
2. Health	.28	.53						.01	.03	.02
3. Achieve in life	.34	.57	.41					.02	.07	.05
4. Personal rel/ships	.28	.41	.23	.47				.03	.10	.08
5. Safety	.34	.52	.48	.40	.22			.04	.13	.09
6. Comm. Connect	.30	.48	.34	.42	.42	.51		.01	.03	.02
7. Future security	.32	.58	.38	.43	.38	.62	.46	.02	.02	.01

* p<.03; ** p<..01 $R^2 = .22^a$

[a]Unique variability = .04; shared variability = .19 Adjusted $R^2 = .20$

Dissatisfaction with standard of living was the best predictor of stress. It was also the best predictor of stress in the regression of the satisfaction domains and all analyses suggest the importance of this area of Personal Wellbeing.

4.6.5 Analysis Of Variance Of Personal Wellbeing According To Stress Scores

In section 4.3.4, evidence was provided for the theory of SWB homeostasis (Cummins, 1995, 1998, 2000a; Cummins, Gullone et al., 2002). Personal Wellbeing was maintained with low levels of depression but dramatically decreased with moderate to high levels of depression. Analysis of variance of Personal Wellbeing according to anxiety scores was also completed to investigate the influence of anxiety on SWB homeostasis.

Normative values of stress were calculated by Lovibond & Lovibond (1995) through the use of Z scores. DASS stress scores ranging from 0-14 indicate normal levels of stress, 15-18 mild, 19-25 moderate, 26-33 severe and 34 or greater extremely severe. Stress levels were categorised similar to the categories of depression and anxiety. However, an additional category was included because of the higher scores and greater range of scores in the DASS stress scores. The frequencies and categories are presented below in Table 4.27.

Table 4.27: Personal Wellbeing Mean Scores According to DASS Stress Scores (N=283)

Stress Scores	PWB Mean Score	PWB SD	N
0	80.10	13.70	28
1-5	75.83	10.13	50
6-10	74.20	13.04	106
11-15	70.83	10.20	50
16-20	63.55	13.25	29
21+	53.93	19.12	20

The majority of participants fell within the stress score category of 6-10, which is indicative of normal levels of stress (Lovibond & Lovibond, 1995). Similar variation exists in the scores of all groups with the exception of the Personal Wellbeing of those with stress scores of 21 or greater. This is because six individuals within this group rated their Personal Wellbeing as above 65 despite high levels of stress, resulting in increased variation of the scores within this category. Once again, this variation in scores highlights the individuality of responses within group data, and suggests that homeostasis of SWB is subject to individual difference. Thus, the homeostasis cut off point of 70 is only an estimate for group data.

An increase in stress symptomatology is associated with a decrease in Personal Wellbeing. A statistically significant difference is indicated at the $p<.001$ level in Personal Wellbeing scores for the six stress groups according to the Welch

statistic [Welch (4, 277) = 9.53, p = .000]. Post-hoc comparisons using the Dunnett T3 indicated that the mean score for those with anxiety scores of 16-20 or 21 or greater were significantly different from those with scores of 0, 1-5 or 6-10 (p<.001). Therefore, Personal Wellbeing homeostasis is maintained with normal levels of stress but appears to decline with higher levels of stress. This is illustrated in Figure 4.4 below.

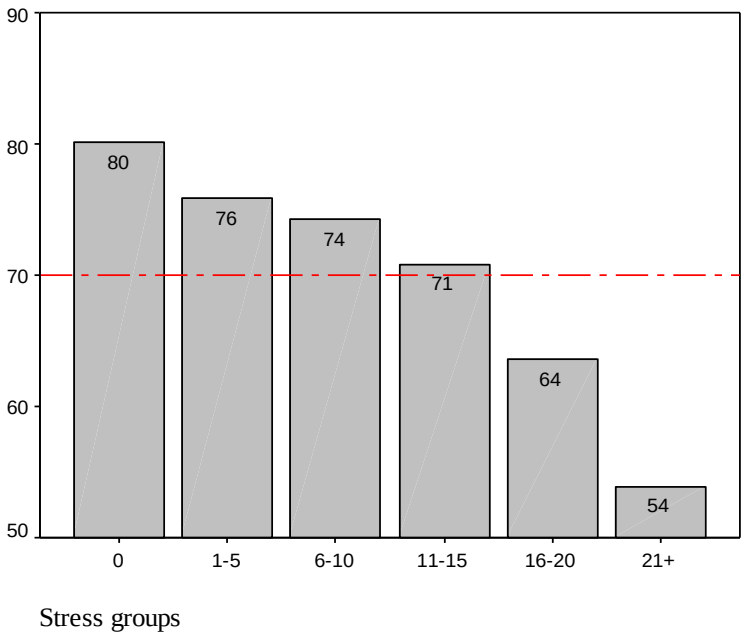


Figure 4.4: Personal Wellbeing and Stress Scores In Reference to Homeostasis

Personal Wellbeing mean scores are presented above according to stress levels. Personal Wellbeing begins to decrease with mild stress levels within the range of 16-20 and a marked decline occurs with moderate levels of stress or scores of 21 or greater. The dotted reference line on Figure 3.4 indicates the approximate Personal Wellbeing homeostasis point of 70 suggested by Cummins (1995; 1998; 2000). Even mild stress levels are related to a fall in Personal Wellbeing and moderate to high stress is associated with the failure of Personal Wellbeing homeostasis. Similar trends exists in the depression and anxiety results presented in Figures 4.2 and 4.3, however, it appears that even mild levels of stress have a strong influence on the decline of Personal Wellbeing.

4.6.6 Stress, Self-Esteem, Pessimism, Optimism and Personal Wellbeing

The above results suggest that stress is an important influence of Personal Wellbeing homeostasis. To further investigate the predictive ability of stress, additional independent variables of self-esteem, pessimism and optimism were included in a regression.

Table 4.28 displays the unstandardised regression coefficients (B) and intercept, the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, $F(4, 267) = 24.99$, $p < .001$. Three of the independent variables contributed significantly to prediction of Personal Wellbeing scores, stress (sr^2 = -.31) pessimism (sr^2 = -.17) and optimism (sr^2 = .18). Self-esteem was not an important predictor of Personal Wellbeing and the four independent variables in combination contributed another .11 in shared variability. Altogether, 27% (26% adjusted) of the variability in Personal Wellbeing scores was predicted by knowing scores on these independent variables.

Table 4.28: Standard Multiple Regression Analysis Predicting Personal Wellbeing by Self-Esteem, Optimism, Pessimism and Stress (N = 272)

Variable	Personal Wellbeing	1.	2.	3.	B	β	sr^2
1. Self-Esteem	-.12				-.12	-.03	.02
2. Optimism	.29	.01			1.38**	.18	.18
3. Pessimism	-.36	.17	-.24		-1.06**	-.19	-.17
4. Stress	-.44	.19	-.18	.35	-.66*	-.34	-.31
* p< .001; ** p<..005						R^2 = .27[a]	
[a]Unique variability = .16; shared variability = .11						Adjusted R^2 = .26	

Stress is a more powerful predictor of Personal Wellbeing than pessimism, optimism and self-esteem. Furthermore, self-esteem did not correlate with optimism in this regression or any other analysis, suggesting that a positive outlook on life is not associated with positive self-evaluation.

In summary, stressed individuals report lower levels of satisfaction and are more dissatisfied with their lives than those who are not stressed. Furthermore, even mild levels of stress appear to cause a significant decline in Personal Wellbeing while moderate levels of stress are associated with the failure of Personal Wellbeing homeostasis. Of all the domains of satisfaction and dissatisfaction, standard of living is the most important predictor of stress. Self-esteem, optimism and pessimism are not important to the prediction of Personal Wellbeing. When satisfaction with happiness is included in these regression it is the single most important predictor of stress.

4.6.7 Summary for Unpleasant Affect

Personal Wellbeing is significantly affected by depression, anxiety and stress. Satisfaction with life decreases, and dissatisfaction with life increases with symptoms of these unpleasant affective states. In comparison, the absence of depression, anxiety and stress is associated with greater life satisfaction. Of all the domains of life satisfaction and dissatisfaction investigated, standard of living is the best predictor of depression, anxiety and stress. This domain appears to be one of the most important domains of life and its importance is indicated in all negative affect analyses.

Satisfaction with achievements in life and personal relationships are important to the prediction of depression. However, these domains become less important when satisfaction with happiness is included. The affective domain of happiness explains the greatest amount of unique variance in depression scores, and together with achievements in life, are the best predictors of depression.

Satisfaction and dissatisfaction with standard of living and health are the best predictors of anxiety. The domain of health is likely to be important in predicting anxiety because of the autonomic expression of anxiety, expressed as physiological reactions and can effect health. Unlike depression, satisfaction with happiness is not important to the prediction of anxiety.

Satisfaction and dissatisfaction with standard of living and achievements in life are the best predictors of stress symptomatology. Dissatisfaction of these domains was more important than satisfaction in predicting stress; however, including the domain of satisfaction with happiness aided further explanation.

Self-esteem, optimism and pessimism are not as important as depression, anxiety and stress in the prediction of Personal Wellbeing. Pessimism produces moderate correlation with depression, which is expected given the negative thought patterns that are characteristic of depression. In comparison, optimism is not correlated with self-esteem even though it would seem beneficial to maintain a positive outlook when evaluating oneself.

Homeostasis of Personal Wellbeing can be maintained with low levels of depression, anxiety and stress. Personal Wellbeing decreases as depression and anxiety severity increases but remains close to 70 if only mild depression or anxiety is reported. In the presence of moderate to severe symptoms, homeostasis fails leading to a sharp decline in Personal Wellbeing. Lower levels of stress are required to defeat the homeostasis of Personal Wellbeing and even mild to moderate stress can cause a sudden decline in wellbeing.

The theory of homeostasis was proposed by Cummins (1995; 1998; 2000) and Cummins, Gullone & Lau (2002) and suggests that Personal Wellbeing should approximately remain within a range of 70-80. The mean scores for non-depressed individuals, non-anxious individuals, and non-stressed individuals all ranged from 70-80. In comparison, the mean scores for depressed individuals, anxious individuals and stressed individuals ranged from 50-65. Individual variation exists in the scores of all group means but average scores are consistent with the theory of homeostasis.

SUMMARY

Bipolarity is evident in life satisfaction and dissatisfaction when a unipolar response scale is employed. Participants appeared to become confused with a bipolar response scale in the assessment of life dissatisfaction and responded to these items in a similar pattern to the satisfaction items. Consequently, difficulty in rating dissatisfaction with a bipolar response scale lead to the inclusion of only the unipolar data in further analyses of dissatisfaction. In comparison, bipolarity was indicated in the data collected with a unipolar response scale, with means for satisfaction and dissatisfaction in the reverse direction, and correlations up to -.86. As hypothesised, these results were consistent with the circumplex model of affect.

There was a tendency for males to produce stronger bipolarity in their ratings of satisfaction and dissatisfaction. However, significant differences existed on very few variables and the overall differences were consistent with previous Australian Unity Wellbeing Index results with females often rating satisfaction higher than males (Cummins, Eckersley, Lo, Okerstrom, Hunter & Davern, 2003).

In general, depressed participants reported significantly greater dissatisfaction and lower levels of satisfaction with their lives than non-depressed participants. Dissatisfaction with standard of living and achievements in life were the most important domains in distinguishing between depressed and non-depressed individuals. These domains suggest that dissatisfaction with needs and wants are an important indicator of depression and exhibit ubiquitous influence on everyday life. Furthermore, dissatisfaction with standard of living and achievements in life were also important predictors of anxiety and stress.

Depression is the most important predictor of Personal Wellbeing when compared to self-esteem, stress, anxiety, pessimism and optimism. Even though depression and pessimism were moderately correlated, depression remained the strongest predictor of wellbeing. Depression was best predicted by the dissatisfaction domains and pessimism correlated more strongly with dissatisfaction than satisfaction. These results suggest that depressed, pessimistic or negative thoughts are very important influences of Personal Wellbeing.

Finally, the 21-item DASS proved to be and extremely effective short measure of depression, anxiety and stress. The strong psychometric properties and factor structure support the inclusion of the scale and suggest that the 7-item depression subscale could be used on its own in future research.

CHAPTER 5: STUDY 1 DISCUSSION

The nature of response scales may influence the assessment of life satisfaction and dissatisfaction. This study has confirmed such influence in the case of bipolar and unipolar response scales. While life satisfaction was found to be reciprocally related to life dissatisfaction when a one-way unipolar response scale was employed, the same relationship was not evident when life satisfaction and dissatisfaction were assessed using a two-way bipolar response scale. Descriptions of the influence of these response scales are provided and explanations for these results are discussed. Following this, the impact of depression, stress and anxiety are discussed in relation to life satisfaction and dissatisfaction.

Unipolar and Bipolar Response Scales

The two-way bipolar scale has been traditionally used in SWB research. This typically ranges from "*completely dissatisfied*" to "*completely satisfied*" covering the entire range of satisfaction and dissatisfaction. A midway score of 'neutral' resides between the two anchors. The alternative is a unipolar, or one-way scale, where satisfaction and dissatisfaction are assessed separately. A one-way satisfaction scale ranges from "*not at all satisfied*" to "*completely satisfied*" while a one-way dissatisfaction scale ranges from "*not at all dissatisfied*" to "*completely dissatisfied*".

These two response scales were investigated in relation to whether the unipolar scale confirms bipolarity within the affective construct. Bipolar scales force people to respond in a bipolar style. In contrast, one-way unipolar scales enable participants to determine their own definitions for the lower end of a scale (Russell & Carroll, 1999a). The left anchor of "*not at all*" included in the one-way satisfaction response scale is left for participants to define. The upper and "*completely satisfied"* anchor is equally defined for both forms of response scale.

In terms of satisfaction, the two scales produced equivalent values. The mean for satisfaction with life as a whole assessed with a one-way scale was 72.63%SM, and when assessed with a two-way scale the mean was 73.67%SM. This was not the case for dissatisfaction, however.

Most importantly, life dissatisfaction assessed with a two-way bipolar scale produced invalid data. Participants were asked to rate life dissatisfaction with a two-way bipolar scale ranging from *"completely dissatisfied"* to *"completely satisfied"* creating a complex response task. Dissatisfaction was lower than satisfaction, but positively correlated ($r = .48$) with it, and appeared to reflect a discounted level of satisfaction. Dissatisfaction was rated at approximately 10% lower than satisfaction across all items. When assessed with a two-way scale, the mean score for satisfaction with life as a whole was 73.67%SM but at the same time mean life dissatisfaction was rated as 65.21%SM. It appears that the two-way dissatisfaction to satisfaction response scale confused participants. Consequently, the dissatisfaction data collected with a two-way response scale

were not included in further analyses. The results also confirm Russell & Carroll's (1999a) thesis that one-way unipolar scales should be used in preference to two-way bipolar scales in the investigation of affective terms.

The relationship between life satisfaction and dissatisfaction was, thus, unable to be assessed with a two-way bipolar scale. However, when assessed with one-way unipolar response scales, life satisfaction and dissatisfaction appear to be conceptualised in a relationship of affect balance. Thus, dissatisfaction appears to be conceptualised either as the difference between current levels of satisfaction and 100% complete satisfaction, or as the difference between dissatisfaction and 100% complete dissatisfaction. Employing a one-way scale, the mean score for satisfaction with life as a whole was 72.63%SM while dissatisfaction was 27.16%SM. Furthermore, it is possible that the ostensibly unipolar format was treated in a bipolar manner by respondents consistent with the suggestion by Russell & Carroll (1999a). Thus, the midpoint of the scale was treated as neutral rather than moderate pleasure or displeasure, and the low end of the scale treated as the bipolar opposite of the high end.

In comparison, the same questions of life satisfaction and dissatisfaction assessed with a two-way bipolar scale produced very different results. The mean rating for satisfaction with life as a whole was 73.67%SM and dissatisfaction 65.21%SM showing no affect balance relationship. This clearly indicates that these two forms of response scales have produced very different results.

Satisfaction and dissatisfaction are representative of pleasant and unpleasant affect, and the relationship between these affects has been summarised by Yik et al. (1999). This relationship is of particular importance in understanding SWB because satisfaction is a representative of pleasant affect (Remington, Fabrigar & Visser, 2001) and dissatisfaction of unpleasant affect. Thus, if satisfaction and dissatisfaction are linked in a relationship of affect balance, it also suggests that pleasant and unpleasant affect are reciprocally related. This proposal is reaffirmed by Schimmack (2001) who found that after being shown mood induction pictures college students reported pleasure and displeasure as reciprocally activated and coexisting affects. This current study is the first to demonstrate a similar relationship between life satisfaction and dissatisfaction.

Affect Balance, Life Satisfaction & Life Dissatisfaction

The finding that life satisfaction and dissatisfaction appear to be reciprocally related is consistent with the pioneering research of Bradburn (1969), and his theory of affect balance. This theory proposes that most experiences are coded into positive, negative or neutral affective tone, and the balance between these experiences forms psychological wellbeing. However, Bradburn referred to all positive feelings as positive affect and all negative feelings as negative affect; moreover he did not distinguish between valence and activation in affect.

Since Bradburn did not incorporate the circumplex theory of affect into his proposition, his theory was not based on affective descriptors that lie 180° apart.

The circumplex theory states that only affects that are located 180° apart, such as the poles of the pleasant-unpleasant axis, will be direct affective antonyms. Bradburn however, did not base his theory on affective antonyms, and positive feelings were assessed with items describing pleasant-activated affect such as *excited, proud,* and *on top of the world*. Negative feelings were assessed with a variety of unpleasant and activated affect such as *depressed, bored, lonely* and *restless.* These terms are not paired according to opposing locations of the circumplex and appear to be biased towards the activation component of affect. According to Bradburn (1969), overall psychological wellbeing describes the amount of positive affect remaining when negative affect is subtracted. However, his affect terms describe different aspects of the circumplex and not all of these aspects relate to each other in a balanced relationship. For example, *excited* describes pleasant-activated affect and *restless* describes unpleasant-activated affect and these affects are located 90° apart on the circumplex. Therefore, the affective descriptors are not opposing affect states, or descriptors of the same dimension of affect. In comparison, satisfaction and dissatisfaction do lie at the opposite poles of the pleasant-unpleasant axis of the circumplex, and the reciprocal relationship between the terms supports their location on the same axis. Thus, satisfaction and dissatisfaction are related to each other as a balance of separate feelings of pleasant and unpleasant affect. Bradburn correctly suggested that affect balance is important to psychological wellbeing but what is now understood is that this balance only exists in the assessment of affects from opposing poles of the circumplex. Life satisfaction and dissatisfaction are representatives of pleasant and unpleasant affect and both can be experienced at the same time but as an interdependent relationship.

Mixed Feelings

The co-occurrence of pleasant and unpleasant feelings is described by Schimmack (2001) as mixed feelings and he suggests that two main arguments prevail in relation to their composition. Larsen, McGraw & Cacioppo (2001) and Diener & Iran-Nejad (1986) consider pleasant and unpleasant affect as two separate emotions that can be experienced at the same time. Pleasure and displeasure are considered two distinct feelings and these experiences are best represented by two unipolar dimensions. In contrast, others such as Russell (1980; Russell & Carroll, 1999a) argue that pleasant and unpleasant affect are mutually exclusive emotions that form a single dimension. Just as individuals are either short or tall, Russell & Carroll (1999a) argue that feelings of pleasure and displeasure cannot be experienced concurrently. Such an explanation would contradict the current results of life satisfaction and dissatisfaction. Instead, these data should produce a pattern similar to an L-shaped "either or" pattern where satisfaction and dissatisfaction are mutually exclusive and produce low correlations. If satisfaction is experienced then dissatisfaction is absent, or if dissatisfaction is experienced then satisfaction is absent In comparison, the two-dimensional model as described by Diener & Iran-Nejad (1986) suggests that people can feel pleasure and displeasure at the same time, producing contingency and frequency tables outside of the expected L-shape.

The separation of pleasant and unpleasant affect as two distinct feelings is consistent with earlier research which has found that people can experience mixed feelings at the same time. In one of the first studies that investigated this phenomenon, Diener & Iran-Nejad (1986) collected daily emotion reports from college students over a 6 week period when students felt emotional. The authors found that high average levels of pleasant and activated affect (PA) occurred with low levels of unpleasant and activation/deactivation (NA). Thus, a person who describes themselves as predominantly happy experiences low levels of unpleasant activated/deactivated affect (NA), or the complete absence of this type of affect. These categories of affect were believed to produce moderate inverse correlations over a broad spectrum of time because the experience of high PA and high NA could not co-exist for long periods. During emotional times, both pleasant and unpleasant emotions were experienced but not during non-emotional times. Diener & Iran-Nejad (1986) argued that a strongly inverse linear relationship between the different affects will only occur during emotional periods when affect is at high, but not low intensities of affect.

The presence of mixed feelings has also been investigated by Schimmack (2001) using unipolar intensity ratings of adjectives after participants were exposed to unpleasant, neutral or pleasant pictures during a single session. Ratings of hot and cold conformed to a one-dimensional L-shaped pattern both before and after the experiment; when one feeling was present the other feeling was absent, producing correlations close to zero. However, a different result was produced with feelings of pleasure and displeasure. Before the experiment began most participants reported moderate levels of pleasure in the absence of feelings of displeasure. After exposure, pleasure and displeasure ratings were reciprocally activated and could co-exist together despite a moderate negative correlation of -.47. Consistent with the current results, Schimmack (2001) found these affects to be reciprocally related so that increases in one affect reduce the intensity of the opposite affect.

Mixed feelings have also been found in other studies of mood induction. For example, Larsen, McGraw & Cacioppo (2001) found that after watching the movie *Life is Beautiful* participants were more likely to report both happy and sad feelings than before they watched the movie. In a subsequent investigation, the authors asked university freshmen to complete an emotion questionnaire as they returned their dormitory keys after graduating. This university scenario was thought to be an experience of mixed feelings; sadness of leaving friends behind and excitement associated with new life experiences. On a typical or average day for the college students only 16% of students reported feeling both happy and sad, while 54% experienced both feelings on their moving out day. A similar result was reproduced in a third study when students were asked to rate their feelings on the day following graduation from university. The authors concluded that emotions are less likely to conform to the circumplex during complex real life scenarios compared to the rare and unique settings used to study emotions in laboratory studies. Furthermore, Larsen, McGraw & Cacioppo (2001) argued that bipolarity is the stable endpoint of emotional processes that are organized in a bivariate space. Emotions such as happy and sad can occur at the same time but

instability of the emotional process means that it only occurs for a short length of time.

The results of the present study concur with Diener & Iran-Nejad (1986), Schimmack (2001) and Larsen, McGraw & Cacioppo (2001) because life satisfaction and dissatisfaction appear to co-exist in a reciprocal relationship of affect balance. Mood induction studies are essentially an investigation of affect states, while life satisfaction and dissatisfaction appears to be more of a trait considering the stability of ratings. However, these studies of induced affective states are consistent with the present study which suggests that both state and trait affects behave in a similar manner. Individuals do not report being highly satisfied and dissatisfied with their lives at the same time. Instead, when a unipolar response scale was employed, feelings of satisfaction and dissatisfaction co-exist but in inverse proportions. The overall average level of satisfaction with life was 71.91%SM while dissatisfaction was 29.21%SM. Therefore, the opposing relationship of reciprocal affect balance appears to be the stable endpoint of emotional processes as suggested by Larsen, McGraw & Cacioppo (2001).

Depression, Life Satisfaction and Life Dissatisfaction

Depressed individuals reported lower levels of life satisfaction and higher levels of life dissatisfaction than people who are not depressed. The presence or absence of depression was defined according to a DASS depression score of greater than 9. DASS depression scores are based on a "dimensional rather than categorical conception" where differences in severity separate depressed from non-depressed individuals (Lovibond & Lovibond, 1995; p.3). Consequently, depression cutoff scores are provided indicating severity labels, but no discrete diagnostic categories in relation to DSM are provided. A DASS depression score of 0-9 is suggested as normal, 10-13 as mild, 14-20 as moderate, 21-27 as severe and 28+ as extremely severe. A depression score below ten on the DASS was found to represent the 78th percentile in normative testing, while a score greater than 10 represented the top 22 percentiles (Lovibond & Lovibond, 1995). Across all domains, mean life satisfaction or SWB of depressed individuals was 60.00%SM compared to 75.20%SM in non-depressed people. Across all domains, mean life dissatisfaction, or Personal Illbeing of depressed individuals was 42.18%SM compared to 26.01%SM in non-depressed individuals. Dissatisfaction scores were approximately the reverse of satisfaction scores and the domains of standard of living and achievements in life were most strongly associated with the presence or absence of depression. Consequently, both satisfaction and dissatisfaction with these domains was found to be important. However, MANOVA analyses suggested that life dissatisfaction produced a marginally stronger association with depression scores.

Many theories of SWB suggest that the construct is divided into individual domains. In a review of quality of life definitions, Cummins (1996) found that 85% included some form of emotional wellbeing, 70% included health, 70% social and family connections, 59% wealth or material wellbeing and 56% work

or productive activity. According to this review, the domains of standard of living and achievements in life were included in only 59% and 56% of quality of life definitions. Of all the domains assessed in the present study, these two domains were most strongly associated with depression. Table 3.8 indicates that depression and dissatisfaction with standard of living and achievements in life produced a partial eta squared of .20 and .19 respectively. On the other hand, depression and satisfaction with standard of living and achievements in life produced partial eta squared of .18 and .15 respectively. These domains of dissatisfaction are approximately twice as strongly associated with depression as any other personal domain, and dissatisfaction with personal relationships is the third most important domain producing a partial eta squared of .10. In comparison, the satisfaction domain of future security produced the strongest eta squared value of .13 after standard of living and achievements.

The domain of standard of living is a subjective measure of material circumstances. Conventionally, standard of living has been defined as the consumption of material goods (Diwan, 2000). Furthermore, this consumption effects nearly all aspects of life, influencing daily choices and attitudes, housing, transport, education and even life opportunities. A subjective assessment of standard of living is therefore an indicator of satisfaction with consumption of material goods and needs associated with life. Most importantly, the current results suggest that perceived satisfaction or dissatisfaction with one's current material needs is strongly associated with the presence or absence of depression.

Self-perceptions of productivity or achievements in life are another domain strongly associated with the presence or absence of depression. This aspect of SWB provides a measure of achieved and desired goals which are driven by individual goals influenced by societal referents. Less discrepancy exists between desired and achieved goals in people with higher scores on this domain while low scores reflect greater discrepancy. Hence, a sense of achievement might also be associated with stronger feelings of perceived control and self-competence as an individual evaluates aimed and achieved goals in life. In this sense, the domain of achievements in life becomes a powerful influence of SWB and Subjective Illbeing.

Despite the importance of achievements in predicting depression, personal relationships remain more important when explaining variance in satisfaction with life as a whole. Personal relationships explain 5% of unique variance in satisfaction with life as a whole while achievements explain 4% of unique variance. The small advantage accorded to personal relationships in explaining satisfaction with life is traded to achievements in predicting depression. In the satisfaction domains of Table 4.10, achievements explain 3% ($r = -.46$) and personal relationships 2% ($r = -.36$) of unique variance in depression scores. In the dissatisfaction domains of Table 4.9, achievements explain 3% ($r = .47$) and personal relationships 1% ($r = .36$) of unique variance in depression scores. It is speculative, but perhaps achievements are more important to predicting depression because they are more internally controlled and closer to the identity of self than personal relationships. Alternatively, personal relationships and

social support have a buffering effect on the presence of depression but this is secondary to the influence of achievements. It is easier to develop and maintain personal relationships when a sense of self-achievement has been developed.

Standard of Living, Achievements in Life & Multiple Discrepancies Theory

Multiple Discrepancies Theory (MDT) as defined by Michalos (1985), asserts that net satisfaction is a function of perceived discrepancies between what someone has and wants, feels they deserve and need, what relevant other have, what one expects to have, the best one had in the past and the best one expects to have in the future. When this theory is examined in relation to the current results, the domains of standard of living and achievements in life can be argued to constitute the important aspects of needs and wants. Standard of living encompasses material consumption of the needs associated with everyday living including housing, food and ability to pay for essential services. The maintenance of these basic needs is harder to achieve in low income groups with reduced SWB than higher income groups where income rises to meet basic needs (Cummins, 2000). The importance of essential needs is also confirmed in the classic psychological theory of Maslow (1970). This theory suggests that human needs are organized into a hierarchy where physiological needs, safety and security need to be satisfied before higher psychological growth can occur. The current results are consistent with such theory because individuals who are most dissatisfied with these basic needs are also most likely to be depressed.

In comparison to needs, judgments of satisfaction about achievements in life are based on aspirations, goals or wants that a person has and hopes to have achieved. The importance of a domain related to achievements and aspirations is also consistent with past research suggesting that inappropriately high or low aspirations can decrease happiness (Wilson, 1967), or lead to boredom (Csikszentmihalyi, 1990). In a review Diener (1999) found that for goal achievement to positively influence SWB, the goals must be relevant to a person's motives and needs. Making progress towards desired goals can lead to an increase in SWB while progress towards goals not congruent with needs does not increase SWB (Brunstein, Schultheiss & Grassman, 1998). This may help to explain why dissatisfaction and satisfaction with achievements in life are so strongly associated with depression.

According to MDT, discrepancies between needs and wants explain overall satisfaction. The theory is described by Michalos (1985) as a theory of satisfaction influenced by ancient Greek philosophy, cognitive dissonance theory (Festinger, 1957), relative deprivation theories (Runciman, 1966), and comparison theories (Campbell, Converse & Rodgers, 1976; Andrews & Withey, 1976). MDT evidence provided by Michalos (1985) has been criticized by Cummins (1997) as representing a tautology for satisfaction. MDT explained 53% of global life satisfaction while 53% of the variance in life satisfaction was explained by the satisfaction ratings on the 12 separate life domains. Furthermore, Cummins (1997) also describes difficulty in using discrepancy theory as an assessment method for intervention. If an individual is dissatisfied

with their situation Cummins believes intervention is necessary but questions how much discrepancy is required before intervention is engaged. Thus, it is unclear how the operationalisation of MDT can be used to improve SWB.

The present results suggest that both theories of satisfaction and MDT may actually be complimentary and not competing theories or a tautology. MDT is a valid theory, useful for understanding SWB because it provides a definitional framework for understanding SWB. It is the first level of cognitive deconstruction required to make a decision about satisfaction and dissatisfaction. An individual relies on MDT to make satisfaction judgments for all individual domains of SWB. The cognitive judgments assessed with MDT are combined with trait affective responses, personality and temperament to produce overall satisfaction ratings of SWB. This model of SWB is illustrated below in Figure 5.1.

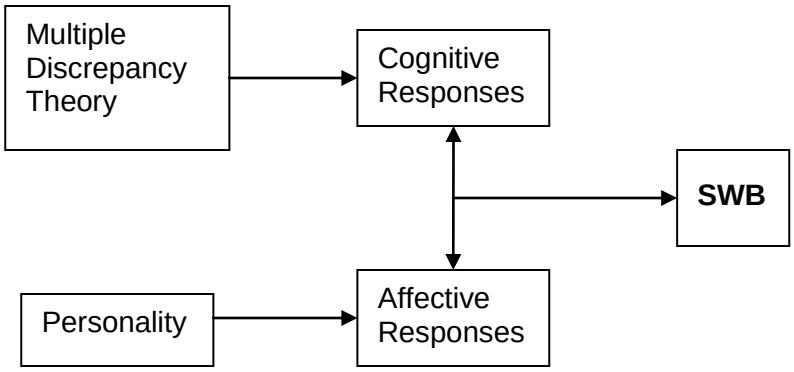


Figure 5.1: An Affective and Cognitive Model of SWB

Comparisons made between what one has, what one would like to have and what one aspires to achieve in comparison to others, reflects the values of current western industrialized civilization. Needs and wants of self, others and society form the basis of these societies. Western society revolves around consumption of technologies and current trends which are deemed important to each individual. Furthermore, what is considered relevant to each individual is made in comparison to referent groups and society. The application of MDT as an explanation of life satisfaction and dissatisfaction is useful and has major implications in terms of life dissatisfaction and depression. In non-depressed individuals satisfaction levels remain higher, and less discrepancy exists in personal needs and wants, than those of relevant others. Discrepancies in personal needs, wants and those of relevant others leads to increased dissatisfaction and depression.

Irrational negative thought patterns associated with pre-existing depression could also influence the judgment of discrepancies between personal needs and wants.

The depressive cognitive content in Beck's (1976) Negative Cognitive Triad suggests that negative assessments of the self, the world and the future are all automatic thoughts associated with depression. Irrational and negative thoughts act as the precursors to depressed mood, and negative thought produces the experience of the unpleasant emotion (Beck, 1976; Hawton, Salkovskis, Kirk & Clark, 1996). These negative thoughts associated with depression may lead to an assessment of discrepancy between needs and wants. Alternatively, the judgment of discrepancy between needs and wants may lead to feelings of dissatisfaction and depression.

SWB Homeostasis and Depression

Discrepancies between needs and wants are pertinent to the development of dissatisfaction and depression. However, in spite of the strong association between needs, wants and depression, SWB homeostasis is maintained at approximately 70%SM with low levels of depression. The model of homeostasis outlined by Cummins (1995, 1998, 2000; Cummins, Gullone & Lau, 2002) suggests that SWB is usually maintained between 70-80%SM with an average of 75%SM in western countries. This suggests an estimated SWB set-point range of ±10% SM from lowest to highest level of SWB. Psychological homeostasis controls SWB in a similar manner to the biological control of blood pressure, thus attempting to prevent extreme levels of a condition.

SWB is highest in those with no symptoms of depression and a DASS depression score of 0 resulted in a mean SWB score of 79.37%SM. Similarly, a depression score of 1-5 resulted in a SWB mean of 74.51%SM, with both depression scores reflecting normal scores for the general population. A DASS depression score of 0-9 is suggested as normal, 10-13 as mild, 14-20 as moderate, 21-27 as severe and 28+ as extremely severe. (Lovibond & Lovibond, 1995). Hence, as depression scores rise to greater than 10, homeostasis begins to struggle to keep SWB within the approximated homeostatic boundary of 70%SM. A DASS depression score of 6-10 resulted in a SWB mean of 69.23%SM and a depression score of 11-15 resulted in a SWB mean of 67.81%SM. SWB is maintained by homeostasis in the presence of mild depression. However, homeostasis can be defeated if extrinsic conditions dominate and the homeostatic system is unable to withstand its influence. Participants with a DASS depression score of ≥16 (moderate or greater depression) produced a dramatically reduced SWB mean of 53.00%SM. In this situation the SWB homeostatic system is unable to buffer the effects of moderate to severe depression resulting in a serious reduction in SWB. The data support a linear relationship between SWB and depression because SWB decreases as depression increases, particularly with moderate or greater depression severity.

Homeostasis and Set-Point Ranges

The theory of SWB homeostasis is based on group population data which remain remarkably stable across time (Cummins, 1995; 1998; 2003). In Western countries, life satisfaction group scores cluster around a mean of 75.0 ± 2.5 scale

maximum score (%SM) on a standardized Likert scale ranging from 0-100. Thus, two standard deviations defined the normative range for Western countries as 70-80%SM. Including Western and non-Western countries, world population life satisfaction was determined as 70 ± 5.0, extending the world range in life satisfaction scores to 60-80%SM. These approximations have been confirmed in a subsequent review by Cummins (2003) and an intra-population normative range for Western countries is proposed as 40-100%SM. A similar level of variation exists in the results of the current study. The mean and standard deviation for SWB is 71.84 and 14.20 respectively (Table 3.1), and applying two standard deviations as a normative band the intra-population normative range is 43-100%SM consistent with Cummins (2003).

Individuality of homeostasis is also demonstrated by the SWB scores associated with depression severity. Severe depression does not guarantee low levels of SWB nor does the absence of depression guarantee high SWB. This is identified when individual SWB scores were categorised as being above or below 65%SM. This particular cut-off was employed because 90% of participants rated their SWB as greater than this level including individuals who reported mild to moderate depression. Group means associated with DASS depression scores in Table 4.12 indicate that only those reporting moderate to severe depression rate their SWB below 65%SM. However, despite the trend of lower SWB being associated with depression, 24% of participants with severe depression rated their SWB as greater than 65%SM (Table 3.14). Alternatively, 12% of participants who failed to report a single symptom of depression rated their SWB as less than 65%SM. Thus, depression provides an indicator of SWB but individuals can tolerate different depression severity according to their individualized level of SWB homeostasis. Furthermore, the clinical condition of depression reflects a loss of wellbeing; therefore depression scales are only measuring symptoms of the disorder and not the underlying condition itself.

The data supporting SWB homeostasis is based on population averages (Cummins, 1995; 1998; 2003) but individuality of homeostasis set-points also exist. For example, it is speculative, but a generally content person may rate their usual level of SWB as 80%SM with an expected range of 75-85%SM. If this person experiences depression, homeostasis acts to prevent a decline in SWB beyond their usual low of 75%SM. However, severe depression is unable to be buffered by the homeostatic mechanism resulting in a decline in SWB to 68%SM. Such an individual would still remain above 65%SM despite severe depression because of their SWB set-point range. In comparison, another individual who is less content than the average person in a western population, reports an average SWB score of 69%SM. When this individual experiences moderate to severe depression their SWB immediately drops below 65%SM despite their usual homeostatic range of between 64-74%SM. Others report low SWB of less than 65%SM and fail to report depressive symptomatology. In general, these individuals are less happy and satisfied with their lives though these feelings do not constitute the clinical symptoms of depression. These people experience less pleasant affect in relation to their lives but this does not always equate with the experience of depression.

SWB Homeostasis and Anxiety

Anxious individuals also reported lower levels of satisfaction and higher levels of dissatisfaction on all domains of SWB. Satisfaction with the domain of future security, and both satisfaction and dissatisfaction with standard of living and health, produced the strongest association with the presence or absence of anxiety. Anxiety and dissatisfaction with standard of living and health produced partial eta squared of .15 and .13 respectively. Anxiety and satisfaction with standard of living, health, and future security produced partial eta squared of .13, .12 and .12 respectively

The importance of standard of living in response to anxiety can also be explained in terms of MDT (Michalos, 1985). Perhaps discrepancies between what one has and wants, believes that one deserves and aimed to achieve in reference to others, leads to concerns and worries which manifest as symptoms of anxiety. These discrepancies might then by magnified by the anxiety itself leading to exacerbated symptoms of anxiety.

It is not surprising that the domain of health is also associated with anxiety. Many of the physiological symptoms of anxiety such as palpitations, sweating and breathlessness can be confused as symptoms of ill-health before they are associated with the psychological condition of anxiety. These types of symptoms lead to heightened physical awareness and concerns about physical health. For example, part of the diagnostic criteria for anxiety or panic attacks requires that an individual experiences chest pain, fears they are going crazy or dying (American Psychiatric Association, 1994). Anxiety and physical health are intrinsically related to one another through the measurement methodology.

Anxiety is defined as worry or apprehensive expectation (American Psychiatric Association, 1994), and it is extremely difficult to experience such feelings without concerns for future security. An anxious individual ruminates about the past, present and future. Hence, the strength of association between satisfaction with future security seems expected with significant differences between the means of anxious (M=50.26%SM) and non-anxious individuals (M=70.26%SM) on the domain.

Like depression, increased anxiety is also associated with lower SWB. SWB remained close to the expected average of 75%SM in individuals (Cummins, 1995; 1998) where anxiety was minimal or absent. Homeostasis was unable to maintain SWB at this level as anxiety increased from mild to moderate and a slight decrease resulted. As anxiety increased to severe levels SWB dropped further to an average of 48%SM well below the lower homeostatic boundary of 70%SM.

SWB can be maintained in the presence of minimal anxiety which is necessary for facing uncertainties associated with everyday life. However, excessive anxiety is unable to be buffered by the SWB homeostatic system and such levels of anxiety result in a loss of wellbeing. A similar linear relationship also exists

between depression and SWB and supports the homeostatic SWB relationship suggested by Cummins (1995; 1998; 2003).

SWB Homeostasis and Stress

Stressed individuals are more dissatisfied and less satisfied with all the domains of their lives. Like depression and anxiety, standard of living also produced the strongest association with stress, emphasizing the importance of this SWB domain. In particular, dissatisfaction with standard of living was most strongly associated with stress (partial eta squared = .16) and MDT (Michalos, 1985) is argued to be the best explanation for this result. Perhaps stress results when discrepancies exist in relation to material wellbeing and personal needs and wants are not able to be met. Nearly all aspects of everyday life are influenced by income and wealth, and the desire to be affluent is becoming central to western societies. Increased consumerism requires increased income, and possibly increased discrepancy between current needs and wants and those of other members in society. It is speculative, but discrepancies in the domain of standard of living may be an important influence of stress.

Stress and anxiety refer to similar emotional states; however, differences do exist in their common use and understanding. Stress is solely psychological and can be used to describe pressures and worries similar to anxiety. It can also refer to time pressures, competing goals and a sense of importance. Essentially, to describe feeling stressed has negative and positive connotations. In comparison, anxiety consists of psychological worries and rumination that usually co-exist with autonomic symptoms of anxiety that can be confused with symptoms of physical illness. The layperson's understanding of anxiety is not associated with any positive connotations and most consider anxiety an unpleasant psychological state. The differences between stress and anxiety explain why health, in addition to standard of living, is strongly associated with anxiety, while standard of living alone is more strongly associated with stress. Perhaps stress results when an individual remains focused on achieving goals associated with material wealth, particularly when discrepancies occur between past, present and future goals for the self and important reference groups. The application of MDT (Michalos, 1985) can explain why the colloquial expression of "keeping up with the Jones'" is such an important influence on psychological wellbeing. Perhaps society's fixation with material wealth has detrimental effects on SWB where social comparisons can lead to personal discrepancies and dissatisfaction with life.

STUDY 1 CONCLUSIONS

One-way unipolar response scales are recommended in order to measure the affective component of life satisfaction. An assessment of life satisfaction and dissatisfaction using a one-way response scale clearly indicated a reciprocal affect balance relationship. In comparison, participants were unable to rate life dissatisfaction when a two-way *dissatisfaction-satisfaction* bipolar response scale was employed, leading to the collection of invalid data. These results strongly support the inclusion of one-way unipolar response scales in the assessment of SWB because of the strong affective component in the concept. This argument is supported by the earlier studies of response styles in affect ratings (Schimmack, Böckenholt, & Reisenzein, 2002), and the experience of pleasant and unpleasant affect simultaneously (Diener & Iran-Nejad, 1986; Larsen, McGraw & Cacioppo, 2001; Schimmack 2001).

Increased life dissatisfaction is associated with a reciprocal drop in life satisfaction. Those who feel more dissatisfied with life are also more likely to report symptoms of depression, anxiety and stress, suggesting that dissatisfaction provides a valid indication of global psychological illbeing, while life satisfaction provides an indication of SWB. Life dissatisfaction is an alternate measure of loss of SWB. As life satisfaction is related to dissatisfaction in a reciprocal affect balance these results have wide ranging clinical implications. The assessment of life satisfaction involves general global items about life and can provide an indication of overall mental health. The results of the present study suggest that individuals with life satisfaction scores below 65%SM, are associated with higher life dissatisfaction and increased risk of depression, anxiety and stress. Therefore, the assessment of SWB also provides a reciprocal assessment of subjective illbeing, and can be used in initial mental health screening without the use of intrusive clinical measures. This may be of particular use to medical practitioners working within general practice.

SWB homeostasis is able to be maintained in the presence of low level depression, anxiety and stress but SWB is unable to be maintained when symptoms of any disorder increases to moderate levels. Satisfaction and dissatisfaction domains of standard of living and achievements in life are most strongly associated with the presence of depression and stress, while satisfaction and dissatisfaction with health is strongly associated with anxiety. Multiple Discrepancies Theory (Michalos, 1985) is argued as providing a useful framework for understanding the contribution of standard of living and life achievements in the presence of depression, anxiety and stress.

The investigation of life satisfaction and dissatisfaction confirms a strong affective component in SWB consistent with the circumplex theory of affect. Consequently, life satisfaction and dissatisfaction are reciprocally related and should be assessed with unipolar response formats. The use of these response formats is consistent with affect theory and enables a measure of psychological wellbeing and illbeing in a single assessment.

CHAPTER 6: STUDY 2 INTRODUCTION AND METHODOLOGY

Introduction to Study 2

The results of Study 1 confirm a reciprocal relationship between life satisfaction and dissatisfaction only when unipolar response scales are employed. This is consistent with the affect literature and suggests that unipolar formats should be employed in the assessment of affect. Furthermore, moderate to high levels of depression and anxiety were associated with low levels of life satisfaction and high levels of life dissatisfaction. Thus, similar relationships were found between response scales in both affect and SWB. From this it may be inferred that affective disorders of depression and anxiety were associated with the loss of SWB. These results, in association with the suggestion that SWB comprises affective and cognitive components (Andrews & Withey, 1976; Lucas et al., 1996), lead to two further questions. How much variance in SWB can be explained by affect and does the affective component of SWB conform to the circumplex model? It is hypothesised that affect in SWB will conform to the circumplex model, and at least half of the variance in SWB will be explained by affect.

Participants

The sample was drawn from the cohort who comprised the 5th Survey of the Australian Unity Wellbeing Index conducted in November 2002. Survey 5 was the next wave of data collection for the Index which has been described in the methodology section of Study 1. 79% of those surveyed by telephone for Survey 5 agreed to participation by providing a contact name for mailing purposes. Postal addresses were available in the public telephone directory. Names, telephone numbers and addresses remained with Australian Unity. A unique identifier was used to code each mailed survey.

In total 1546 questionnaires were mailed to the survey participants and 478 questionnaires were returned, resulting in a 31% response rate. The sample comprises 43% males and 57% females and their mean age was 47 years, with a standard deviation of 16.77 and ranged between 18-72 years.

Materials and Procedure

Participants were mailed one questionnaire each. These questionnaires consisted of Personal Wellbeing Index, National Wellbeing Index, and 31 affect items rated according to feelings about life. The instructions for the affect items were "please indicate how each of the following describes your feelings when you think about your life in general". This instruction preceded the list of affect items which were selected as representatives of the eight octants of the affective circumplex. These affective descriptors were selected from the affect literature and are consistent with previous investigations of the circumplex model (Campbell, Converse, & Rodgers, 1976; Ortony, Clore, & Foss, 1987; J. Russell, 1980; J. Russell &

Feldman Barrett, 1999; Schlosberg, 1952). The affects were: *happy*, *content*, *satisfied* and *pleased* as pleasant affect; *enthusiastic*, *delighted*, *excited* and *elated* as pleasant-activated affect; *aroused, alert, energised* and *elated* as activated affect; *stressed*, *nervous*, *annoyed* and *distressed* as unpleasant-activated affect; *sad, discontent* and *upset* as unpleasant affect; *flat, bored, depressed* and *gloomy* as unpleasant deactivated affect; *tired, fatigued, sleepy, exhausted* as deactivated affect; and *relaxed*, *at ease*, *serene* and *calm* as pleasant deactivated affect. *Dissatisfied* should have been included as a representative of unpleasant affect but its inclusion was prevented by a typographical error. Each of these affects was rated according to a one-way unipolar response scale of (0) "not at all" to (10) "extremely".

This study forms part of an on-going study involving which systematically follows-up respondents of the quarterly telephone surveys. The usual response format employs a bipolar response scale. However, the results from Study 1 suggest that a unipolar response scale may be a superior form of measurement. Thus, two questionnaires were constructed. Questionnaire 1 employed a one-way unipolar scale for all AUWBI items and affect items. Questionnaire 2 employed the usual bipolar response scale for the AUWBI items and a one-way unipolar response scale for the affect items. This was necessary in order to retain compatibility with previous surveys in regard to these Index data. The Personal Wellbeing Index was used for the assessment of SWB and is the same measure employed in Study 1 presented in Chapter 2.

CHAPTER 7: STUDY 2 RESULTS

All affect scores have been converted to Percentage of Scale Maximum, (%SM). When a scale is scored 0-X, %SM is calculated through the formula [(score) x 100/(number of scale points - 1)]. In comparison, the formula would become [(score-1) x 100/(number of scale points - 1)] if a scale scoring starts from the number one (Cummins, 1995). This conversion assists in understanding scores and comparison with other data.

7.1 MEANS AND STANDARD DEVIATIONS OF AFFECT RATINGS

Participants were asked to indicate how each affective descriptor described their feelings when they thought about their life in general, according to a unipolar scale ranging from "Not at all" (0) to "Extremely"(10). Means and standard deviations are presented below in Table 7.1 together with the theoretical location of the affect according to the circumplex model proposed by Russell (1980). Affect terms are listed from highest to lowest scores.

Table 7.1: Means and Standard Deviations for Affect Ratings In Relation to Life as a Whole (N=478)

Affective Adjective	Mean	SD	Location on Circumplex
1. Happy	71.96	20.80	Pleasant
2. Content	70.30	21.88	Pleasant
3. Satisfied	68.37	21.68	Pleasant
4. Pleased	66.67	21.11	Pleasant
5. At Ease	66.35	22.01	Pleasant Deactivated (Low PA)
6. Enthusiastic	66.13	22.29	Pleasant Activated (High PA)
7. Relaxed	65.15	22.76	Pleasant Deactivated (Low PA)
8. Serene	62.95	23.04	Pleasant Deactivated (Low PA)
9. Calm	62.70	22.92	Pleasant Deactivated (Low PA)
10. Alert	62.22	22.75	Activated
11. Energised	59.91	22.75	Activated
12. Lively	59.38	22.06	Activated
13. Delighted	58.52	22.92	Pleasant Activated (High PA)
14. Excited	57.32	23.10	Pleasant Activated (High PA)
15. Elated	52.76	23.69	Pleasant Activated (High PA)
16. Tired	50.89	28.66	Deactivated
17. Aroused	43.43	25.91	Activated
18. Fatigued	38.78	30.27	Deactivated
19. Sleepy	37.51	28.15	Deactivated
20. Stressed	37.34	27.56	Unpleasant Activated (High NA)
21. Exhausted	35.77	28.88	Deactivated
22. Flat	28.83	27.30	Unpleasant Deactivated (Low NA)
23. Sad	28.12	24.05	Unpleasant
24. Nervous	27.02	24.14	Unpleasant Activated (High NA)
25. Annoyed	25.98	25.19	Unpleasant Activated (High NA)
26. Discontent	25.92	25.91	Unpleasant
27. Bored	24.09	23.98	Unpleasant Deactivated (Low NA)
28. Depressed	23.80	24.28	Unpleasant Deactivated (Low NA)
29. Upset	22.30	23.53	Unpleasant
30. Gloomy	22.12	23.65	Unpleasant Deactivated (Low NA)
31. Distressed	21.56	22.40	Unpleasant Activated (High NA)

When describing life in general, the highest mean scores came from pleasant and pleasant-deactivated affective descriptors. Regardless of activation level, all unpleasant affect descriptors grouped together with lowest mean scores. Descriptors that focused on energy alone, either activated or deactivated, were rated approximately half way between the highest and lowest ratings. Hence, the means presented in Table 7.1 suggest that the highest and lowest means for the affective descriptors focused on pleasant and unpleasant affect rather than levels of activation. This suggests that the pleasant-unpleasant dimension of affect is most important to evaluations of affective state.

In relation to this ordering, it is interesting to note the values of the positive affect terms included in the original Delighted-Terrible Scale proposed by Andrews & Withey (1976). This scale was one of the first measures of life satisfaction and included the anchors of "*delighted*, *pleased*, mostly *satisfied*, mixed, mostly *dissatisfied*, *unhappy*, *terrible*". The mean scores for the top three anchors of the scale are presented in Table 6.1 and indicate that *delighted*, *pleased* and *satisfied*, produce means of 58.5, 66.7 and 68.4 respectively. This suggests that the direction of positive affective strength is reversed in the Delighted-Terrible Scale most likely due to confusion between pleasant and activated affective descriptors. *Delighted* is a pleasant and activated affect, while *satisfied* and *pleased* are more pure measures of pleasant affect.

7.2 GENDER DIFFERENCES

Gender differences were evident in the bipolarity of affect in terms of satisfaction and dissatisfaction in Study 1. Consequently, analyses of gender differences were undertaken again. The means and standard deviations are presented according to gender in Table 7.2 below.

Table 7.2: Means and Standard Deviations for Affect Ratings According to Gender

Affect	**Males (N=198)**		**Females (N=258)**		**p**
	Mean	SD	Mean	SD	
Energised	57.59	22.36	60.82	22.86	.134
Excited	54.20	23.62	58.97	22.23	**.029**
Happy	69.64	21.47	72.79	20.06	.109
Serene	62.23	23.34	62.94	22.61	.745
Tired	48.21	26.89	53.37	29.42	.056
Bored	23.42	21.67	24.72	25.06	.564
Sad	26.48	22.36	30.04	25.12	.120
Alert	60.10	22.82	63.10	22.24	.160
Elated	49.53	23.50	54.44	23.42	**.030**
Content	68.27	21.45	70.94	21.97	.197
Relaxed	65.72	21.20	63.98	23.68	.414
Sleepy	37.81	27.31	37.73	28.73	.975
Stressed	35.10	26.47	39.76	28.02	.076
Lively	57.85	21.81	59.64	21.97	.394
Delighted	55.45	21.88	59.96	23.23	**.039**

Table 7.2: Means and Standard Deviations for Affect Ratings According to Gender (continued)

Affect	Males (N=198)		Females (N=258)		p
	Mean	SD	Mean	SD	
Pleased	65.03	20.69	66.89	21.01	.349
Calm	65.05	21.83	60.16	23.38	**.024**
Fatigued	38.39	29.39	39.45	30.72	.713
Gloomy	22.67	23.19	21.94	23.93	.748
Upset	22.49	23.00	22.64	23.95	.947
Annoyed	28.50	25.89	24.05	23.94	.061
Aroused	45.80	25.46	41.23	25.66	.062
Satisfied	66.91	21.56	68.97	21.72	.316
At Ease	66.86	20.48	65.14	22.91	.412
Exhausted	34.82	27.35	36.80	29.73	.472
Flat	30.73	27.46	27.62	26.90	.232
Discontent	26.35	25.73	26.10	26.24	.918
Distressed	20.32	20.88	22.91	23.51	.220
Enthusiastic	64.48	21.83	66.88	22.11	.255
Nervous	23.75	21.35	30.36	25.74	**.003**
Depressed	21.73	21.95	25.79	25.84	.074

t-test analyses revealed few significant gender differences on affect ratings. Females rated pleasant-activated affect such as *excited, elated, delighted*, and *nervous* higher than males, while males rated the pleasant-deactivated affect of *calm* higher than females. Of the 16 pleasant adjectives, females reported higher mean scores than males on 13 items, while males reported higher mean scores than females on 3 items (binomial probability = .046). Females also rated the unpleasant-activated affect of *nervous* higher than males. These few significant differences between genders, contradicts the commonly held notion that females generally report greater extremes of emotions.

7.3 AGE DIFFERENCES

The Australian Unity Wellbeing Index has found that wellbeing steadily improves after the age of 55 years (Cummins et al., 2003a). Considering this, it was of interest to investigate age differences in the different types of affect within the circumplex. Means for affective descriptors according to age are presented below in Table 7.3. A subsequent series of 2-way gender by age analyses of variance revealed no significant gender by age interaction effects.

Table 7.3: Means and Standard Deviations for Affect Ratings According to Age (N=451)

Axis	Affect	18-25	26-35	36-45	46-55	56-65	66-75	76+	p
Pleasant Affect	Happy	75.29	74.63	70.65	69.12	72.53	69.32	75.83	.515
		15.86	16.45	21.73	20.69	21.87	22.07	20.20	
	Content	62.94	73.27	65.76	65.93	71.88	72.47	80.42	**.009**
		20.24	18.76	22.93	21.45	21.54	23.20	16.54	
		36-45 < 76+, p=.048							
	Satisfied	63.53	69.44	65.70	65.82	70.71	70.27	69.17	.505
		18.69	17.74	22.23	21.35	22.81	23.11	21.85	
	Pleased	67.06	70.37	65.16	61.65	67.78	64.41	72.61	.127
		14.48	19.32	20.46	21.51	20.83	23.65	16.57	
Unpleasant Affect	Discontent	35.88	25.19	29.67	30.66	22.77	20.44	19.57	**.038**
		32.03	20.44	26.12	26.74	25.29	26.79	25.85	
	Sad	37.06	26.48	29.14	29.23	28.23	30.00	20.00	.442
		24.94	19.83	22.87	22.91	25.46	26.62	26.63	
	Upset	35.29	19.63	25.05	24.29	20.52	20.87	15.91	.114
		26.25	19.42	24.08	22.27	22.54	26.94	22.39	
Activated Affect	Alert	57.06	58.89	58.37	61.32	65.88	63.70	62.92	.274
		22.57	22.88	24.24	21.92	19.83	22.02	28.66	
	Energised	61.76	61.45	59.14	57.91	61.13	55.71	61.30	.758
		14.25	19.48	23.11	20.08	22.35	27.74	28.01	
	Lively	65.29	62.78	59.68	55.05	60.21	54.64	60.91	**.048**
		11.79	16.07	21.79	19.68	23.09	25.99	27.59	
	Aroused	54.12	40.56	46.20	42.31	41.35	43.09	41.25	.470
		25.51	25.13	24.71	21.14	25.65	29.64	32.61	
Deactivated Affect	Tired	52.94	59.07	61.63	53.30	41.34	47.78	36.52	**.000**
		27.56	24.44	26.94	26.88	28.31	28.69	29.79	
		56-65 < 26-35, p=.003; 76+ < 26-36, p=.018							
		56-65 < 36-65, p=.000; 66-76 < 36-45, p=.024; 76+ < 36-45, p=.024							
	Fatigued	47.65	45.27	45.11	42.22	34.69	31.71	25.42	**.003**
		29.48	29.81	29.67	28.51	30.09	30.31	29.92	
	Sleepy	60.59	43.89	42.39	38.35	31.05	33.09	29.57	**.000**
		26.80	29.87	27.39	26.09	25.91	29.59	28.20	
		46-56 < 18-25, p=.038; 56-65 < 18-25, p=.001;							
		66-75 < 18-25, p=.005; 76+ < 18-25, p=.008;							
	Exhausted	43.53	44.63	44.30	39.45	28.96	27.06	19.55	**.000**
		30.81	26.26	27.48	29.03	27.66	28.86	21.26	
		56-65 < 26-36, p=.017; 66-75 < 26-36, p=.010; 76+ < 26-36, p=.007							
		56-65 < 36-45, p=.003; 66-75 < 36-45, p=.002; 76+ < 36-45, p=.004							
Pleasant-Activated	Enthusiastic	72.94	67.59	63.33	63.63	68.74	63.29	70.00	.263
		14.90	18.52	22.23	22.14	22.89	24.77	18.88	
	Excited	66.47	62.04	60.22	55.93	56.49	48.99	52.38	**.010**
		18.35	18.57	23.08	20.49	23.05	26.63	26.82	
		66-75 < 26-35 p=.027; 66-75< 36-45, p=.032							
	Delighted	60.00	62.41	59.68	54.18	58.51	55.29	58.18	.397
		18.03	19.22	22.62	21.91	23.87	24.71	25.57	
	Elated	57.50	49.62	50.87	53.22	55.10	48.29	56.82	.406
		14.83	20.00	25.23	21.08	23.53	26.48	27.50	
Pleasant-Deactivated	At Ease	64.12	66.48	62.39	63.08	69.59	66.23	74.78	.101
		18.05	18.95	21.91	21.89	22.19	25.21	16.20	
	Relaxed	63.53	66.48	59.57	61.10	68.16	68.59	69.13	**.046**
		17.30	20.01	22.36	21.98	24.04	23.50	23.14	
	Serene	67.65	61.15	58.92	61.98	65.00	64.08	67.20	.443
		14.80	19.27	23.61	21.51	24.67	24.41	25.42	
	Calm	62.35	64.07	58.04	61.32	63.65	63.92	68.46	.392
		15.62	18.79	22.35	22.32	25.72	23.75	23.27	

Table 7.3: Means and Standard Deviations for Affect Ratings According to Age (continued)

Axis	Affect	18-25	26-35	36-45	46-55	56-65	66-75	76+	p
Unpleasant-Deactivated	Depressed	29.41	26.48	24.30	27.78	21.37	22.21	17.39	.345
		29.04	23.24	22.18	24.80	24.48	25.79	23.97	
	Gloomy	34.71	22.22	24.41	25.38	19.05	18.09	20.45	.085
		27.64	21.16	23.15	23.87	22.65	22.14	31.39	
	Flat	34.71	36.67	35.65	32.42	21.58	20.29	22.73	**.000**
		26.72	27.95	29.74	26.81	22.71	24.49	27.98	
		56-65 < 26-36, p=.016; 66-75 < 26-36, p=.013; 56-65 < 36-45, p=.000; 66-75 < 36-45, p=.006;							
Unpleasant-Activated	Stressed	42.35	44.55	47.53	43.85	28.54	28.82	19.09	**.000**
		23.33	25.23	26.57	24.58	26.52	27.51	26.89	
		56-65 < 26-36, p=.006; 66-75 < 26-36, p=.016; 76+ < 26-36, p=.002 56-65 < 36-45, p=.001; 66-75 < 36-45, p=.007; 76+ < 36-45, p=.001							
	Annoyed	42.94	23.15	29.35	27.14	23.26	23.19	20.00	**.030**
		25.19	22.64	24.84	23.44	24.30	28.00	22.36	
		56-65 < 18-25, p=.040							
	Distressed	30.00	26.11	23.55	25.78	17.40	18.09	11.82	**.009**
		26.69	23.67	21.90	25.04	18.25	21.67	19.43	
	Nervous	34.71	32.04	27.53	29.33	24.89	26.87	19.09	.269
		20.95	24.29	23.39	24.71	22.75	26.18	25.43	

Age differences appear in one affective descriptor of pleasant affect (*content*) and one descriptor of unpleasant affect (*discontent*). The strength of contentment gradually increases with age, with a sudden increase occurring between the ages of 26-35 years. Discontent appears as the approximate mirror image to the increase in contentment, with a drop around 26-35 years, increases during middle age and drops again after the age of 56 years. Consequently, a strong negative correlation (r = -.64) exists between contentment and discontentment.

Only one significant age difference resulted for pleasant-activated affect (*excited*) and most of these types of affect decrease with age. Pleasant and activated affect is associated with the younger age groups.

Deactivated affect (*tired, exhausted, sleepy*) and unpleasant-deactivated affect (*bored, flat, distressed*) all decrease with age. However a sharp peak emerges in boredom between the ages of 55-65 before decreasing again, and it is presumed that this age is associated with retirement and initial decreases in productivity. Unpleasant-activated affect (*distressed, stressed*) is higher in the younger age groups but decreases with age, with a marked decrease after the age of 55.

Pleasant-deactivated affect (*relaxed*) increases with age yet shows a marked decline during middle age before increasing after the age of 56. Young people under the age of 35 years have more time for themselves before embarking on careers, family and financial responsibilities associated with middle life which causes a reduction in feelings of relaxation. However, as life slows with approaching retirement in the fifth and sixth decade, pleasant and deactivated affect such as relaxation increases again.

These results indicate that some octants of the circumplex are associated with reciprocal age related changes while others do not. This lead to an investigation of the relationship between affects in the major circumplex categories and is presented in the following section.

7.4 MEANS, STANDARD DEVIATIONS AND CORRELATIONS OF MAJOR CIRCUMPLEX CATEGORIES

Means and standard deviations were also calculated for the eight affective descriptors representing the octants of the circumplex model and are presented below in Table 7.4. Opposing affects are those that are located 180° apart and Table 7.4 presents these affect pairs and their associated correlation.

Table 7.4: Means, Standard Deviations and Correlations for Affect Grouped According to Major Axes of the Circumplex Model

Affect	Mean	SD	Opposing Affect (180°)	Mean	SD	Total	Correlation
Pleasant	69.30	19.27	Unpleasant	25.17	21.31	94.47	-.66
Activated	55.65	17.55	Deactivated	40.26	25.13	95.81	-.20
Unpleasant Deactivated (Low NA)	24.69	20.80	Pleasant Activated (High PA)	58.46	19.96	83.15	-.47
Unpleasant Activated (High NA)	27.90	19.43	Pleasant Deactivated (Low PA)	63.96	19.84	91.86	-.58

The weakest reverse relationship is evident between activated and deactivated affect. Both of these affective descriptors are rated as approximately midway along the response scale. Higher negative correlations result with greatest difference between the means of opposing affect creating polarity in responses.

Weak inverse relationships also exist between the mean scores for unpleasant-deactivated and pleasant-activated affect, and unpleasant-activated and pleasant-deactivated affect. The correlations between the major affect groups are presented below in Figure 7.1 on the circumplex model.

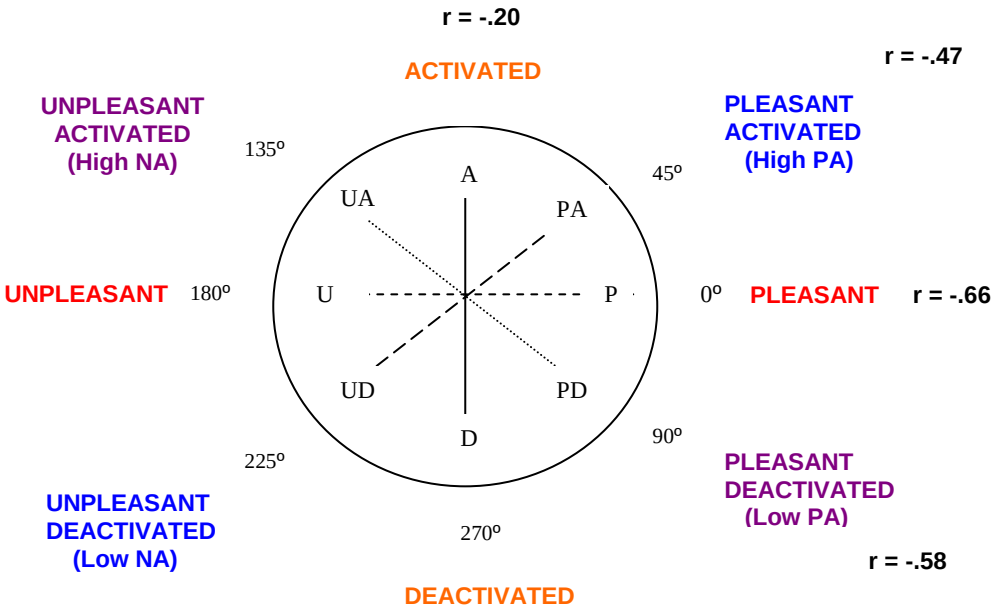


Figure 7.1: Correlations Between Opposing Affects of the Circumplex Model

Greater polarity exists in pleasant and unpleasant affect than in all other regions of the circumplex model. The mean for pleasant affect is approximately the inverse of the mean for unpleasant affect (Total = 94.5). Consistency in the definition of these affect categories is also likely to be responsible for the strong negative correlation (r = -.66). In comparison, the coupling of activation and deactivation with the pleasant-unpleasant axis produces less polarity in responses. The relationship between activation and deactivation alone produces the lowest negative correlation between opposing affects of the circumplex model.

7.5 FACTOR ANALYSIS OF AFFECT ITEMS

A principle components factor analysis was completed to explore the data classification according to valence and activation. An exploratory factor analysis was also necessary to ascertain if confirmatory factor analysis could be used to test the classification of affect according to the major dimensions of the circumplex model.

Inspection of the correlation matrix revealed the presence of all coefficients as .3 or greater and all coefficients were included to investigate possible cross loadings between factors. The Kaiser-Meyer-Oklin value was .95 and the Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. Principal components analysis revealed the presence of four factors with eigenvalues greater than 1. The four factor solution explained a total of 69.62 per cent of the variance, with Factor 1 explaining 45.78 per cent of the variance, Factor 2 explaining 14.39 per cent, Factor 3 explaining 5.35 per cent

and Factor 4 explaining 4.10 per cent. To aid the interpretation of these four factors Oblique rotation was performed producing four correlated factors as presented in Table 6.5 below.

Table 7.5: Oblique Rotation of Four Factor Solution for Unpleasant, Pleasant, Activated and Deactivated Affect Terms (N = 465)

Hypothesised Circumplex Aspect		**Item**	**Factor 1 Unpleasant**	**Factor 2 Pleasant Activated**	**Factor 3 Deactivated**	**Factor 4 Pleasant Deactivated**
U	D	Gloomy	-.80			
U	-	Sad	-.80			
U	-	Upset	-.78			
U	D	Bored	-.78			.33
U	-	Discontent	-.71			
U	A	Annoyed	-.70			
U	D	Depressed	-.65			
U	A	Distressed	-.64			
U	A	Nervous	-.63			
-	A	Aroused		.77		
P	A	Elated		.77		
-	A	Lively		.77		
P	A	Excited		.70		
-	A	Energised		.66		
P	A	Delighted		.63		.30
P	A	Enthusiastic	.37	.63		
-	A	Alert		.62		
P	-	Pleased		.50		.38
-	D	Tired			-.89	
-	D	Fatigued			-.82	
-	D	Exhausted			-.81	
-	D	Sleepy			-.78	
U	A	Stressed			-.50	-.39
U	D	Flat	-.42		-.46	
P	D	Calm				.79
P	D	Relaxed				.78
P	D	At ease				.70
P	D	Serene				.67
P	-	Content				.60
P	-	Satisfied	.37			.54
P	-	Happy		.42		.45
% of variance explained			45.78%	14.39%	5.35%	4.10%

The interpretation of the affect factors is somewhat consistent with the circumplex model. Unpleasant valence is associated with Factor 1, while pleasant valence is associated with Factors 2 and 4. Contrary to the circumplex model, activated items failed to load onto a separate activation factor. Furthermore, no items loaded onto separate factors of unpleasant deactivated affect or pleasant deactivated affect. The factor analysis did not produce four

separate factors of pleasant, unpleasant, activated and deactivated affect and confirmatory factor analysis was therefore unsuitable.

Eight affect items cross-loaded between factors. The items *bored*, *delighted*, *pleased* and *stressed* all cross-loaded on Factor 4 named Pleasant Deactivated Affect. The items *enthusiastic, flat* and *satisfied* all cross-loaded on Factor 1 named Unpleasant Affect and the item *happy* cross-loaded on Factor 2 named Pleasant Activated Affect. Most of these cross-loadings appear to reflect the multiple meanings of affect terms. The most unexpected factoring occurred with *stressed* and *flat* with the four deactivated affects of *tired, fatigued, exhausted* and *sleepy*. *Stressed* and *flat* produced much lower loadings on Deactivated Factor 3 and their unpleasant valence is not consistent with their location on this factor. It is possible that these terms are not clear indicators of the octants of the circumplex they were chosen to represent. In comparison, the item *happy* cross loaded below the item *pleased* on Pleasant Activated Factor 2 and also on Pleasant Deactivated Factor 4 below the item of satisfied. These loadings are consistent with *happy* defined as pleasant affect with more or less activation.

7.6 CIRCUMPLEXITY OF AFFECTIVE DESCRIPTORS

Factor analysis results did not produce useful information about the location of affect according to the circumplex. Therefore, a second model was produced plotting the location of all 31 affective descriptors included in Table 7.1. The CIRCUM program developed by Browne (1992; Fabrigar, Visser & Browne, 1997) was used for this analysis. This program provides an estimate of the polar angle between 0° and 360° for each affect item enabling each item to be plotted on a circle according to the circumplex model. One variable is specified as the reference variable within CIRCUM and the location of this variable is set at 0°. The affect item *pleased* was designated the reference variable consistent with the pleasant pole of the pleasant-unpleasant axis. The locations of the remaining affect items were estimated relative to this reference variable. Communality estimates of all affect items were unconstrained.

The data converged on the solution in 58 iterations and the final model had a total of 67 free parameters producing a model that fitted well: χ^2 (429, N = 460) = 2065.32, $p < .001$, $\chi^2 / df = 4.8$, RMSEA = .09. The model is presented below in Figure 7.2.

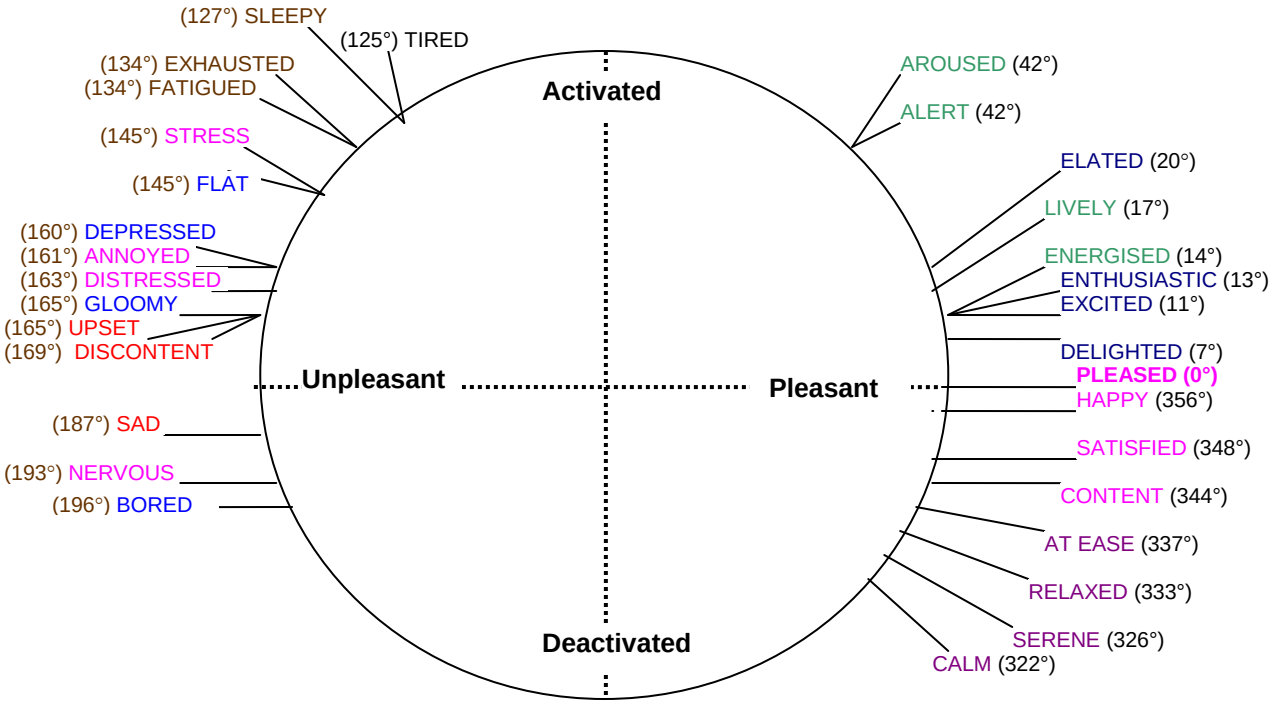


Figure 7.2: A Circumplex Representation of all 31 Affective Descriptors

This model confirms the results of the plotted factor structure. Pleasant, pleasant-activated and pleasant-deactivated affective descriptors are approximately located where expected according to the circumplex model. However, affective descriptors thought to represent unpleasant-activated, unpleasant-deactivated and deactivated affect tend to congregate within the unpleasant and activated quadrant. All deactivated affective descriptors (*tired, fatigued, sleepy, exhausted*) fell within 44° of the activated pole but were expected to fall close to the deactivated pole of the axis. According to the circumplex model, *flat*, *depressed* and *gloomy* were all expected as unpleasant-deactivated descriptors but were located within the unpleasant-activated quadrant. These results suggest that it is possible that all unpleasant affect is conceptualised as simply unpleasant regardless of activation.

In order to advance this analysis, an expert on circumplex theory of affect was contacted for assistance given the unexpected location of the unpleasant-deactivated factor. Associate Professor Lisa Feldman Barrett of Boston College kindly agreed to review the result, and suggested that the affective descriptors *stressed* and *flat* did not fit well semantically with the rest of the data, and significantly influenced the overall model. This was confirmed by further inspection of the correlation matrix and cross-loadings of these items on unexpected factors in the factor analysis. Dr Feldman Barrett also suggested that this was probably caused by an insufficient sample of low arousal, neutral valence affect items, and that this is highly relevant since the items sampled determine the circumplex model produced. Following this advice, a second

circumplex model was evaluated using 29 affective descriptors without the inclusion of the *stressed* and *flat* affect items.

7.6.1 Circumplexity of 29 Affective Descriptors

Once again, the affect item *pleased* was designated the reference variable and its location set at 0° and the locations of the remaining affect items were estimated relative to this reference variable. Communality estimates of all affect items were unconstrained.

The data converged on the solution in 249 iterations and the final model had a total of 91 free parameters producing a model that fit well: χ^2 (344, N = 462) = 1447.15, $p < .001$, χ^2 /*df* = 4.2, RMSEA = .08. The results of the model are shown below in Figure 7.3.

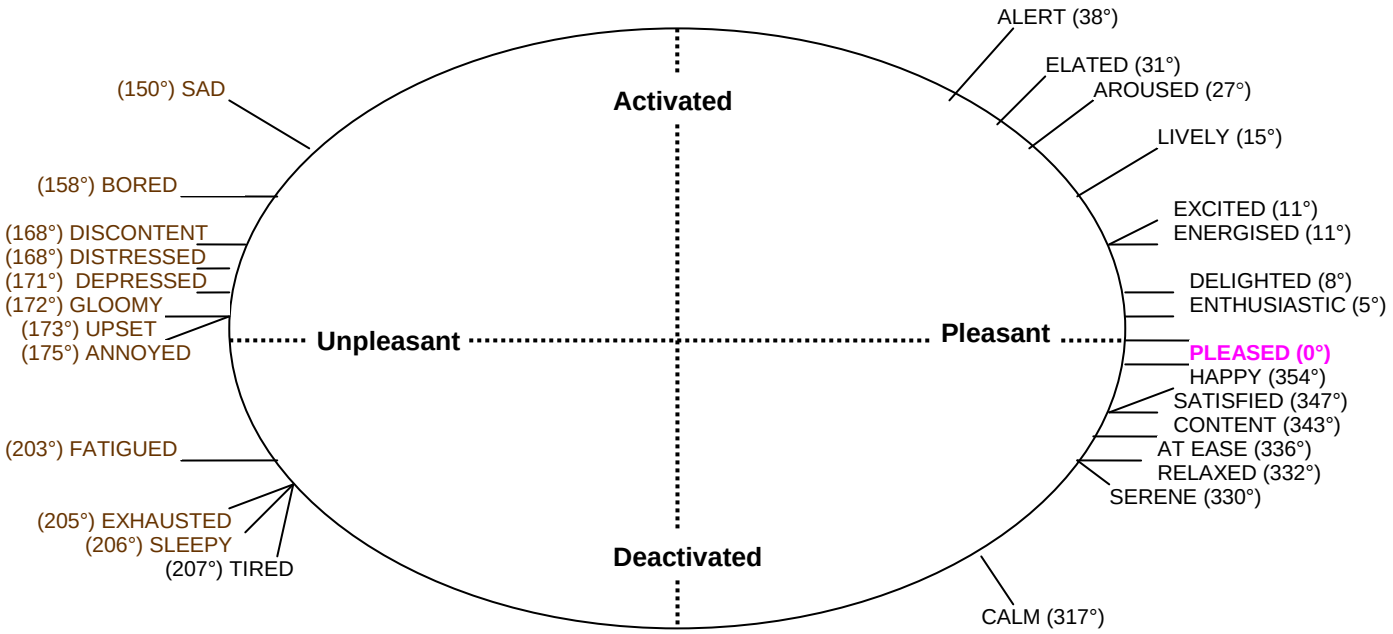


Figure 7.3: A Circumplex Representation of 29 Affective Descriptors

The removal of *flat* and *stressed* from the correlation matrix improved the circumplex model fit. Both the RMSEA decreased to .08 and the affective descriptors were approximately located as expected in order around the perimeter of a circle according to the valence and activation axes. However, the oval shape depicted in Figure 4.4 represents the aggregation of affective descriptors around the poles of the pleasant-unpleasant axis. The descriptors do not load close to the arousal axis, and *calm* is the closest loading affect 47° away from the deactivated pole. This circumplex model is consistent with past affect theory and suggests that the pleasant-unpleasant axis is dominant in the affective component of life satisfaction.

7.7 STANDARD MULTIPLE REGRESSION PREDICTING SATISFACTION WITH LIFE AS A WHOLE BY AFFECT

The above analysis suggests that life satisfaction is largely dominated by pleasant and unpleasant affect. Following this, a standard multiple regression was employed to investigate the predictive power of each individual affective descriptor in explaining satisfaction with life as a whole. This was to investigate if particular affects, especially those referring to valence, explain more variance in life satisfaction than others. The sample size permits such a regression despite the large number of independent variables, fulfilling the formula of $N \geq 50 + 8m$ where m is the number of independent variables (Tabachnick & Fidell, 2001).

Table 7.6 displays the unstandardised regression coefficients (B), the standardized regression coefficients (β), the semipartial correlations (sr^2) and R^2 and adjusted R^2. The R for the regression was significantly different from zero, $F(31, 410) = 25.34$, $p < .001$. Six of the independent variables contributed significantly to prediction of satisfaction with life as a whole: *content* ($sr^2 = .15$), *happy* ($sr^2 = .12$), *energised* ($sr^2 = .09$), *satisfied* ($sr^2 = .08$), *stressed* ($sr^2 = -.08$) and *pleased* ($sr^2 = .06$). The 31 independent variables in combination contributed another .57 in shared variability. Altogether, 66% (63% adjusted) of the variability in satisfaction with life as a whole was predicted by knowing scores on these 31 independent variables of affect ratings.

Table 7.6: Standard Multiple Regression of Affect Terms on Satisfaction with Life as a Whole (N = 441)

Variable	B	β	sr^2
Energised	.01	.17***	.09
Excited	.00	-.05	-.02
Happy	.02	.27****	.12
Serene	.00	.02	.01
Tired	.00	.03	.02
Bored	.00	-.03	-.02
Sad	.00	.01	.01
Alert	.00	-.02	-.01
Elated	.00	.01	.00
Content	.03	.33****	.15
Relaxed	.00	-.05	-.02
Sleepy	.00	.01	.01
Stressed	-.01	-.12**	-.08
Lively	.00	-.05	-.03
Delighted	-.01	-.13	-.06
Pleased	.01	.14*	.06
Calm	-.01	-.07	-.04
Fatigued	.00	-.03	-.02
Gloomy	.00	.07	.03
Upset	-.01	-.07	-.03
Annoyed	.00	.02	.01
Aroused	.00	.01	.01
Satisfied	.01	.18**	.08
At ease	.00	.05	.03
Exhausted	.00	.04	.02

Table 7.6: Standard Multiple Regression of Affect Terms on Satisfaction with Life as a Whole (continued)

Variable	B	β	sr^2
Flat	.00	-.01	-.01
Discontent	.00	.02	.01
Distressed	.00	-.01	.00
Enthusiastic	.00	.01	.01
Nervous	.00	-.02	-.01
Depressed	.00	.00	.00

**** p<.001, *** p<.005 $R^2 = .66^a$
** p<.01, * p<.05 Adjusted $R^2 = .63$
[a]Unique variability = .06; shared variability = .57

The regression suggests the importance of 6 separate affective descriptors that contribute unique variance to the prediction of satisfaction with life as a whole. Of the 6 predictors, 4 include descriptors of pleasant affect and all of these are located within 16° of each other in the circumplex model presented in Figure 7.3. *Energised* is the only pleasant and activated descriptor but is located only 14° above the reference variable of *pleased,* suggesting that it might also be conceptualized as a predominantly pleasant affect. In contrast, *stressed* is the only unpleasant affect descriptor that contributes unique variance to satisfaction with life as a whole, which is consistent with its cross loading status (Table 7.5).

7.7.1 Standard Multiple Regression Predicting Satisfaction with Life as a Whole by Content, Happy, Energised, Satisfied, Stressed and Pleased

The six affective descriptors that contributed unique variance to satisfaction with life as a whole were selected for further analysis. The purpose of this analysis is to compare the amount of variance explained in satisfaction with life as a whole by these top 6 affective descriptors against the amount of variance explained by all 31 affective descriptors. Hence, a standard multiple regression of *content, happy, energised, satisfied, stressed* and *pleased* was performed on satisfaction with life as whole.

Table 7.7 shows that R for the regression was significantly different from zero, F (6, 444) = 131.87, p<.001. Five of the independent variables contributed significantly to prediction of satisfaction with life as a whole: *content* ($sr^2 = .16$), *happy* ($sr^2 = .13$), *energised* ($sr^2 = .06$), *satisfied* ($sr^2 = .10$), and *stressed* ($sr^2 = -.09$). The 6 independent variables in combination contributed another .58 in shared variability. Altogether, 64% (64% adjusted) of the variability in satisfaction with life as a whole was predicted by knowing scores on these 6 independent variables of affect ratings.

Table 7.7: Standard Multiple Regression Predicting Life Satisfaction by Six Key Affective Descriptors

Variable	LAW	1.	2.	3.	4.	5.	B	β	sr^2
1. Energised	.58						.07*	.09	.06
2. Happy	.72	.67					.21***	.24	.13
3. Content	.73	.56	.74				.24***	.29	.16
4. Satisfied	.73	.60	.77	.78			.17***	.20	.10
5. Stressed	-.41	-.25	-.35	-.39	-.39		-.07**	-.10	-.09
6. Pleased	.65	.46	.33	.72	.77	-.31	.02	.03	.02

** p<.05; ** p<.005; *** p<.001 $R^2 = .64^a$

[a]Unique variability = .06; shared variability = .58 Adjusted $R^2 = .64$

These mainly pleasant affective descriptors predict over 60% of satisfaction with life as a whole and it appears that life satisfaction is largely a measure of pleasant affect. The importance of *energised* in this list of key predictors indicates that energy and motivation are also important in life satisfaction. This kind of pleasant and activated affect is assumed to assist with the achievement of goal directed activity which is important to a sense of overall life satisfaction. In contrast, *stressed* is the only unpleasant affective descriptor included with these predictors and has a negative relationship with life satisfaction. This unpleasant-activated descriptor is a modern day adjective used to describe how busy or time-pressed an individual is. However, s*tressed* is an ambiguous term that may also be used by busy people who experience a high, or a sense of purpose, despite the unpleasant valence of the term.

7.7.2 Hierarchical Multiple Regression Predicting Satisfaction with Life as a Whole by Key Affect Predictors and Personal Domains of SWB

In order to determine whether the Personal Wellbeing Index explained variance in 'Life as a whole' beyond the key affective predictors, a hierarchical regression was performed.

Table 7.8 shows that, after all 13 independent variables were entered into the equation, $\underline{R} = .87$, $\underline{F}(13, 437) = 99.68$, $\underline{p} < .001$. The best predictors of satisfaction with life as a whole were the personal domains of standard of living, achievements in life and personal relationships and the affective descriptors of *content* and *happy*.

Table 7.8: Hierarchical Multiple Regression Predicting Satisfaction with Life as a Whole by Key Affect Predictors and Personal Domains (N = 450)

Variable	B	β	sr^2 (incremental)
Step 1			
1. Energised	.07*	.09	.64***
2. Happy	.21***	.24	
3. Content	.24***	.29	
4. Stressed	-.07**	-.10	
5. Pleased	.02	.03	
6. Satisfied	.17***	.20	
Step 2			
1. Energised	.02	.02	.11***
2. Happy	.09*	.10	
3. Content	.16***	.19	
4. Stressed	-.04*	-.06	
5. Pleased	.01	.01	
6. Satisfied	.08	.09	
7. Standard of living	.23***	.26	
8. Health	.05	.06	
9. Achievements	.19***	.20	
10. Personal relationships	.12***	.14	
11. Safety	.00	-.01	
12. Community Connectedness	.04	.05	
13. Future security	-.05	-.07	
			R^2 = .75
*p<.05; **p<.005; ***p<.001			Adjusted R^2 = .74
			R = .87***

The addition of the personal domains to the regression equation containing only the key affect predictors results in a significant increment in $\underline{R}^2$. This suggests that satisfaction with life as a whole is not only a measure of affect and these domains contribute additional unique variance.

7.7.3 Correlations Between Affect, Extraversion and Neuroticism

Extraversion and neuroticism are argued as being important predictors of life satisfaction and are thought to relate to pleasant and unpleasant affects (Cummins, Gullone & Lau, 2002). The contributions of these aspects of personality were assessed as part of a separate research project and formed a sub-sample of the total sample (N=75). Extraversion and neuroticism were measured by the Revised NEO Personality Inventory Short Form (Costa & McCrae, 1992).

Before investigating the predictive power of neuroticism and extraversion in explaining life satisfaction, correlations were calculated between the major personality dimensions. These correlations are presented in Table 7.9 below.

Table 7.9 Correlations Between Affective Descriptors, Neuroticism and Extraversion (N = 138)

Affect Type	Correlation With Extraversion		Affect Type	Correlation with Neuroticism	
Pleasant	Pleased	0.51	Pleasant	Pleased	-0.47
Pleasant	Happy	0.49	Pleasant	Happy	-0.39
Pleasant	Satisfied	0.44	Pleasant	Satisfied	-0.54
Pleasant	Content	0.43	Pleasant	Content	-0.49
Unpleasant	Sad	-0.31	Unpleasant	Sad	0.50
Unpleasant	Discontent	-0.38	Unpleasant	Discontent	0.58
Unpleasant	Upset	-0.44	Unpleasant	Upset	0.64
Activated	Lively	0.49	Activated	Lively	-0.39
Activated	Energised	0.47	Activated	Energised	-0.36
Activated	Alert	0.36	Activated	Alert	-0.15
Activated	Aroused	0.32	Activated	Aroused	-0.12
Deactivated	Fatigued	-0.15	Deactivated	Fatigued	0.61
Deactivated	Sleepy	-0.19	Deactivated	Sleepy	0.36
Deactivated	Tired	-0.19	Deactivated	Tired	0.47
Deactivated	Exhausted	-0.19	Deactivated	Exhausted	0.59
Pleasant Activated	Delighted	0.49	Pleasant Activated	Delighted	-0.43
Pleasant Activated	Enthusiastic	0.45	Pleasant Activated	Enthusiastic	-0.54
Pleasant Activated	Elated	0.56	Pleasant Activated	Elated	-0.37
Pleasant Activated	Excited	0.54	Pleasant Activated	Excited	-0.32
Pleasant Deactivated	At Ease	0.40	Pleasant Deactivated	At Ease	-0.58
Pleasant Deactivated	Serene	0.37	Pleasant Deactivated	Serene	-0.43
Pleasant Deactivated	Calm	0.28	Pleasant Deactivated	Calm	-0.44
Pleasant Deactivated	Relaxed	0.27	Pleasant Deactivated	Relaxed	-0.51
Unpleasant Activated	Annoyed	-0.39	Unpleasant Activated	Annoyed	0.56
Unpleasant Activated	Distressed	-0.27	Unpleasant Activated	Distressed	0.62
Unpleasant Activated	Nervous	-0.27	Unpleasant Activated	Nervous	0.51
Unpleasant Activated	Stressed	-0.23	Unpleasant Activated	Stressed	0.54
Unpleasant Deactivated	Gloomy	-0.42	Unpleasant Deactivated	Gloomy	0.69
Unpleasant Deactivated	Depressed	-0.35	Unpleasant Deactivated	Depressed	0.72
Unpleasant Deactivated	Bored	-0.34	Unpleasant Deactivated	Bored	0.49
Unpleasant Deactivated	Flat	-0.24	Unpleasant Deactivated	Flat	0.68

Extraversion is strongly related to pleasant, pleasant-activated, pleasant deactivated and activated affects. In comparison, neuroticism is even more strongly related to unpleasant, unpleasant-deactivated, unpleasant-activated and deactivated affect.

7.7.4 Standard Multiple Regression Predicting Satisfaction with Life as a Whole by Extraversion and Neuroticism

Considering the strong association between extraversion, neuroticism and affect, an initial standard multiple regression was conducted to examine the variance explained in satisfaction with life as whole by extraversion and neuroticism alone. Table 7.10 shows that R for the regression was significantly different from zero, F (2, 73) = 8.93, $p < .001$. Only neuroticism contributed significantly to prediction of satisfaction with life as a whole ($sr^2 = .35$). Altogether, 20% (18% adjusted) of the variability in satisfaction with life as a whole was predicted by knowing scores on neuroticism and extraversion.

Table 7.10 Standard Multiple Regression Predicting Satisfaction with Life as a Whole by Neuroticism and Extraversion (N = 75)

Variable	LAW	2.	B	β	sr^2
1. Neuroticism	-.44		-3.41*	-.39	-.34
2. Extraversion	.29	-.49	1.12	.10	.09

* p<.005 $R^2 = .20^a$

[a]Unique variability = .12; shared variability = .08 Adjusted $R^2 = .18$

Neuroticism is a better predictor of satisfaction with life as a whole than extraversion. However, despite strong correlations with affect, these major aspects of personality explain less than a fifth of the variance in overall life satisfaction.

7.7.5 Hierarchical Multiple Regression Predicting Satisfaction with Life as a Whole by Key Affect Predictors, Extraversion and Neuroticism

The results above suggest that neuroticism and extraversion explain 20% of the variance in life satisfaction, which is much reduced compared to the 64% of variance explained by the 6 key affect terms. In order to determine the separate contributions of affect, extraversion and neuroticism as predictors of 'Life as a whole', a further hierarchical multiple regression was performed.

Table 7.11 shows that R was significantly different from zero at the end of step 1 with key affect predictors entered into the equation. After all 13 independent variables were entered into the equation, $R^2 = .64$, F_{inc} (6, 69) = 20.49, $p < .001$. After step 2, with extraversion and neuroticism added to the prediction of life satisfaction, $R^2 = .66$ (adjusted $R^2 = .62$), F_{inc} (8, 67) = 16.47, $p < .001$. The addition of extraversion and neuroticism to the equation did not reliably improve R^2 despite the contribution of additional unique variance.

Table 7.11: Hierarchical Multiple Regression Predicting Satisfaction with Life as a Whole by Extraversion, Neuroticism and Key Affect Predictors (N = 75)

Variable	B	β	sr^2 (incremental)
Step 1			
1. Energised	.07	.09	.64**
2. Happy	.21	.24	
3. Content	.24*	.29	
4. Satisfied	.17	.20	
5. Stressed	-.07	-.10	
6. Pleased	.02	.03	
Step 2			
1. Energised	.10	.12	.02
2. Happy	.25*	.29	
3. Content	.23*	.28	
4. Satisfied	.15	.18	
5. Stressed	-.06	-.09	
6. Pleased	.06	.07	
7. Neuroticism	-.54	-.06	
8. Extraversion	-2.18*	-.19	
			R^2 = .66
* p<.05; ** p<.001			Adjusted R^2 = .62
			R = .81

This regression is limited by a small sample size, however the analysis suggests that affect is a better predictor of satisfaction with life as a whole than the major personality dimensions of extraversion and neuroticism. Once more, pleasant affective descriptors represented by *happy* and *content* contribute unique variance to the explanation of satisfaction with life as a whole, and all pleasant descriptors correlate strongly with life satisfaction. Extraversion also contributes unique variance but the inclusion of the two major personality concepts only explains an additional 2% of variance in life satisfaction beyond the top 6 affective descriptors.

7.7.6 Hierarchical Multiple Regression Predicting Satisfaction with Life as a Whole by Key Affect Predictors, Personal Wellbeing, Extraversion and Neuroticism

The regression above suggests that the 6 key affect terms, particularly those of pleasant valence, are better predictors of life satisfaction than the major personality dimensions of extraversion and neuroticism. This regression explained 66% of the variance in satisfaction with life as a whole. A final hierarchical regression analysis was completed to investigate if variance in life satisfaction could be increased with the addition of Personal Wellbeing. In this analysis, Personal Wellbeing, key affect terms, neuroticism and extraversion were all regressed against satisfaction with life as a whole.

Table 7.12 shows that $\underline{R}$ was significantly different from zero at the end of step 1 with affect items entered into the equation $\underline{F}_{inc}$ (6, 69) = 20.49, $p < .001$. After step 2, with Personal Wellbeing added to the prediction of life satisfaction, $\underline{R}^2$ =

.70, $\underline{F}_{inc}$ (7, 68) = 22.18, p < .001. After step 3, with extraversion and neuroticism added to the prediction of life satisfaction, $\underline{R}^2$ = .72 (adjusted $\underline{R}^2$ = .68), $\underline{F}_{inc}$ (9, 66) = 18.56, p < .001. The addition of extraversion and neuroticism to the equation did not reliably improve $\underline{R}^2$ despite the contribution of additional unique variance.

Table 7.12: Hierarchical Multiple Regression Predicting Satisfaction with Life as a Whole by Key Affect Predictors, Personal Wellbeing, Extraversion and Neuroticism (N = 75)

Variable	B	β	sr^2	sr^2 (incremental)
Step 1				
1. Energised	.07	.09	.06	.64***
2. Happy	.21	.24	.13	
3. Content	.24*	.29	.16	
4. Satisfied	.17	.20	.10	
5. Stressed	-.07	-.10	-.09	
6. Pleased	.02	.03	.02	
Step 2				
1. Energised	.01	.01	.01	.06**
2. Happy	.10	.12	.06	
3. Content	.20*	.24	.14	
4. Satisfied	.13	.16	.08	
5. Stressed	-.04	-.06	-.06	
6. Pleased	.01	.01	.00	
7. Personal Wellbeing	.45**	.37	.23	
Step 3				
1. Energised	.04	.05	.03	.02
2. Happy	.14	.16	.08	
3. Content	.20*	.24	.13	
4. Satisfied	.11	.13	.07	
5. Stressed	-.04	-.05	-.04	
6. Pleased	.04	.05	.03	
7. Personal Wellbeing	.44**	.37	.23	
8. Neuroticism	-.44	-.05	-.03	
9. Extraversion	-2.12*	-.19	-.15	
				R^2 = .72
*p<.05; **p<.005; ***p<.001				Adjusted R^2 = .68
				R = .85

The 6 key affective descriptors explain 64% of the variance in life satisfaction and only an additional 6% of variance is explained with the addition of Personal Wellbeing. Considering that most of the key affect items are pleasant affect, the regression indicates significant overlap between affect and Personal Wellbeing. This was confirmed by a strong canonical correlation (r = .77) between the 6 key affect terms and Personal Wellbeing. No additional variance in life satisfaction was contributed by extraversion and neuroticism after the inclusion of affect and Personal Wellbeing.

SUMMARY

All of the above results confirm a strong affective component in life satisfaction and SWB. Examination of the affective component according to the circumplex model suggests that the two major axes of pleasant-unpleasant and activated-deactivated are not of equal strength. The pleasant-unpleasant axis is dominant in all affective investigations including means, factor analyses, multiple regressions and plots of affective descriptors.

The dominance of the pleasant-unpleasant axis of the circumplex was initially suggested by the means and standard deviations for each individual affective descriptor. When asked to rate affect in relation to life in general, the highest means were for pleasant affect terms and the lowest means unpleasant affect terms, with activated and deactivated terms located between these extremes. These means were also consistent with the elliptical shape produced for the circumplex model when affective descriptors were plotted around the perimeter of a circle. The oval shape indicated that affect terms aggregated around the poles of the pleasant-unpleasant axis of the model.

The affective component of life satisfaction was confirmed when all affect terms were regressed on life satisfaction. Multiple regression analyses found that 64% of the variance in life satisfaction was explained by the entire list of affect terms or the top six terms of *content, happy, energised, satisfied, stressed* and *pleased*. Four of these top six predictors represent the pleasant axis of the circumplex consistent with the dominance of pleasant affect in life satisfaction. When the personal domains of standard of living, health, achievements in life, personal relationships, safety, community connectedness, and future security were added to the regression equation, an additional 11% of variance was explained in life satisfaction. These personal domains explain unique variance beyond affect suggesting that both affect and cognition are unique predictors of life satisfaction.

The two major dimensions of personality were also regressed on life satisfaction to determine if personality contributes additional variance beyond affect. The major personality dimensions of extraversion and neuroticism alone explain only 20% of the variance in life satisfaction, compared to 64% of variance explained by affect. When the top 6 affective descriptors were added to the regression equation, the additional variance explained by neuroticism and extraversion was reduced to only 2%, with only extraversion contributing unique variance. This suggested that both affect and personality are important predictors of life satisfaction but significant overlap appears to exist within the concepts. Such overlap was confirmed by strong correlations between affect with extraversion and neuroticism, particularly pleasant and unpleasant affect terms.

The regression of affect, Personal Wellbeing, neuroticism and extraversion on life satisfaction revealed significant overlap between the three concepts. The results suggest that affect and Personal Wellbeing are measuring the same thing and only an additional 6% of variance in life satisfaction is explained by Personal Wellbeing. The major personality dimensions of neuroticism and extraversion did not increase the explained variance in life satisfaction.

CHAPTER 8: STUDY 2 DISCUSSION

Perceptions of wellbeing are understood to comprise affective and cognitive components (Campbell et al., 1976; Cummins, Gullone et al., 2002). However, the following discussion addresses only the affective component as investigated in the results section of chapter 4. The role of both affect and cognition will be addressed in the final study, and for simplicity, '*satisfied'* is referred to as a purely affective descriptor in the discussion below.

The results of the second study confirm that affect is a strong component of life satisfaction. In particular, the pleasant-unpleasant axis of the circumplex model is important to evaluations of life. This was evident in the means and standard deviations, correlations, regressions, factor structure and the circumplex structure of affect. The following chapter will discuss the affective component of SWB in terms of the circumplex model, age and gender differences in affect and the dominance of pleasant and unpleasant affect in life satisfaction. Implications of the current results are discussed in terms of the measurement of SWB and the chapter concludes with a proposed model of SWB homeostasis that includes affect.

Pleasant and Unpleasant Affect in Life Satisfaction

When asked to think about their lives in general, mean scores were highest for pleasant and pleasant-deactivated affect. *Happy, content, satisfied* and *pleased* produced the highest mean scores while *depressed*, *upset, gloomy,* and *distressed* produced the lowest mean scores. Other affect terms produced intermediate values. The affective descriptors of the activation axis of the circumplex model are less dichotimised. This suggests that the hedonic aspect of affect is more prominent in feelings about life than activation.

The Dominance of Pleasant and Unpleasant Affect in Theories of Affect

The predominant strength of the pleasant-unpleasant aspect of emotion in the current results are consistent with early psychological theories of emotion proposed by Freud (1917/1966) and Wundt (Blumenthal, 1975; Rosensohn, 1963) in the 19th Century. Freud's psychoanalytic theory centres on the Id's insatiable appetite for pleasure, and the struggle between the ego and the superego in controlling this (Mitchell & Black, 1995). Similarly, Wundt argued that pleasure and displeasure formed one of the three paramount pairs of simple feelings and introduced the dimensions of excitation and quiescence, and strain and relaxation, to his theory of emotion (Blumenthal, 1975; Rosensohn, 1963). Later Woodworth (Woodworth & Schlosberg, 1938) and Schlosberg (Schlosberg, 1941, 1952, 1954) formulated these aspects into the circumplex theory of affect.

The importance of pleasant-unpleasant affect, and the combination of these with various levels of activation in the present results, supports these historical theories of affect. The circumplex theory, first defined by Schlosberg (1952,

1954) and later by Russell (1980), suggests equal contribution from the pleasant-unpleasant and activated-deactivated axes. The current results, however, clearly indicate that the pleasant-unpleasant axis dominates within the current data set.

The domination of pleasant-unpleasant affect was also found in an investigation of dispositional mood by Huelsman, Nemanick & Munz (1998). These authors discovered that students' commonsense notions of mood rely more on a general understanding of good moods and bad moods than on activation. In discussions with people unfamiliar with theoretical models of affect, the authors found that adjectives representing tiredness (*exhausted, fatigued, tired, weary, worn out*) and unpleasant-activated affect (*aggravated, agitated, hostile, irritable, upset, uptight*) were simply classified as variations of the same bad-mood theme. Energy levels were not thought of as being a part of their moods. Similarly, it is possible that laypersons' feelings in relation to life are usually conceptualized as good, positive or pleasant as opposed to bad, negative or unpleasant. In general, and consistent with Huelsman, et al., (1998), it is argued that descriptions of feeling *tired, fatigued* or *exhausted* with life are commonly conceived as unpleasant feelings while adjectives like *enthusiastic, energised* or *delighted* represent pleasant feelings despite their associated levels of activation.

Affect valence dominance has also been found in studies of self-reported mood. In a comparison between self-reported and semantic mood circumplexes, Feldman (1995a; 1995b) found that affect valence accounted for greater variance in mood ratings than arousal. The author suggested that a more elliptical circumplex seems appropriate, which is consistent with the current results.

High correlations between depression and anxiety can also help to explain the imperfect circular shape of the circumplex model. A comparison of the angles between anxiety and depression in different circumplex models was completed by Feldman (1995a). As correlations between anxiety and depression terms increased, the importance of the arousal dimension decreased and the terms were located closer to the unpleasant pole of the pleasant-unpleasant axis. Furthermore, when depression and anxiety terms were plotted according to the circumplex and compared to the theoretical semantic model, the size of the arousal dimension decreased between 25% and 50%. It was suggested by Feldman (1995a) that the weight of the arousal dimension may vary according to the context of assessment or arousal related terms (*e.g. aroused, sleepy, relaxed*) and, thus, they do not refer to basic mood states (Ortony et al., 1987). It is also possible that mood states such as depression and anxiety are primarily classified as unpleasant moods, regardless of arousal. However, this is in contrast to theoretical definitions of the mood states. For example, when undergraduate students were asked to provide semantic definitions, depression and anxiety were defined according to equal contributions of valence and arousal (Feldman, 1995). These theoretical definitions are also consistent with DSM IV (American Psychiatric Association, 1994) definitions where depression is defined as unpleasant and deactivated affect, and anxiety as unpleasant and activated affect.

In conclusion, valence is most prominent in the circumplex model using the current data. A perfect circular shape is consistent with semantic definitions of affect but incongruent with the dominance of the pleasant-unpleasant axis. This was confirmed in factor analysis and circumplex modelling.

Factor Structure of Affect

The factor structure of the 31 affective descriptors also supports the dominance of affect valence in the circumplex. When all affective descriptors were subjected to principal components analysis, affect was classified into two positive and two negative factors where the greatest proportion of variance was explained by the negatively loading factor of unpleasant affect. All unpleasant affective descriptors except for *stressed* and *flat* were classified into this one major factor regardless of activation.

Greater differentiation between valence and activation exists in pleasant affect, with activated and pleasant-activated affect factoring together, while pleasant and pleasant-deactivated affect factored together. All of the affective descriptors of deactivated affect factored together with the exception of *stressed* and *flat* which respectively cross-loaded with pleasant and unpleasant factors. The cross-loading of *stressed* on the deactivated and pleasant factors is most likely an indication of the multiple affects that the term describes. Stress is associated with depleted personal resources, fatigue and being worn out, but is also used to describe a sense of purpose and importance which is pleasant. Similarly, feeling flat is nearly as much a state of deactivation and lack in energy as it is unpleasant. Common use of the term flat is often used synonymously with feeling down or mildly depressed.

Circumplex Structure of Affect

The affective descriptors conformed to the circumplex model but the spread across the 360° was restricted beyond the pleasant-unpleasant axis. No affective descriptors were located precisely on the activated-deactivated axis and few were located in the unpleasant-deactivated quadrant. A number of reasons may explain the unexpected presence of deactivated affective descriptors in the unpleasant-activated quadrant. These affective descriptors are associated with increases in expended energy which are similarly conceived to activation. Alternatively, as has been suggested, affect in relation to life might simply be classified as pleasant or unpleasant producing strong relationships between all types of affect regarded as unpleasant despite differing activation levels. Deactivation and a lack of energy are commonly conceived as unpleasant or undesirable, perhaps even associated with illness or psychopathology. In comparison, activation combined with pleasant affect is conceived as separate to pleasant affect because of the positive connotations associated with energy and motivation in society today.

In conclusion, the activation component of affect in life evaluation is dominated by affect valence. Activation is usually defined as pleasant and deactivation as unpleasant, and no affect was solely defined according to activation level. The strength of the pleasant-unpleasant axis was confirmed in the relationship between the major circumplex categories.

The Major Circumplex Categories of Affect

Correlations between the major circumplex categories were calculated to compare the relationship between self-reported affect and the theoretical circumplex model. As the model suggests, pleasant and unpleasant affect are strongly negatively correlated, and high levels of pleasant affect are associated with reciprocally low levels of unpleasant affect. This is not unlike the early conception of affect balance first proposed by Bradburn (1969), who suggested that happiness is a balance between positive and negative affect. Furthermore, the presence of unpleasant and pleasant affect suggests that individuals can report the presence of mixed pleasant and unpleasant feelings about life at the same time, concordant with Larsen, McGraw & Cacioppo (2001) and Schimmack (2001). Thus, pleasant and unpleasant affect cannot be regarded as purely bipolar constructs because true bipolarity, using unipolar response formats, is argued as being the absence of one dimension in the presence of another dimension (Russell & Carroll, 1999a). If a bipolar relationship exists between two opposing types of affect and they are assessed with a unipolar scale, the relationship between them is mathematically argued by Russell & Carroll (1999a) to be -.47. This is somewhat lower than the current result of -.66 between pleasant and unpleasant affect. As mean scores of pleasant and unpleasant affective descriptors approximate mirror images, these affects are related to each other in a reciprocal relationship when assessed using a unipolar response format.

The opposing quadrants of the circumplex, represented by unpleasant-activated and pleasant-deactivated affect, are also strongly negatively correlated ($r = -.58$), as is unpleasant-deactivated and pleasant-activated affect, but to a lesser extent ($r = -.47$) consistent with Russell & Carroll's (1999a) definition of bipolarity. The lower negative relationships between opposing quadrants of the circumplex is associated with greater emphasis on the activation-deactivation axis. Common, shared understanding of activated-deactivated affect is not as consistent as the pleasant-unpleasant component, producing lower negative correlations. This is also consistent with the argument that the pleasant-unpleasant axis of the circumplex is the dominant component of self-reported affect.

When considering affect in relation to life, it is possible that affective descriptors, characteristic of activated or deactivated affect, are first categorised into pleasant or unpleasant, good or bad, regardless of activation. For example, affective descriptors such as *tired* or *exhausted* are conceptualised as unpleasant before they are classified as deactivated, while others such as *lively* and *energised* are conceptualised as pleasant before they are classified as activated because of a sense of motivated energy in the descriptors. In comparison, *sleepy* might be associated with contentment and relaxation or boredom instead of purely

deactivated affect, while *aroused* might be connected to pleasure as in sexual arousal. Such examples demonstrate the ambiguity associated with affective descriptors thought to represent the activated-deactivated axis of the circumplex, and a tendency for all affect to be classified according to the dominant aspect of hedonic tone.

Gender Differences in Affect

Despite the significant literature on the circumplex model of affect, few studies have investigated gender differences of the specific affects associated with different areas of the circumplex model. These gender differences were investigated in the present study to determine whether men and women reported different affect in relation to feelings about their life in general. It was found that women reported higher levels of pleasant-activated affect than men, while men reported higher levels of the pleasant-deactivated affect of *calm*. Women also reported higher levels of the unpleasant-activated affect of *nervous*.

The finding that women reported feeling more intense affect in relation to their lives than men, is consistent with past research (Diener, Sandvik, & Larsen, 1985; Feldman Barrett, Robin, Pietromonaco, & Eyssell, 1998; Fujita, Diener, & Sandvik, 1991; Mackinnon & Keating, 1989). A number of reasons can be suggested. Firstly, sex role stereotypes might influence these results. Past and contemporary psychological and sociological views present women as experiencing greater intensity and expression of emotion. For example, the majority of Freud's studies of hysteria focused on women beginning with the famous case of Anna O (Freud & Breuer, 1895) and popular culture continues to portray women as more emotional than men. Perhaps gender role differences teach girls at an early age to discuss and express emotional experiences more easily than young boys who model the more contained emotional expression of adult men. The enhanced male response of *calm* in life evaluation is consistent with this suggestion. The traditionally accepted gender role for women encourages the expression of all emotion, particularly the pleasant and friendly affect of a "lady". In contrast, the traditionally accepted gender role for men restricts emotional expression, does not encourage discussion of emotional experiences, is more less activated and intense, and is commonly described as the "boys don't cry" phenomena. Women are taught to communicate and identify emotions while men are not. These opposing gender roles might actually influence the experience of emotion so that the expressive and intense role for females gears the brain towards the experience of more intense emotion, while the restricted and contained role for males gears the brain towards the experience of less intense emotion. Alternatively, social desirability may lead to men and women responding to different affects associated with gender relevant personality traits as suggested by Costa, Terracciano & McCrae (2001).

An alternative explanation for the gender differences relates to the type of question proposed. Participants were asked to rate how each affect described their feelings when they thought about their life in general which requires a global assessment of their current life situation. When Feldman Barrett, Robin,

Pietromonaco & Eyssell (1998) asked undergraduates to rate affect intensity and feelings according to the NEO-PI R (Costa & McCrae, 1992a), gender differences appeared in global retrospective descriptions of emotional characteristics but not when emotional reactions were documented on a momentary basis. Women described themselves as more affectively intense, more open and sensitive to their feelings, more anxious, sad and happy than men when making these global retrospective self-descriptions. If the "describe how you feel about your life in general" item is interpreted as reflecting a more global retrospective assessment compared to a momentary assessment then the questions style itself might influence gender differences. Feldman Barrett et al., (1998) argue that retrospective ratings of emotional characteristics function as emotional traits while momentary ratings function as state measures of emotion. If so, the current study provides evidence of few gender differences in trait affective experiences in relation to life in general. Alternatively, some individuals might interpret the item according to a current and abstract measure of affect, similar to state measures, and is consistent with Russell's (2003) definition of core affect. If so, then gender differences in affect could be related to alternative state and trait interpretations of the item.

Age Differences in Affect

One of the most important age differences in the experience of affect is the general trend for pleasant affect to follow a similar pattern to life satisfaction. Pleasant affect and global life satisfaction tend to conform to a u-shaped pattern of change as age increases. This is consistent with age related changes in SWB assessed by the Australian Unity Wellbeing Index involving quarterly surveys of 2000 Australians, beginning in 2001 (Cummins et al., 2003b). SWB gradually increases over the lifespan but shows a decrease between the ages of 36-55 before increasing again from 56 years and on. Several reasons have been suggested (Cummins et al., 2003b). An initial increase in SWB before the age of 25 is generally associated with an increase in financial and personal freedom. However, this occurs before a decrease in wellbeing across the ages of 36-55 which is thought to be associated with dual responsibilities of family, career and finance. Later in life work and financial pressures ease, resulting in increased levels of SWB. In the current study, feelings of *contentment* produced significant differences with age in line with the age related pattern of SWB, and similar patterns are also present in other measures of pleasant affect including *satisfaction*, *happiness* and feeling *pleased* with life. In contrast, unpleasant affect tended to produce the reverse relationship. Even though the only significant relationship was between feelings of *discontent* and age, the trend is also present with feelings of *upset* and *sad*.

Unpleasant-activated affect, described by feelings of *stress*, *distress* and *annoyed*, peaked during middle age then decreased with time. Unpleasant-deactivated affect such as *boredom* decreased with age after a middle age peak at 55-65 years, presumably around the age of retirement. Feeling *flat*, also a measure of unpleasant-deactivated affect remained higher across the first four decades of life and then dropped after the age of 55. Deactivated affect, described by feeling

fatigued, *sleepy* or *exhausted*, all decreased with age, while feeling *tired* tended to peak across the ages of 36-45 years. In general, deactivated affect decreased with age and younger people are more likely to report feeling greater levels of tiredness than older people, which is most likely the direct result of the demands of life at different stages of the lifespan. The pleasant-activated affect of *excitement* also decreases with age, and a less stable pattern of decrease is also apparent in the pleasant activated affect represented by feelings of *elation*, *enthusiasm* and *delight*. Perhaps these results suggest a gradual decrease of all types of activation, whether pleasant or unpleasant across the lifespan, which may reflect life experience. As age increases, fewer novel life experiences occur, individuals become familiarized with life, and energy levels deplete. It is possible that the experience of low arousal affect states is commonly conceived as undesirable. Alternatively, the desirability of certain affective states may be dependant on age and cultural differences.

The personality literature supports such age related differences in affect. Life span changes in the traits associated with extraversion, neuroticism and openness to experience generally decline from young adulthood into older adulthood, while small changes occur in conscientiousness and agreeableness, the direction depending on culture (McCrae et al., 2000). These patterns in personality might also reflect associated changes in affect across the lifespan. If the experience of all types of activated affect decreases with age, it would also help to explain the decline in neuroticism and extraversion with age, depending on the possible causal nature of the relationship.

Extraversion is associated with sociability, activity, energy, excitement, and a cheerful disposition (Costa & McCrae, 1992a), and represent pleasant and activated affect. The present results support this, with feelings of excitement about life steadily decreasing with age. Neuroticism is a measure of emotional distress, irrational ideas, inability to cope with stress and a general tendency to experience fear, anger, sadness, embarrassment, guilt, and disgust (Costa & McCrae, 1992a). The affects associated with neuroticism reflect unpleasant and activated affect, and in terms of feelings about life, stress, distress and annoyance all decreased with age. Thus, personality change and affect patterns appear to be very closely linked, particularly in terms of activated affect states. Therefore, it is not surprising extraversion is associated with Watson & Tellegen's (1985) positive and negative affect, which include only high pole pleasant-activated and unpleasant-activated affect.

It is clear that personality and affect are closely related in SWB. However, the exact nature of the relationship is unclear, even though age related changes are similar. Consequently, it is important that key affects involved in life satisfaction are first determined before personality is investigated.

Affect & Satisfaction with Life as a Whole

The inclusion of all 31 affective descriptors in regression analyses predicted an astounding 64% of the variance in individual ratings of satisfaction with life.

Moreover, this was achieved by only 6 significant key affective descriptors. Four of these are represented as pleasant affect, and their location on the pleasant axis was confirmed when plotted on the circumplex model. *Stressed* was also a significant predictor of life satisfaction and was located in the unpleasant activated quadrant of the circumplex. *Energised,* the other significant predictor was confirmed to represent pleasant and activated affect, though appears closer to the pleasant axis at 14° above the reference variable of *pleased.*

All four pleasant affect terms are included in the six key affective predictors of global life satisfaction. Despite the inherent activation included in *energised,* I consider it to be more an assessment of pleasant affect than pleasant-activated affect, consistent with the pleasant affective descriptors. The inclusion of *stressed* as a key predictor appears less predictable. Factor analysis results indicate that *stressed* loads nearly as highly (negatively) on the pleasant affect factor as it does positively on the deactivated and unpleasant factor. As discussed earlier, this is probably because stress conveys multiple meanings in society today. It can be used to describe unpleasant affect, especially in terms of physiological symptoms and anxiety, or it can be used to describe being busy, important and driven, which are associated with pleasant affect.

Considering the predominance of pleasant affects as predictors of life satisfaction, it is argued that the subjective evaluation of life satisfaction is predominantly an assessment of pleasant affect. Asking individuals to rate life satisfaction immediately activates pleasant affect. Furthermore, the strong association between pleasant affect and life satisfaction should be expected because the term satisfaction is itself a descriptor of pleasant affect. Use of the word satisfaction effectively primes the brain for pleasant affect. Regression analyses support the overlap between pleasant affect and satisfaction ratings of SWB. Only an additional 6% of variance is in life satisfaction is explained when SWB is added after key affect terms. Thus, SWB provides a measure of pleasant affect without asking people to comment directly on their feelings. Study 1 revealed that pleasant and unpleasant affect exist within a reciprocal relationship, therefore, pleasant affect or SWB can be used as an indicator of mental health without the need for intrusive clinical questions.

Implications of Affect Ratings on Assessment of SWB

Investigation of affect within the construct of life satisfaction also has important implications for the assessment of SWB, particularly when early SWB research typically relied on affective descriptors. In the following section, rating scales used in past research will be evaluated according to the current results.

Satisfaction and dissatisfaction have been used in SWB since research in the area began. In one of the earliest studies of life satisfaction, Cantril (1965) employed the "self-anchoring striving scale". A person thought about their best possible life and worst possible life, then asked to place themselves at a point where they believed their current life ranked. This ladder rating scale ranged from "satisfied" at the top to "dissatisfied" at the bottom and the current results suggest that the

scale constitutes an effective measure of pleasant and unpleasant affect. However, when people are asked to think about their life in terms of best and worst possibilities, they also engage cognitive components of comparison and discrepancy theory. Thus, even though the response format of "dissatisfied-satisfied" is consistent with pleasant-unpleasant affect, the context of the scale amalgamates the affective and cognitive components of SWB. A similar problem is also encountered in Campbell, Converse & Rogers' (1976) satisfaction rating scale of well-being. The authors argue that satisfaction with life is dependent on perceptions based on internal standards, experience and personality, suggesting that the use of 'satisfaction' in rating scales incorporates cognitive and affective responses.

Other early researchers believed that psychological wellbeing was best described as the difference between positive and negative feelings, and Bradburn (1969) used a rating scale of incremental level of happiness. The current results confirm that happiness is a measure of pleasant affect but other affective descriptors such as *content, satisfied* and *pleased* would also adequately assess pleasant affect. However, Bradburn's happiness scale, like Cantril's (1965) self-anchoring striving scale, asks an individual to combine cognitive judgments with an affective response. Individuals are asked: "Taking all things together how would you say things are these days – would you say you are very happy, pretty happy or not too happy". To answer this question an individual must compare their current situation with expectations and aspirations from the past, the future, and relevant others, similar to the process described in Multiple Discrepancies Theory (Michalos, 1985). Following this evaluation, the level of happiness is estimated, thereby providing a measure of pleasant affect. Likewise, the question leading to an assessment of happiness in Bradburn's (1969) Affect Balance Scale provides a context which leads to an assessment of pleasant affect following cognitive comparisons. In this sense, the scale is really a measure of SWB and not affect alone.

Following the introduction of Bradburn's (1969) scale, Andrews & Withey (1976) began experimenting with different response scale anchors. The authors found that the best spread in respondents answers resulted using their seven point Delighted-Terrible scale. The scale ranged from *delighted, pleased, mostly satisfied, mixed* (about equally satisfied and dissatisfied), *mostly dissatisfied, unhappy* and *terrible.* When Andrews & Withey's (1976) Delighted-Terrible scale is assessed in terms of the current results, the affective descriptors of *happy, content, satisfied* and *pleased* all appear in order with little discrimination between them. These adjectives represent pleasant affect and are the most common response used to describe feelings about life in general. In comparison, the adjective *delighted* represents pleasant and activated affect and is less common as a descriptor of feelings about life. *Delighted, excited* and *elated* all represent pleasant and activated affect and are ranked approximately midway between the highest ranked pleasant affective descriptors and the lowest ranked unpleasant affective descriptors. Therefore, the highest rating anchor of Andrews & Withey's (1976) Delighted-Terrible scale refers to an affective descriptor which is not ranked of greatest importance within the current results. *Delighted*

is ranked 13th (M=58.52), *pleased* is ranked 4th (M=66.67), and *satisfied* is ranked 3rd (M=68.37), below *happy* which is ranked 1st (M =71.96), and *content* which is ranked 2nd (M=70.30). This suggests that Andrews & Withey's (1976) original assessments of American SWB may well have been flawed because highest ratings were based on pleasant and activated affect, which appear to be less important to the assessment of SWB.

The current results indicate that anchors which refer to feelings of happiness, contentment or satisfaction are more important indicators of SWB. Thus, rating scales of SWB similar to those proposed by Cantril (1965), Campbell, Converse & Rodgers (1976) and Bradburn (1965) should be used in preference to rating scales resembling Andrews & Withey's (1976) Delighted-Terrible scale. Rating scales of SWB need to assess pleasant affect given the importance of this type of affect in all of the analyses completed in this study. Greater understanding of SWB requires adequate assessment of pleasant affect, and only after this is achieved, can a comprehensive model of the construct be proposed and tested.

A Model of SWB Homeostasis Including Affect

SWB homeostasis has been proposed by Cummins (2000; 2003) in response to earlier findings of stability in population life satisfaction. In two reviews of life satisfaction within western countries, Cummins (1995, 1998) found that individuals were generally three-quarters satisfied with their lives. Furthermore, most of these life satisfaction scores fell within a normative range of 70-80% of scale maximum scores. The theory of homeostasis suggests that each individual has a SWB set-point, similar to the theory of dynamic equilibrium first proposed by Headey & Wearing (1989). Such a narrow SWB set-point is determined by homeostatic regulation, analogous to the control of blood pressure. As SWB approaches upper or lower limits, the homeostatic system is activated to keep SWB within the normal range for each individual. Homeostasis defeat occurs when SWB is challenged by strong internal or external events that exceed the adaptive capacity of the homeostasis system.

Three levels of processing are included in the model of SWB homeostasis, with personality and affect acting as important contributors (Cummins, Gullone et al., 2002). The first level of the model includes the unconscious processes of habituation and adaptation. The second level is the conscious awareness of met and unmet needs. The third level includes cognitive buffers such as self-esteem, perceived control and optimism, which mediate the relationship between external experiences, and help to absorb the impact of a changing system. Personality and affect influence all of the levels of processing in SWB homeostasis.

It is argued that the subjective evaluation of life satisfaction is a strong indicator of pleasant affect. This is because the current results indicate that all forms of pleasant affect are the best predictors of global life satisfaction. However, greater understanding of the contribution of affect in SWB needs also to account for the differences between affect and personality.

The Distinction Between Personality and Affect

Personality is best described as stable thoughts or attitudes to life, while affect captures feelings and emotions. The influence of personality is evident in the NEO-PI-R developed as operationalisation of the five factor model of personality (Costa & McCrae, 1992a). This model represents the five most basic dimensions that all personality traits can be factored into, and includes Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. Neuroticism describes emotional instability, irrational thinking and a tendency to experience unpleasant affects like *fear*, *anger*, *sadness*, *guilt*, *disgust* and *embarrassment*. Extraversion describes sociability, excitement seeking, being assertive, talkative and active, optimistic, energetic and cheerful. Openness to experience describes imagination, creativity, intellectual curiosity, aesthetic appreciation and independent judgment. Agreeableness describes interpersonal tendencies to help others, feel sympathy towards others and act cooperatively. Conscientiousness refers to planning, organizing and completing tasks and can be described as will to achieve. All of these five factors represent attitudes to life, people and situations. They consist of thought processes which lead to the experience of different associated affects. If an individual is higher in personality traits consistent with extraversion, then more pleasant and activated affect would be expected. Thus, as extraversion declines with age (McCrae et al., 2000) it is not surprising that pleasant and activated affect such as *excitement* about life also decreases with age, as found in this study. Alternatively, individuals high in neuroticism experience more irrational thoughts and unpleasant activated affects. Neuroticism also decreases with age (McCrae et al., 2000) and this is consistent with the age related decrease in the unpleasant activated affects of *distressed* and *stressed* in the current results.

The relationship between personality and affect is consistent with the understanding of cognitive behavioural therapies introduced by Ellis (1962) and Beck (1970, 1976) where thoughts influence feelings and emotions. Personality is associated with attitudes and most likely attitudes about life, and these are then intrinsically linked with different types of affect. Personality describes patterns of thought and behaviour which are acquired over time, and with minor changes, is relatively stable after young adulthood, particularly after the age of 30 (Costa & McCrae, 1997; McCrae et al., 2000; McCrae et al., 2002). If personality and affect are intrinsically linked in a manner similar to thoughts or attitudes and feelings, both would also be a major contributor towards the long term stability of SWB. A meta-analysis by DeNeve & Cooper (1998) found an overall correlation of .19 between all personality variables and SWB. Similarly, a review of eight studies by Cummins et al., (2002) found an average correlation of .24 between the five factors of personality and SWB. This slightly higher correlation may be explained by the inclusion of affect scales as measures of SWB. Most importantly, these reviews suggest that personality alone is not the best predictor of SWB. The results of this study are also consistent with this point, because neuroticism and extraversion explained less than 20% of the variance in satisfaction with life as a whole, while over 60% of variance was explained by six key affective predictors. Thus, personality and affect offer individual

contributions to the explanation of SWB though greater understanding is required about the relationship between the concepts.

The Relationship Between Affect and the Five Factor Model of Personality

Extraversion has been linked to positive affect and neuroticism linked with negative affect (Costa & McCrae, 1980). Research continues to support these findings (Olason & Roger, 2001; Vitterso, 2001; Watson et al., 1999). However, most studies of affect and personality have assessed only a subset of positive and negative affect according to the PANAS (Watson et al., 1988). Hence, these definitions of positive and negative affect are more precisely defined as pleasant-activated and unpleasant-activated affect respectively. In contrast, the current results suggest that deactivation is also an important link between extraversion and neuroticism. Unpleasant-activated, unpleasant, unpleasant-deactivated and deactivated affects are all strongly related to neuroticism while pleasant-activated, pleasant, pleasant-deactivated and activated affect all correlate strongly with extraversion. The neuroticism scale of the NEO-PI-R does not refer to feeling *tired*, *sleepy* or *exhausted* but these affects are strongly related to neuroticism. Perhaps this is because the experience of unpleasant-activated affect such as *distress*, *anxiety* and *stress* lead to depletion in energy reserves. These results are inconsistent with Watson & Tellegen (1985) who argued that deactivated affect represents low positive affect.

The affective component of SWB is argued as being related to the five factor model of personality (Costa & McCrae, 1992a). These affective responses are interrelated with cognitive responses of life satisfaction best described by Multiple Discrepancies Theory (Michalos, 1985), resulting in SWB. The proposed model is presented below.

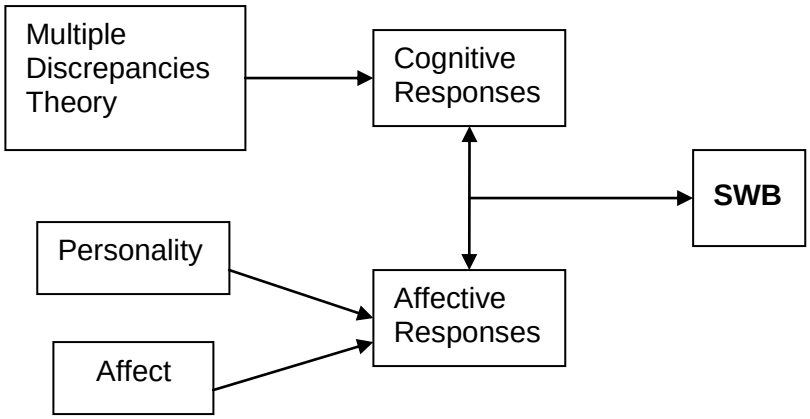


Figure 8.1: An Affective and Cognitive Model of SWB

The homeostatic model proposed by Cummins et al. (2002) describes the relationship between external circumstances and SWB. The first level of the model is the unconscious processing of adaptation and habituation while the

second level involves conscious awareness of met and unmet needs. Personality and affect influence the perception of needs being met during successful adaptation, and work in conjunction with cognitive buffers such as self-esteem, perceived control and optimism to stabilize SWB homeostasis. These cognitive buffers have a secondary role to affect and personality when homeostasis is maintained. However, when the system is under threat from aversive external conditions, the buffers both influence and are influenced by personality and affect in an attempt to stabilize SWB.

The cognitive and affective model proposed in Figure 5.1 differs from the homeostatic model of SWB proposed by Cummins et al. (2002). Three major concepts are determinants of SWB: affect, personality and Multiple Discrepancies Theory (MDT). Key affect and personality combine producing the affective component of SWB and the assessment of discrepancies described in MDT produce the cognitive component of SWB.

The importance of affect in SWB is confirmed by the results of this study. Key affect, explained 64% of the variance in life satisfaction, with an additional 2% explained by the inclusion of neuroticism and extraversion. However, the inclusion of the full five factors of personality may increase the predictive strength of personality in SWB. The five factor model of personality asserts that personality traits are endogenous dispositions, and these basic dispositions or temperaments are measured by personality questionnaires (McCrae et al., 2000). Stability in personality may also help to explain SWB homeostasis. Personality remains stable from early adulthood with little change from age 30 (Costa & McCrae, 1994, 1997) with similar retest correlations over 6, 12 or 20 years (Costa & McCrae, 1992b). In the proposed model, affect and personality combine to produce the affective component of SWB.

The cognitive component of SWB is the second half of the proposed model in Figure 5.1 and is best described by MDT. Cognitive processing is necessary for people to make judgments about past, future and present conditions in relation to expectations and aspirations about life. It involves an assessment of the discrepancy between what a person expects from life and actual life circumstances. Cognitive and affective components are related to each other in a bidirectional relationship where cognition influences affect and affect influences the assessment of discrepancies. SWB is the output of these relationships.

The cognitive buffers of self-esteem, perceived control and optimism described by Cummins et al. (2002) are not included in the proposed model of SWB. This is because they are argued to be alternative measures of personality and affect and their inclusion would result in the inclusion of redundant affective information. Self-evaluation, perceived control and positive thinking reflect affect and personality, therefore their inclusion in the model would not add to the explanation of SWB.

Three separate assessment measures are necessary to test the cognitive and affective model of SWB. Affect is effectively measured using adjectives and a unipolar response scale as demonstrated in the current results. The five factor model of personality is assessed by the NEO personality inventory (Paul T Costa & McCrae, 1992a). This together with the affective adjectives provides a measure of the affective component of SWB. The third assessment measure is derived from Michalos' (1985) original seven items of MDT. These items enable measurement of the cognitive component of SWB.

STUDY 2 CONCLUSIONS

The results of this study confirm that affect, particularly pleasant affect, is a major component of SWB. Furthermore, affect valence dominates over activation when life evaluations are investigated in terms of the circumplex model. However, SWB is also understood to comprise cognitive evaluation (Campbell et al., 1976; Cummins, Gullone et al., 2002) and analysis of the present results lead to the proposal of an affective and cognitive model of SWB. In this model affect represents the affective component of SWB, MDT the cognitive component, and personality a combination of both components. The explanatory power of this model is investigated in the following study.

CHAPTER 9: STUDY 3 INTRODUCTION AND METHODOLOGY

Introduction to Study 3

The results of Study 2 indicate that more than 60% of the variance in SWB can be explained by affect and that when analysed in terms of the circumplex, the affects congregated around the pleasant-unpleasant axis with less emphasis on the activated-deactivated axis. Study 3 aimed to replicate and extend this investigation by including additional affect terms. Furthermore, the model of SWB proposed at the end of Chapter 7 will be tested. This model incorporates affect, the FFM of personality and MDT as representing the cognitive component of SWB.

Participants

The sample was drawn from the 8th telephone Survey of the Australian Unity Wellbeing Index conducted in August 2003. 63% of those originally surveyed provided a contact name for mailing purposes. An additional 988 people were invited to participate who were already part of the AUWBI longitudinal study through their return of a mailed follow-up questionnaire in the previous year.

In total, 1980 questionnaires were mailed and 854 were returned resulting in a 43% response rate. The sample comprises 46% males and 54% females and their mean age was 52 years, with a standard deviation of 15.37 and range of 18-86 years.

Materials and Procedure

The questionnaires consisted of the Personal Wellbeing Index, the National Wellbeing Index, 24 affect items, the depression subscale of the Depression Anxiety and Stress Scales (Lovibond & Lovibond, 1995), the 60 item NEO-PI-R (Costa & McCrae, 1992), and 7 items of MDT (Michalos, 1985). Altogether, participants were asked to answer 113 items.

Two versions of the questionnaire were constructed. These differed according to the response scale of the 15 items of the AUWBI as described for Study 2. Questionnaire 1 employed a one-way unipolar scale for all AUWBI items and affect items. Questionnaire 2 employed the usual bipolar response scale for the AUWBI items and a one-way unipolar response scale for the affect items. Both questionnaires included the remaining items of the DASS depression subscale, the NEO-PI-R and MDT.

Affect items included in the questionnaires were rated in the same manner as Study 2. The instructions for the affect items were "please indicate how each of the following describes your feelings when you think about your life in general". Three affective descriptors were chosen as representatives of the octants in the affective circumplex were largely the same as in Study 2, though the item *stressed* was excluded from the list because of ambiguity in definition, and the item of *dissatisfaction* was included.

The depression subscale of the DASS is assessed by a 4-point severity/frequency scale for the past week ranging from (0) "did not apply to me at all" to (3) "applied to me very much, or most of the time". The 7 items were selected from DASS-21 which is an abbreviated form of the original 42-item DASS. It has been shown to be effective measure, discriminating between depression, anxiety and stress despite the shortened length (Antony et al., 1998; P. F. Lovibond & S. H. Lovibond, 1995).

The NEO-PI-R Short Form is a 60 item version of the Revised NEO Personality Inventory (Costa & McCrae, 1992) which provides an assessment of the Five Factor Model of personality. The five factors are neuroticism, extraversion, openness, agreeableness and conscientiousness. Each factor is assessed by 12 statements that participants rate according to the response options of (SD) strongly disagree, (D) disagree, (N) neutral, (A) agree, and (SA) strongly agree.

Multiple Discrepancies Theory was assessed by 7 separate discrepancy items taken from Michalos (1985). Each item addressed the perceived gap between what the respondent currently has and general life aspirations, what relevant others have, the best one has had in the past, expected to have 3 years ago and expects to have after 5 years, deserves and needs. All of the MDT items were assessed according to a 0-10 response scale.

CHAPTER 10: STUDY 3 RESULTS

All affect scores are converted to Percentage of Scale Maximum (%SM), consistent with the data presented in previous chapters, to enable comparison with other data. When a scale is scored 0-X, %SM is calculated through the formula [(score) x 100/(number of scale points - 1)] (Cummins, 1995).

10.1 MEANS AND STANDARD DEVIATIONS OF AFFECT RATINGS

Participants were asked to indicate how each affective descriptor described their feelings when they thought about their life in general according to a unipolar scale ranging from "Not at all" (0) to "Extremely"(10). Means and standard deviations are presented below in Table 10.1 together with the theoretical location of the affect according to the circumplex model proposed by Russell (1980). Affect terms are listed from highest to lowest scores.

Table 10.1: Means and Standard Deviations for Affect Ratings In Relation to Life as a Whole (N=836)

Affective Adjective	Mean	SD	Location on Circumplex
1. Satisfied	71.96	20.80	Pleasant
2. Happy	70.30	21.88	Pleasant
3. Content	68.37	21.68	Pleasant
4. At Ease	66.67	21.11	Pleasant Deactivated (Low PA)
5. Calm	66.35	22.01	Pleasant Deactivated (Low PA)
6. Relaxed	66.13	22.29	Pleasant Deactivated (Low PA)
7. Alert	65.15	22.76	Activated
8. Active	62.95	23.04	Activated
9. Enthusiastic	62.70	22.92	Pleasant Activated (High PA)
10. Lively	62.22	22.75	Pleasant Activated (High PA)
11. Excited	59.91	22.75	Pleasant Activated (High PA)
12. Aroused	59.38	22.06	Activated
13. Tired	58.52	22.92	Unpleasant Deactivated (Low NA)
14. Exhausted	57.32	23.10	Unpleasant Deactivated (Low NA)
15. Sleepy	52.76	23.69	Deactivated
16. Unaroused	50.89	28.66	Deactivated
17. Sluggish	43.43	25.91	Deactivated
18. Dissatisfied	38.78	30.27	Unpleasant
19. Discontent	37.51	28.15	Unpleasant
20. Annoyed	37.34	27.56	Unpleasant Activated (High NA)
21. Nervous	35.77	28.88	Unpleasant Activated (High NA)
22. Bored	28.83	27.30	Unpleasant Deactivated (Low NA)
23. Unhappy	28.12	24.05	Unpleasant
24. Distressed	27.02	24.14	Unpleasant Activated (High NA)

The highest mean scores came from pleasant and pleasant-deactivated affective descriptors, when participants were asked to describe their life in general. Affect terms with an unpleasant valence produced lowest mean scores, with the exception of the unpleasant-deactivated descriptors *tired* and *exhausted* and the

pleasant-activated terms of *enthusiastic*, *lively* and *excited*. These descriptors were rated approximately half way between the highest and lowest ratings. Deactivated affect is rated higher than unpleasant affect, therefore the overall ordering of affect from highest mean scores to lowest mean scores is as follows: pleasant, activated, deactivated and unpleasant. This is also consistent with the results of Study 2.

10.2 CIRCUMPLEXITY OF AFFECTIVE DESCRIPTORS

Circumplex modeling was employed to determine the location of the affective descriptors in relation to affect valence and activation axes. The affect item *satisfied* was designated the reference variable and its location set at 0°. The locations of the remaining affect items were estimated relative to this reference variable. Communality estimates of all affect items were unconstrained.

The data converged on the solution in 236 iterations and the final model had a total of 76 free parameters producing a model that fit moderately well: χ^2 (224, N = 834) = 1595.18, $p < .001$, $\chi^2/df = 7.1$, RMSEA = .09. The results of the model are shown below in Figure 10.1.

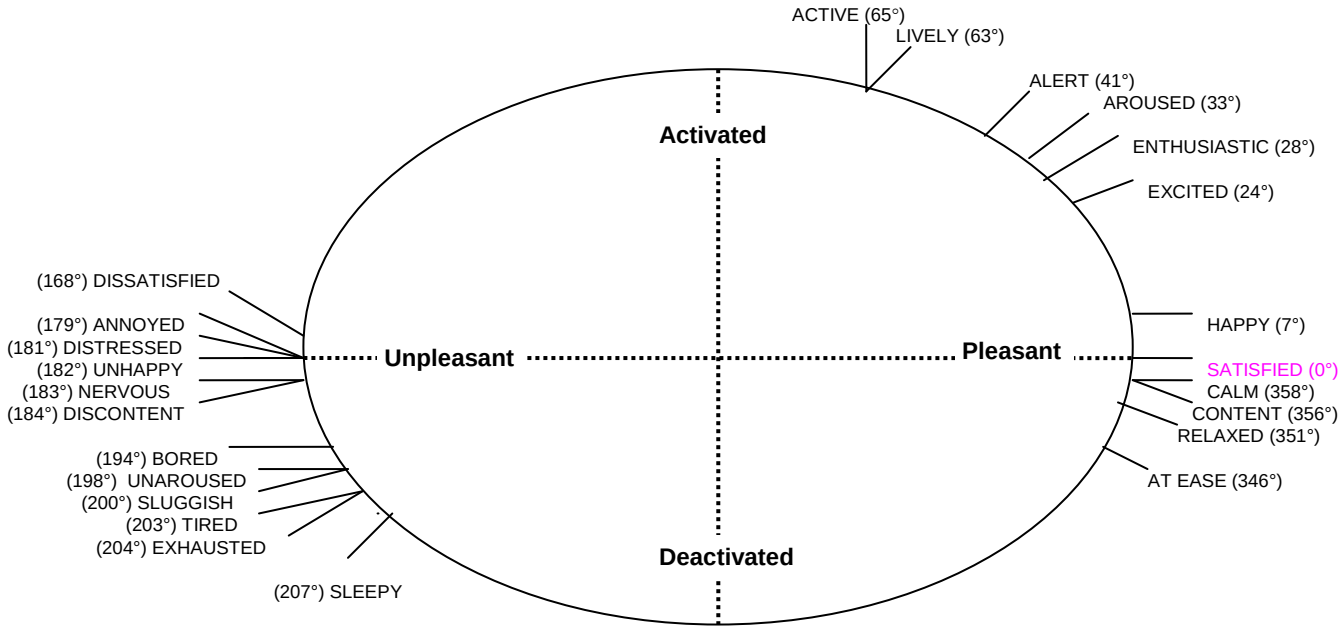


Figure 10.1: A Circumplex Representation of 24 Affective Descriptors

Most of the affective descriptors are approximately located in the expected order of the circumplex, with the exception of the unpleasant-activated affects of *annoyed*, *distressed* and *nervous* which group together with unpleasant affect. Affect valence dominated over activation in the model. Deactivated affect was located further towards the unpleasant pole of affect valence and the activated

affects of *active*, *aroused* and *alert* were located closer to the pleasant-activated octant. Increased differentiation between pleasant and pleasant-activated affects produced a larger spread in the pleasant half of the circumplex than the unpleasant half of the circumplex. The average separation between the pleasant affects of *happy*, *satisfied* and *content* with the unpleasant affects of *unhappy*, *dissatisfied*, and *discontent* was 172°, which is close to the difference of 180° suggested by the circumplex.

10.3 STANDARD MULTIPLE REGRESSION PREDICTING SATISFACTION WITH LIFE AS A WHOLE BY AFFECT

The above circumplex model is largely dominated by pleasant and unpleasant affect. However, the circumplex plot does not provide information on the contribution of affect towards the explanation of life satisfaction. Thus, a standard multiple regression was employed to investigate the predictive power of each individual affective descriptor in explaining satisfaction with life as a whole. This was to investigate whether particular affects, especially those referring to valence, explain more variance in life satisfaction than others.

Satisfaction with life as a whole was assessed with two separate 11 point response scales: a unipolar scale and a bipolar scale. The one-way unipolar scale ranged from "not at all satisfied" to "completely satisfied" while the two-way bipolar scale ranged from "completely dissatisfied" to "completely satisfied". Mean scores and frequencies for satisfaction with life as a whole according to response scale are presented in Table 10.2 below.

Table 10.2: Means and Standard Deviations for Satisfaction with Life as a Whole According to Response Scale (N = 852)

Response Scale	Mean	SD	N	p
Unipolar	72.86	19.54	435	.516
Bipolar	73.69	17.49	417	

As no significant differences existed in satisfaction with life as a whole according to the different response scales, both samples were combined for the regression. Table 10.3 displays the unstandardised regression coefficients (B), the standardized regression coefficients (β), the square of the semipartial correlations (sr^2), which provides the percentage of unique variance contributed by that variable and R^2 and adjusted R^2. The R for the regression was significantly different from zero, F (24, 785) = 65.47, $p < .001$. Five of the variables contributed significantly to prediction of satisfaction with life as a whole: *content* (sr^2 = .16), *happy* (sr^2 = .13), *excited* (sr^2 = .08), *satisfied* (sr^2 = .07), and *discontent* (sr^2 = -.05). The 24 independent variables in combination contributed another .61 in shared variability. Altogether, 67% (66% adjusted) of the variability in satisfaction with life as a whole was predicted by knowing scores on these 24 independent variables of affect ratings.

Table 10.3: Standard Multiple Regression of Affect Terms on Satisfaction with Life as a Whole (N = 852)

Variable	B	β	sr^2
Excited	.10***	.13	.08
Happy	.24***	.25	.13
Calm	-.05	-.05	-.03
Sleepy	.00	.00	.00
Bored	.00	.01	.00
Dissatisfied	.02	.03	.02
Annoyed	.01	.01	.01
Active	.03	.03	.02
Lively	.00	.00	.00
Satisfied	.13***	.14	.07
Relaxed	.05	.06	.04
Sluggish	.02	.03	.02
Exhausted	.00	-.01	.00
Discontent	-.07*	-.10	-.05
Nervous	.02	.02	.02
Aroused	-.01	-.01	-.01
Enthusiastic	-.03	-.03	-.02
Content	.32***	.36	.16
At ease	-.07	-.08	-.04
Unaroused	.03	.05	.04
Tired	.00	-.01	.00
Unhappy	-.07	-.08	-.04
Distressed	-.06	-.07	-.04
Alert	-.02	-.02	-.02

**** p<.001, *** p<.005 $R^2 = .67^a$
** p<.01, * p<.05 Adjusted $R^2 = .66$
[a]Unique variability = .06; shared variability = .61

The regression suggests the special importance of five separate affective descriptors that contribute unique variance to the prediction of satisfaction with life as a whole. These five predictors included all three pleasant affect descriptors. *Excited* is the only included pleasant-activated descriptor, located 17° above the pleasant affect of *happy*. *Discontent* is the only unpleasant affect descriptor that makes a significant contribution.

10.3.1 Standard Multiple Regression Predicting Satisfaction with Life as a Whole by Key Affects of Content, Happy, Excited, Satisfied, and Discontent

The five affective descriptors that contributed unique variance to satisfaction with life as a whole were selected for further analysis. The aim was to compare the amount of variance explained in satisfaction with life as a whole by these top 5 affective descriptors against the amount of variance explained by all 24 affective descriptors. Hence, a standard multiple regression of *content, happy, excited, satisfied,* and *discontent* was performed on satisfaction with life as whole.

The R for the regression was significantly different from zero, F (5, 794) = 311.73, p<.001. All five independent variables contributed significantly to prediction of satisfaction with life as a whole: *content* (sr^2 = .17), *happy* (sr^2 = .14), *excited* (sr^2 = .07), *satisfied* (sr^2 = .08), and *discontent* (sr^2 = -.08) as displayed in Table 10.4. These 5 independent variables in combination contributed another .59 in shared variability. Altogether, 66% (66% adjusted) of the variability in satisfaction with life as a whole was predicted by knowing scores on these 5 independent variables of affect ratings.

Table 10.4: Multiple Regression of the Five Key Affect Terms on Satisfaction with Life as a Whole (N = 852)

Variable	LAW	1.	2.	3.	4.	B	β	sr^2
1. Content	.76					.29*	.33	.17
2. Happy	.74	.76				.25*	.26	.14
3. Excited	.57	.56	.66			.08*	.10	.07
4. Satisfied	.71	.81	.74	.53		.13*	.14	.08
5. Discontent	-.59	-.63	-.58	-.38	-.61	-.08*	-.10	-.08

* p<.001 R^2 = .66[a]
[a]Unique variability = .07; shared variability = .59 Adjusted R^2 = .66

The four pleasant affective descriptors alone predict over 65% of satisfaction with life as a whole. It can be concluded that life satisfaction is largely explained by pleasant affect. To confirm the dominance of the pleasant affect descriptors, a further hierarchical regression analysis was conducted. This included the pleasant affective descriptors followed by the pleasant-activated *excited* and unpleasant *discontent* as predictors of life satisfaction.

10.3.2 Hierarchical Regression Predicting Satisfaction with Life as a Whole by the Key Affects of Content, Happy, Excited, Satisfied, and Discontent

Out of the five key affects, the pleasant affects of *content*, *happy* and *satisfied* appear to be the best predictors of life satisfaction. The previous regression indicates that the pleasant-activated affect of *excited*, and the unpleasant affect of *discontent* do not provide as much predictive strength of the pleasant affects. A hierarchical regression was completed to determine the extent to which the three pleasant affects alone are able to predict life satisfaction. The three pleasant affective descriptors of *content*, *happy* and *satisfied* were entered into the regression at Step 1 and *excited* and *discontent* were entered in Step 2.

R was significantly different from zero at the end of each step. After all 5 independent variables were entered into the equation, R = .81, F(5, 794) = 311.73, p < .001. Table 10.5 indicates that the best predictor of satisfaction with life as a whole was the affective descriptor of *content*, closely followed by *happy*.

Table 10.5: Hierarchical Regression of the Five Key Affect Terms on Satisfaction with Life as a Whole (N = 852)

Variable	B	β	sr^2	ΔR^2
Step 1				
1. Content	.33*	.37	.20	.65*
2. Happy	.31*	.33	.20	
3. Satisfied	.15*	.17	.09	
Step 2				
1. Content	.29*	.33	.17	.01*
2. Happy	.25*	.26	.14	
3. Satisfied	.13*	.14	.08	
4. Excited	.08*	.10	.07	
5. Discontent	-.08*	-.10	-.08	
* p<.001			$R^2 = .66^a$	
			Adjusted $R^2 = .66$	

Sixty-five percent of the variance in life satisfaction is explained by 3 pleasant affect descriptors. Satisfied was expected to provide the greatest contribution of unique variance to the explanation of life satisfaction given the redundancy in terminology. However, feelings of contentment and happiness explain approximately twice as much unique variance in satisfaction with life as a whole as feeling satisfied. The addition of discontent and excited only added an additional 1% of explained variance, though both terms were significant predictors in the standard regression equation. Thus, feelings of excitement and discontent are relevant to this prediction but the pleasant affects of content, happy and satisfied dominate this prediction.

10.4 STANDARD MULTIPLE REGRESSION PREDICTING SATISFACTION WITH LIFE AS A WHOLE BY THE FIVE FACTOR MODEL OF PERSONALITY

Personality is also argued to be an important influence of SWB, and possibly works in conjunction with affect to form the affective component of SWB. Before examining the variance in life satisfaction explained by affect and personality, the Five Factor Model (FFM) of personality alone was subjected to a standard multiple regression on life satisfaction.

The R for the regression is significantly different from zero, F (5, 766 = 54.29, $p < .001$. Table 10.6 indicates that neuroticism ($sr^2 = -.33$) and extraversion ($sr^2 = .18$) contribute significantly to prediction of satisfaction with life as a whole. Altogether, 26% (26% adjusted) of the variability in satisfaction with life as a whole is predicted by knowing scores on the five factors of personality.

Table 10.6: Standard Multiple Regression Predicting Satisfaction with Life as a Whole by the Five Factor Model of Personality (N = 771)

Variable	LAW	1.	2.	3.	4.	B	β	sr^2
1. Neuroticism	-.47					-.85*	-.38	-.33
2. Extraversion	.36	-.41				.59*	.20	.18
3. Openness	.03	-.08	.16			-.08	-.03	-.03
4. Agreeableness	.18	-.30	.28	.13		.01	.00	.00
5. Conscientiousness	.23	-.33	.27	-.01	.21	.14	.05	.04

* p<.001 $R^2 = .26^a$

[a]Unique variability = .14; shared variability = .12 Adjusted $R^2 = .26$

Neuroticism and extraversion are the only personality factors to contribute unique variance. It is possible that these dimensions of personality are more likely to be correlated with pleasant and unpleasant affects which dominate the experience of life satisfaction.

Personality is unable to predict life satisfaction as effectively as affect. When compared to the earlier regression in Table 10.4, only 26% of life satisfaction was explained by the FFM of personality while 66% of the variance in life satisfaction was explained by the 5 key affect terms.

10.5 HIERARCHICAL REGRESSION PREDICTING LIFE SATISFACTION BY THE KEY AFFECTS AND THE FIVE FACTOR MODEL OF PERSONALITY

To compare the shared contribution of affect and personality in predicting satisfaction with life as a whole, a further hierarchical regression analysis was conducted. The 5 factors of personality were entered into the regression at Step 1, and the 5 key affects of *content, happy, excited, satisfied,* and *discontent* were entered into the regression at Step 2. Variable entry was determined according to the proposed cognitive affective model of SWB described in Chapter 5.

Table 10.7 indicates that the R for the regression was significantly different from zero at Step 2, F (10, 755 = 148.45, $p < .001$. At Step 2, only the 5 key affect items contributed significantly to prediction of satisfaction with life as a whole. Once the affect terms were included in the equation the 5 factors of personality no longer contributed unique variance. Altogether, 66% (66% adjusted) of the variability in satisfaction with life as a whole was predicted by knowing scores on the key affects, consistent with Table 10.3.

Table 10.7: Hierarchical Regression Predicting Satisfaction with Life as a Whole by the Key Affects and the Five Factors of Personality (N = 765)

Variable	B	β	sr^2	ΔR^2
Step 1				
1. Neuroticism	-.85**	-.38	-.33	.26**
2. Extraversion	.59**	.20	.18	
3. Openness	-.08	-.03	-.03	
4. Agreeableness	.01	.00	.00	
5. Conscientiousness	.14	.05	.04	
Step 2				
1. Neuroticism	.00	.00	.00	.40**
2. Extraversion	.00	.00	.00	
3. Openness	.03	.01	.01	
4. Agreeableness	-.03	-.01	-.01	
5. Conscientiousness	-.04	-.01	-.01	
6. Excite	.08*	.10	.07	
7. Happy	.25**	.26	.14	
8. Satisfied	.13**	.14	.08	
9. Discontent	-.08**	-.10	-.07	
10. Content	.29**	.33	.17	
* p<.005; ** p<.001			$R^2 = .66^a$	
			Adjusted $R^2 = .66$	

When the above results are compared with Table 10.5 it is evident that personality makes little additional contribution to the explanation of life satisfaction beyond that explained by affect. The 5 factors of personality explain 26% of the variance in life satisfaction and an additional 40% of variance is explained with the addition of the 5 key affects. These results suggest that affect, particularly the pleasant affects of *content*, *happy* and *satisfied* and the opposing affect of *discontent*, are better predictors of life satisfaction than personality.

10.6 STANDARD MULTIPLE REGRESSION PREDICTING LIFE SATISFACTION BY MULTIPLE DISCREPANCIES THEORY

Earlier analyses have suggested that pleasant affect is a strong predictor of life satisfaction; however, SWB is thought to consist of cognitive and affective components. To assess the predictive strength of cognition in life satisfaction, seven items were selected from Michalos' (1985) Multiple Discrepancies Theory. These discrepancy judgments provide one form of assessment of the cognitive component of SWB. Means and standard deviations for these discrepancy items are presented below in Table 10.8. Discrepancies were rated on an 11 point Likert scale ranging from 0-10 and are presented as percentage of scale maximum scores where higher scores indicate greater discrepancies.

Table 10.8: Means and Standard Deviations for Discrepancy Ratings

Discrepancy Item	N	Mean	SD
1. Measure up to your general aspirations	851	29.68	18.55
2. Measure up to average for most people your age	848	32.13	20.29
3. The life you think you deserve	851	39.79	21.89
4. The life you think you need	851	41.79	22.34
5. Compared to what you expected to have	851	39.47	22.58
6. What you expect your life will be 5yrs from now	849	41.65	19.62
7. The best in your previous experience	847	42.46	22.67
Mean Discrepancy Rating		38.14	21.13

Discrepancies between current life and the best life people have experienced in the past produced the highest mean discrepancy rating. Discrepancies were also high when participants were asked to compare their current life with the life they think they need, and what is expected in their future life. The lowest level of discrepancy resulted between perceived current life and general aspirations or what is wanted from life.

To investigate the role of each of these discrepancies in the prediction of life satisfaction, a standard multiple regression was conducted with all of the items regressed against satisfaction with life as whole. Table 10.9 shows that R for the regression was significantly different from zero, F (7, 835 = 143.67, $p < .001$). Four items contributed significantly to prediction of satisfaction with life as a whole. The items asked in relation to life as a whole were: "How does it measure up to your general aspirations or what you want" ($sr^2 = .31$); "How does your life measure up to the best in your previous experience" ($sr^2 = .11$); "How does it measure up to the life you think you deserve" ($sr^2 = .07$); and "Compared to what you expected to have does your life offer…" ($sr^2 = .06$). Altogether, 55% (54% adjusted) of the variability in satisfaction with life as a whole was predicted by knowing scores on the seven discrepancy items.

Table 10.9: Standard Multiple Regression Predicting Satisfaction with Life as a Whole by Multiple Discrepancy Theory Items (N = 842)

Discrepancy Items	LAW	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Measure up to your general aspirations	.71							4.80***	.48	.31
2. Measure up to average for most people your age	.52	.65						.37	.04	.03
3. The life you think you deserve	.55	.59	.50					1.04**	.12	.07
4. The life you think you need	.49	.55	.49	.76				-.33	-.04	-.02
5. Compared to what you expected to have	.57	.63	.56	.67	.67			.75*	.09	.06
6. What you expect your life will be 5yrs from now	.37	.40	.29	.39	.36	.46		.15	.02	.01
7. The best in your previous experience	.55	.57	.44	.55	.55	.60	.50	1.22***	.15	.11

*p<.05; **p<.005; ***p<.001 $R^2 = .55$[a]

[a]Unique variability = .12; shared variability = .43 Adjusted $R^2 = .54$

The most powerful predictor of satisfaction with life as a whole was the item relating to discrepancies about general aspirations of life. This is also the smallest discrepancy (Table 10.8) and possibly most abstract or global discrepancy. The semi-partial correlation indicates that this item alone explained 10% of the variance in life satisfaction scores and is highly correlated (r = .71) with life satisfaction. These discrepancy items were selected as a measure of the cognitive component of life satisfaction, and altogether explain over 50% of the variance in satisfaction with life as a whole.

It is interesting to note that discrepancies of social comparison, comparing current life to the average life for people of the same age, did not contribute unique variance towards the explanation of satisfaction with life as a whole. This is contrary to investigation of student wellbeing by Michalos (1991), which suggested that social comparison was an important influence of life satisfaction. The lack of predictive strength in the current data may be explained by sample age differences as the mean age in the current sample is 52 years. Therefore, a further analysis was conducted to compare social comparison discrepancies according to age, and means and standard deviations are presented below in Table 10.9.1.

Table 10.9.1: Social Discrepancies According to Age (N = 820)

Age	N	Mean	SD
18-25	33	33.64	23.96
26-35	98	34.69	22.12
36-45	157	34.59	21.20
46-55	190	32.63	20.17
56-65	159	29.75	18.86
66-75	131	29.85	19.37
76+	53	27.92	18.43
Total	821	31.99	20.35
Welch (6,814) = 1.72, p=.118			

There were no significant differences between age and social comparison despite a trend towards a reduction in these discrepancies with age. However, the majority of the sample is 36 years and older and if a greater number of participants were included in the age groups of under 35 years and over 76 years, the age group differences might reach statistical significance. Additional age comparisons are presented in Section 10.8.

10.7 STANDARD MULTIPLE REGRESSION PREDICTING LIFE SATISFACTION BY THE KEY AFFECTS, MULTIPLE DISCREPANCIES THEORY AND THE FIVE FACTOR MODEL OF PERSONALITY

The model of SWB being tested proposes that affect and personality combine to form the affective component of SWB, while Multiple Discrepancies forms the cognitive component. Earlier regression analyses suggest that Multiple Discrepancies Theory explains 55% of the variance in life satisfaction (Table 10.8), while the key affects and personality explain 66% (Table 10.7). To investigate the separate contributions of affect, personality and Multiple Discrepancies Theory a hierarchical regression was conducted. Variable entry was determined according to strength of variance explained in the previous regressions with the 5 key affective descriptors entered at Step 1, the 7 Multiple Discrepancies items at Step 2, and the 5 factors of personality at Step 3. The large N of 765 enabled the inclusion of all 17 independent variables satisfying the rule of thumb of $N \geq 50 + 8m$ where m represents the number of independent variables (Tabachnick & Fidell, 2001).

Table 10.10 indicates that ΔR^2 was significantly different from zero at the end of Step 1 and Step 2. ΔR^2 was not significant at Step 3 with the addition of the FFM model of personality indicating that it did not explain additional variance beyond affect and discrepancies. At Step 3 after all 17 independent variables were entered into the equation, $R = .83$, $F(17, 748) = 99.91$, $p < .001$.

Table 10.10: Hierarchical Multiple Regression Predicting Satisfaction with Life as a Whole by the Key Affects, Multiple Discrepancies, and the Five Factor Model of Personality (N = 765)

Variable	B	β	sr^2	ΔR^2
Step 1				
1. Content	.29***	.33	.17	.66***
2. Happy	.25***	.26	.14	
3. Excited	.08***	.10	.07	
4. Satisfied	.13***	.14	.08	
5. Discontent	-.08***	-.10	-.08	
Step 2				
1. Content	.22***	.25	.13	.03***
2. Happy	.20***	.21	.12	
3. Excited	.05*	.07	.05	
4. Satisfied	.10**	.11	.06	
5. Discontent	-.06*	-.08	-.06	
6. General aspirations	-1.43***	-.14	-.08	
7. Average for most people your age	.16	.02	.01	
8. The life you think you deserve	-1.01***	-.12	-.07	
9. The life you think you need	.72*	.09	.05	
10. Compared to expectations	-.71*	-.09	-.05	
11. Life 5yrs from now	.11	.01	.01	
12. Best in your previous experience	-.36	-.04	-.03	
Step 3				
1. Content	.22***	.25	.13	.00
2. Happy	.21***	.22	.12	
3. Excited	.05*	.07	.05	
4. Satisfied	.10**	.11	.06	
5. Discontent	-.07**	-.09	-.06	
6. General aspirations	-1.46***	-.15	-.08	
7. Average for most people your age	.11	.01	.01	
8. The life you think you deserve	-1.00**	-.12	-.07	
9. The life you think you need	.72*	.09	.05	
10. Compared to expectations	-.70*	-.09	-.05	
11. Life 5yrs from now	.09	.01	.01	
12. Best in your previous experience	-.36	-.04	-.03	
13. Neuroticism	.05	.02	.02	
14. Extraversion	-.03	-.01	-.01	
15. Openness	.01	.00	.00	
16. Agreeableness	-.02	-.01	-.01	
17. Conscientiousness	-.04	-.01	-.01	
				$R^2 = .69^a$
*p<.05; **p<.005; ***p<.001				Adjusted $R^2 = .69$
[a]Unique variability = .06; shared variability = .63				R = .83

It can be concluded that life satisfaction is mainly an affective construct. Sixty-six percent of the variance in life satisfaction is explained by the 5 key affects and MDT adds an additional 3% of variance.

10.7.1 Standard Multiple Regression Predicting Total Multiple Discrepancies by the Key Affects

The above regression suggests that life satisfaction is mainly affective and MDT only contributes an additional 3% of variance beyond the 5 key affects (Table 10.10). If MDT represents mainly cognition as initially conceived, then cognition is less important in SWB than affect. Alternatively, MDT may be a strongly affective construct. This leads to a further regression analysis which investigated how much variance in MDT could be explained by the 5 key affects.

The five key affect items were regressed against total discrepancies and R for the regression was significantly different from zero, F (5, 792 = 181.44, $p < .001$). Table 10.11 indicates that four of the key affects contributed significantly to prediction of total discrepancies: *content* (sr^2 = -.15); *happy* (sr^2 = -.08); *excited* (sr^2 = -.14); and *satisfied* (sr^2 = -.10). Altogether, 53% (53% adjusted) of the variability in total discrepancies was predicted by knowing scores on the five key affects.

Table 10.11: Standard Multiple Regression Predicting Total Discrepancies by Affect (N = 797)

Variable	Total Discrepancies	1.	2.	3.	4.	B	β	sr^2
1. Content	-.68					-.16**	-.29	-.15
2. Happy	-.65	.76				-.08*	-.14	-.08
3. Excited	-.56	.56	.66			-.09**	-.19	-.14
4. Satisfied	-.65	.81	.74	.53		-.10**	-.17	-.10
5. Discontent	.50	-.63	-.58	-.38	-.61	.03	.06	.05

* p<.005; ** p<.001 $R^2 = .53^a$

[a]Unique variability = .06; shared variability = .47 Adjusted $R^2 = .53$

The above regression indicates that the five key affects were able to explain at least 50% of total discrepancies. The inclusion of all 24 affects from each octant of the circumplex did not improve on this result. The R for the regression was significantly different from zero, F (24, 761= 38.51, $p < .001$) but altogether the 24 affect items explained 55% (53% adjusted) of the variability in total discrepancies.

10.8 AGE EFFECTS IN AFFECT AND MULTIPLE DISCREPANCIES THEORY

The previous analyses confirm the importance of affective and cognitive components in the prediction of satisfaction with life as a whole. However, before presenting a model of SWB, age effects were examined in these individual components to aid understanding of SWB across the lifespan. The 5 key affects of *content, happy, excited, satisfied* and *discontent* were examined as they were the best predictors of life satisfaction and the results are presented in Table 10.12 below.

Table 10.12: Means and Standard Deviations for the Key Affects According to Age (N=827)

Affect Type	**Affect**	**18-25** (N=33)	**26-35** (N=98)	**36-45** (N=159)	**46-55** (N=191)	**56-65** (N=160)	**66-75** (N=132)	**76+** (N=54)	**p**
Pleasant	Content	71.52	67.60	66.60	71.07	75.26	75.48	77.14	**.000**
		22.79	*22.51*	*22.53*	*20.27*	*18.89*	*20.46*	*15.94*	
		56>36, p=.005; 66>36, p=.007; 76+>36, p=.034							
	Satisfied	71.82	69.48	70.19	70.85	77.28	75.87	74.38	**.005**
		22.84	*21.03*	*19.56*	*20.71*	*16.80*	*19.15*	*21.82*	
		56>26, p=.037; 56>36, p=.026; 56>46, p=.041							
	Happy	74.24	71.13	69.81	72.01	75.68	73.52	74.62	.186
		20.62	*20.46*	*20.65*	*19.27*	*16.90*	*20.53*	*19.35*	
Pleasant Activated	Excited	54.06	60.32	57.10	57.96	60.26	52.30	55.31	.118
		25.89	*22.52*	*24.31*	*23.78*	*21.37*	*25.83*	*28.29*	
Unpleasant	Discontent	25.45	30.32	30.46	27.59	20.00	20.33	20.70	**.000**
		23.73	*25.37*	*25.20*	*23.63*	*21.88*	*23.91*	*23.74*	
		26>56, p=.018; 36>56, p=.003; 26>66, p=.038; 36>66, p=.009							

Feelings of contentment and satisfaction remain steady until 56-65 years, at which point they increase with age. The reciprocal relationship between pleasant-unpleasant affect is evident in the inverse relationship between feelings of discontent and age, with discontent falling at 56-65 years.

10.8.1 Age Effects in Multiple Discrepancies Theory

The experience of contentment and satisfaction appears to change with age. To investigate if this change in affect is related to cognitive processes, descriptive statistics were calculated according to age group and are presented in Table 10.13 below. Higher scores indicate greater discrepancies.

Table 10.13: Means and Standard Deviations for Discrepancies According to Age (N=782)

Discrepancy Item	18-25 (N=33)	26-35 (N=98)	36-45 (N=158)	46-55 (N=191)	56-65 (N=160)	66-75 (N=131)	76+ (N=53)	p
1. Measure up to your general aspirations	31.21 *19.65*	30.92 *19.32*	32.41 *18.21*	29.69 *18.75*	27.06 *17.75*	28.02 *19.63*	27.17 *15.36*	.163
2. Measure up to average for most people your age	33.64 *23.96*	34.69 *22.12*	34.59 *21.20*	32.63 *20.17*	29.75 *18.86*	29.85 *19.37*	27.92 *18.43*	.117
3. The life you think you deserve	41.21 *23.69*	43.16 *23.45*	44.90 *22.72*	40.58 *21.79*	35.94 *20.23*	34.39 *21.83*	36.98 *17.39*	**.000**
	56<36, p=.005; 66<26, p=.040; 66<36, p=.001							
4. The life you think you need	42.12 *22.33*	47.45 *23.03*	45.95 *24.73*	43.16 *23.04*	37.38 *20.11*	36.44 *19.35*	38.11 *21.58*	**.000**
	56<26, p=.009; 56<36, p=.016; 66<26, p=.004; 66<36, p=.006							
5. Compared to the life you expected to have	37.58 *25.98*	44.90 *23.87*	41.72 *24.16*	40.73 *22.42*	35.88 *20.07*	37.05 *22.81*	33.77 *18.73*	**.010**
	56<26, p=.030							
6. What you expect your life will be 5yrs from now	40.30 *21.43*	39.59 *20.35*	35.35 *17.92*	41.94 *19.60*	44.06 *17.78*	44.92 *20.36*	46.60 *21.21*	**.000**
	46<36, p=.028; 56<36, p=.001; 66<36, p=.001; 76+<36, p=.005							
7. The best in your previous experience	42.73 *26.13*	41.43 *24.66*	44.39 *22.43*	41.80 *22.24*	40.44 *22.88*	43.97 *22.14*	42.88 *20.61*	.763

People think they deserve and need less as they get beyond the age of 55 years (Items 3 & 4). Discrepancies in relation to life expectations (Item 5) also fall at 56-65 years. No significant age differences emerged on discrepancies of general aspirations, social comparison or past comparison.

10.9 AFFECT AND MULTIPLE DISCREPANCIES WITHIN A MODEL OF SUBJECTIVE WELLBEING

SWB is predominantly an affective construct but cognition and personality are also important predictors of SWB. Therefore, both affective and cognitive constructs combine to produce an overall level of SWB. The strength of this hypothesised model of SWB will now be examined using structural equation modelling.

Using AMOS and maximum likelihood estimation, the relationships were examined between the key affects, a latent variable with 5 indicators (*excited, satisfied, content, happy, discontent*), the Five Factor Model of Personality, a latent variable with 5 indicators (Extraversion, Neuroticism, Agreeableness, Openness and Conscientiousness), and Multiple Discrepancy Theory, a latent variable with 7 indicators (general aspirations, average life of someone your age, life you deserve, life you need, life you expected, what you expect in 5 years, previous best). The dependent variable of SWB was assessed by the Personal Wellbeing Index.

Before analysis of the SWB model, individual assessments were completed on the measures used to assess the 3 independent latent variables of the Key Affects, Personality and Multiple Discrepancies Theory and the output variable of SWB. Separate models were constructed to investigate the reliability for the all measures. These were completed for the 5 key affect items; the 5 personality factors in the NEO Form S (Costa & McCrae, 1992a); the 7 MDT items (Michalos, 1985), and the 7 SWB items of the Australian Unity Wellbeing Index (Cummins et al., 2001) The goodness of fit indices for the separate models produced are presented below in Table 10.14.

Table 10.14: Reliability Analysis and Goodness of Fit Indices for the Separate Aspects of Affect, Personality and MDT Within a Model of SWB (N=854)

Measure	Reliability	χ^2	df	χ^2/df	GFI	AGFI	SRMR	RMSEA
Key Affect	.85	4.36	4	1.09	1.0	.99	.01	.01
Agreeableness	.75	85.01	24	3.54	.98	.96	.06	.04
Conscientiousness	.82	47.75	25	1.91	.99	.98	.02	.03
Extraversion	.77	55.65	18	3.09	.98	.97	.03	.05
Neuroticism	.86	94.16	34	2.77	.98	.96	.03	.05
Openness	.73	71.26	25	2.85	.98	.97	.03	.05
MDT	.89	16.67	10	1.67	.99	.98	.01	.03
SWB	.84	18.35	7	2.62	.99	.98	.02	.04

The data above confirm that each independent variable achieves good model fit confirming their inclusion as independent variables in the model of SWB. Thus, the hypothesised model presented in Figure 10.2 was analysed. Circles represent latent variables and rectangles represent measured variables. The model presented illustrates the hypotheses that affect, personality and Multiple Discrepancies Theory predict SWB. Affect is the strongest predictor of SWB and these latent variables are all interrelated.

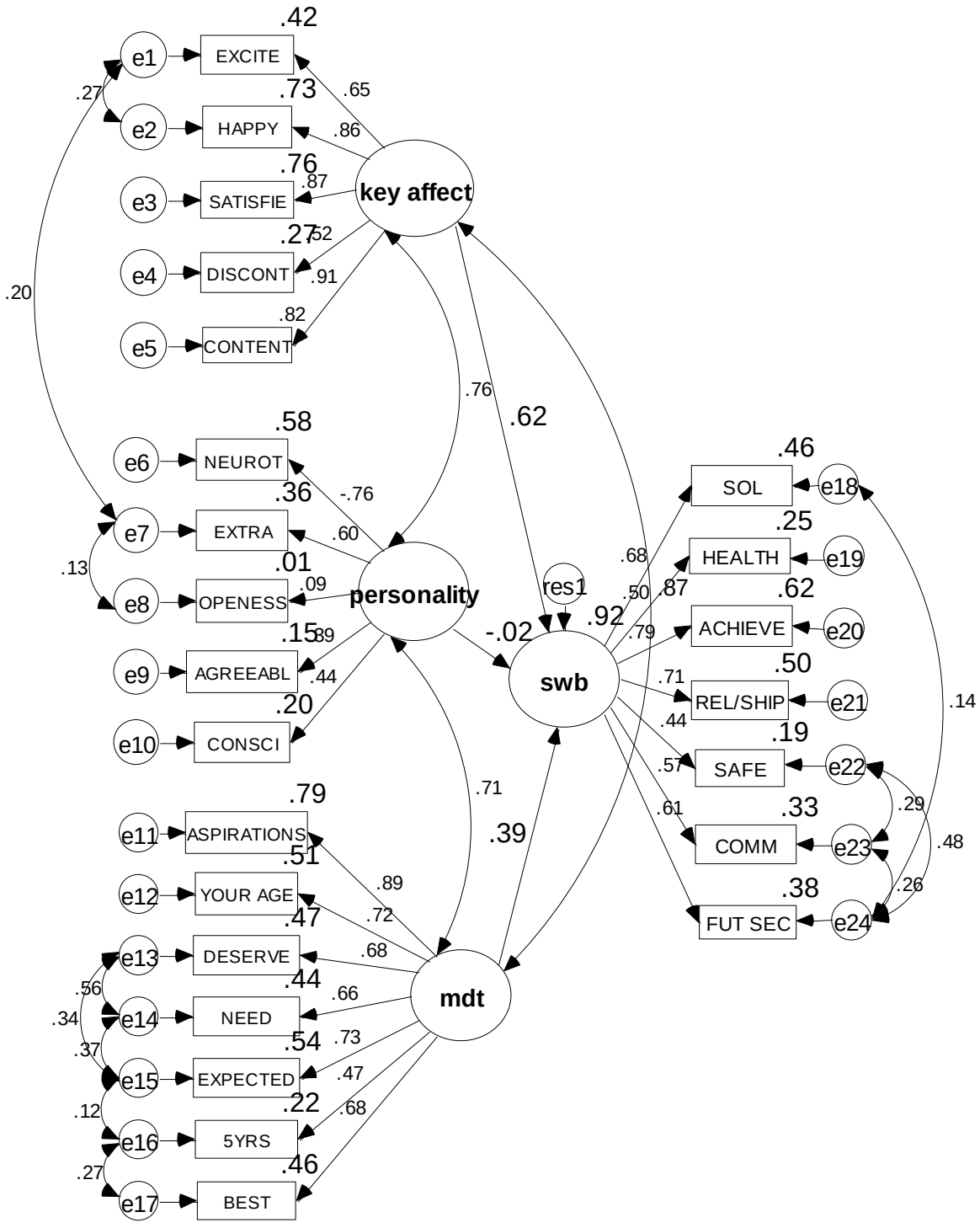


Figure 10.2: A Model of SWB Incorporating Affect, Personality and Multiple Discrepancies Theory

Table 10.15 provides correlations and a summary of fit indices. The χ^2/df ratio of 3.84 is higher than desired, however, the remaining fit indicators indicate a

reasonable fit between the data and the model. The 90% confidence limit for the RMSEA is between .05 and .06 suggesting a satisfactory model fit (Kline, 1998; Byrne, 2001).

Table 10.15: Analysis of a Cognitive Affective Model of SWB Incorporating Personality (N=854)

Correlations	1.	2.	3.
1. Key Affect	-		
2. Personality	.76	-	
3. Multiple Discrepancies Theory	.87	.71	-

Pathways	**B**	**p**
Affect→SWB	.62	.000
Personality→SWB	-.02	.676
MDT→SWB	.39	.000

Fit Statistics									
χ^2	**df**	**χ^2/df**	**GFI**	**AGFI**	**NNFI**	**SRMR**	**RMSEA**	**SMC**	**AIC**
898.77	234	3.84	.92	.90	.93	.04	.06	.918	1030.77

Covariances were inserted between error terms to produce the final model presented in Figure 10.2 and all of these correlations can be theoretically justified. The key affects of excitement and happiness correlated because both represent pleasant affect with varying levels of activation. This is confirmed in the circumplex model of affect presented in Figure 10.1 where the affects are in succession, only 17° apart. Excitement seeking and energy are also important aspects of extraversion (Costa & McCrae, 1992), hence the correlation between these terms on the model.

The personality factors of extraversion and openness to experience were also found to be related to one another. These factors are probably correlated because individuals need to be open to new life experiences if they want to experience exciting events. Familiarity breeds monotony and security, while new and unusual life experiences produce excitement.

Discrepancies related to what people believe they deserve, need and expect are all interrelated. This is confirmed in the high correlations (r = .67) between these items presented in the regression of discrepancy items on life satisfaction in Table 10.9. Similarly, future expectations are probably made in reference to the best that someone has experienced in the past.

The SWB domain of standard of living is related to satisfaction with future security which, in turn, is interrelated with safety and community connectedness. Standard of living is effectively a measure of material wellbeing, enabling the purchase of additional resources which can enhance positive feelings about the future. If people feel secure about their future, they are also likely to feel safe at

the present time, and feelings of community connectedness are likely to be fostered if people feel safe and mobile within their local environment.

The covariance between the latent variables of key affect and MDT is consistent with the proposed affective-cognitive model of SWB. Even though affect and cognitions are entered separately as key affect and MDT into the model, both components combine to produce an overall level of SWB.

Factor loadings for the three independent latent variables are consistent with the regressions presented in earlier sections. The highest factor loading for key affect is contentment, followed by satisfaction, happiness, excitement and discontentment. Neuroticism is the strongest factor of the FFM of personality, followed by extraversion, conscientiousness, agreeableness and openness to new experiences. General aspirations and expectations of life load highest on MDT, followed by past experiences, what one deserves, needs, social comparison and future discrepancies. SWB was assessed by 7 separate domains. Personal relationships produced the highest factor loadings on SWB, followed by achievements, future security and standard of living, community connectedness, health and safety.

The FFM of personality is the only non-significant latent variable in the prediction of SWB. Personality is related to both cognitions of MDT and key affect but does not have any significant direct effect on SWB. Key Affect was the best predictor of SWB (standardised coefficient = .62). The cognitive component of MDT was also an important predictor of SWB (standardised coefficient = .39) while the FFM of personality has a minimal effect on SWB (standardised coefficient = -.02). Thus, this model confirms that SWB is predominantly a measure of affect and to a lesser extent, discrepancy cognitions. Personality is not as strong a predictor of SWB and is the weakest component of the model. Of the five personality factors neuroticism and extraversion produced the strongest factor loadings consistent with earlier regression analyses of the FFM on SWB. In conclusion, this model suggests that SWB is predominantly a measure of pleasant affect and associated discrepancy cognitions and personality is not a strong influence of SWB.

10.9.1 An Alternative Model of SWB: Affect as the Driving Force

The above model indicates that affect, not personality, is the strongest component of the model. However, this initial model failed to consider the affective content of MDT which is a possible factor reducing model fit. A regression of affect on MDT in Table 10.11 suggests that the assessment of discrepancies is not a predominantly cognitive process because over 50% of the variance in MDT can be explained by affect. Thus, a second model is proposed with affect driving personality, MDT and ultimately, SWB. In this model affect is the driving force behind personality, MDT and SWB and it is presented in Figure 10.3 below. Circles represent latent variables and rectangles represent measured variables.

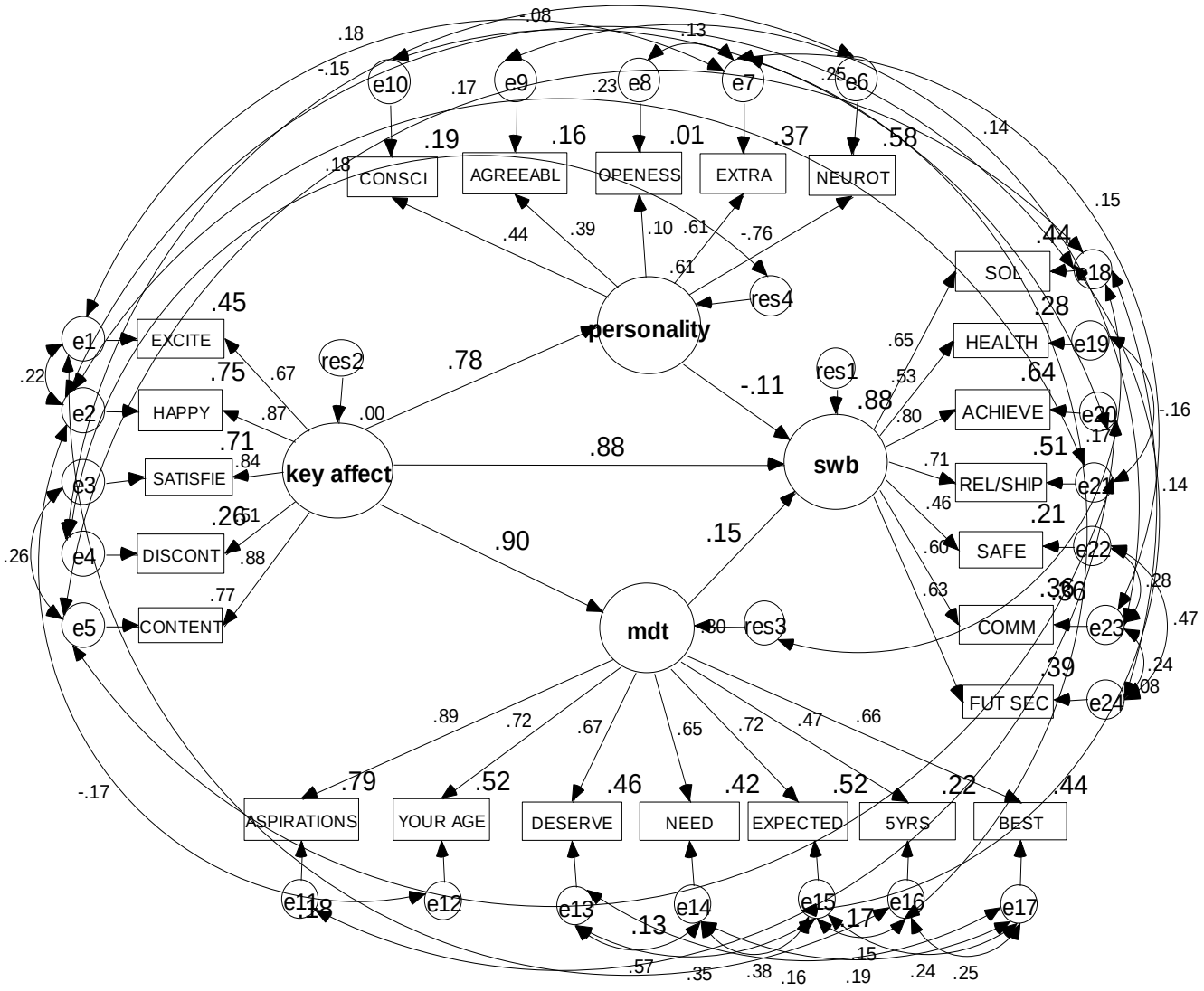


Figure 10.3: An Affective Model of SWB

All pathways in this model are significant and the χ^2/df ratio of 2.17 indicates a good level of model fit. Key Affect is a powerful predictor of SWB (standardised coefficient = .88). MDT (standardised coefficient = .90) and the FFM of personality (standardised coefficient = .78). Modelling affect as giving rise to personality increases the strength of the pathway between personality and SWB (standardised coefficient = -.11). In comparison, accounting for the affective component in MDT by the inclusion of the key affect →MDT pathway, decreases the strength of the pathway between MDT → SWB (standardised coefficient = .15). With the key affects driving MDT, the affective component of MDT is accounted for and the MDT→SWB pathway is the non-affective component of MDT. Model fit statistics and pathway significance are presented in Table 10.16 below.

Table 10.16: Analysis of an Affective Model of SWB (N=854)

Pathways	B	p
Affect→MDT	.90	.000
Affect→Personality	.78	.000
MDT→SWB	.15	.053
Affect→SWB	.88	.000
Personality→SWB	-.11	.046

Fit Statistics							
χ^2	df	χ^2/df	p	GFI	AGFI	NNFI	SRMR
466.91	215	2.17	.000	.96	.94	.96	.03
RMSEA	**SMC**	**AIC**					
.04	.88	636.91					

These fit statistics confirm that a good level of model fit and over 88% of the variance is explained in this model of SWB. As χ^2 is sensitive to sample size and degrees of freedom, it is not surprising that $p < .001$. However, if sample size is increased it is likely that χ^2 will reach non-significance ($p > .05$) indicating fit between the proposed model and data.

During the development of this model, modification indices suggested the inclusion of the large number of covariances (see Figure 10.3). All of these correlations are consistent with the theories of affect, personality, MDT and SWB and are included in the final model. Such correlations emphasize the extent of interrelation between affect, personality, MDT and SWB. Furthermore, they also suggest that a lack of discriminant validity exists in the measures used to assess SWB, MDT and personality. Each of these concepts is highly affective in nature and the spider's web appearance of the model presented in Figure 10.3 confirms this.

The model confirms that the FFM is not an independently important predictor of SWB. Most of the covariances between personality with SWB, MDT and affect are located on the dominant personality factors of neuroticism and extraversion. These factors also provide the greatest contribution towards the prediction of SWB. This is not surprising because the model indicates that SWB is a concept driven by affect and both neuroticism and extraversion are largely measures of unpleasant-activated and pleasant-activated affects respectively. The reduced role of personality in the prediction of SWB is inconsistent with the role of personality proposed by (Cummins, Gullone et al., 2002). These authors proposed a model describing the relationship between external events and the maintenance of SWB comprising of three levels of processing. The first level is of unconscious habituation and adaptation, the second level of conscious awareness of met needs, and the third level of cognitive buffers which absorb the impact of differing need states. Cummins et al., (2002) argue that personality, described as stable cognition and affectivity, influences the second and third levels of the model. Thus, personality mediates the relationship between SWB and the external environment. However, the model presented in Figure 10.3 indicates that the FFM of personality is not an important predictor of SWB, and

affect is the most important factor in the explanation of SWB. To ensure that personality is not playing a mediating role on affect a final model was tested and is presented below.

10.9.2 Personality Mediates the Relationship Between Affect and SWB

A final model was constructed to assess whether the FFM of personality mediates the relationship between affect and SWB. This model is largely the same as the affective model of SWB presented in Figure 10.3 with the removal of the highly significant direct pathway between affect and SWB. If affect is mediated by personality, the pathway from personality to SWB should become significant. A lack of significance in this pathway indicates that affect is an important predictor of SWB and is not mediated by personality. The tested model is presented below in Figure 10.4.

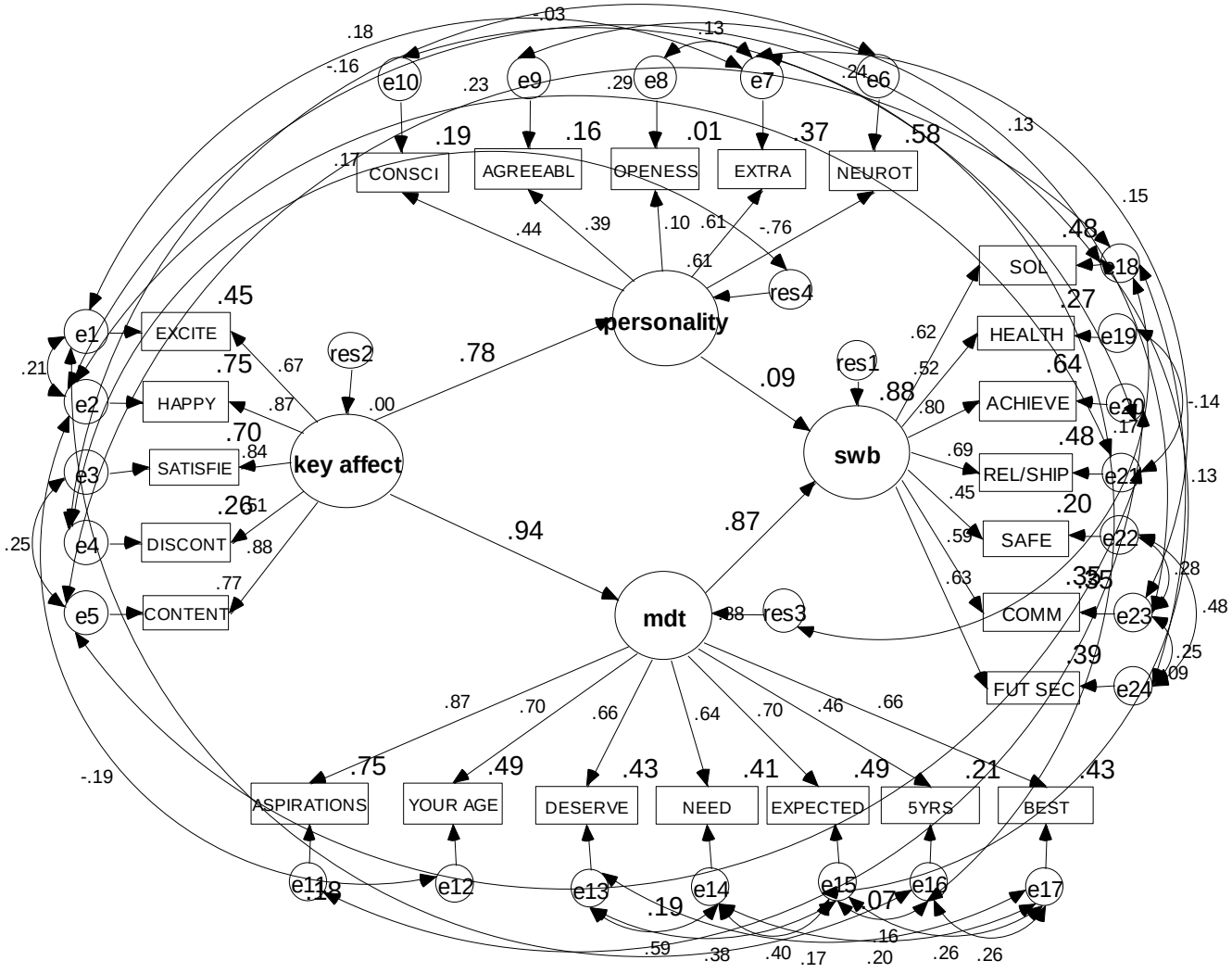


Figure 10.4: Personality Mediating Affect in a Model of SWB

Personality becomes less important in the prediction of SWB when affect is mediated by personality. In contrast, the removal of the direct pathway from affect → SWB leads to affect being re-directed through MDT, making the MDT → SWB pathway highly significant. Affect is not mediated by personality because the Personality → SWB pathway remains non-significant despite the removal of the direct pathway of affect → SWB included in the affective model of SWB. Model fit statistics and pathway significance levels for Figure 10.4 are presented below in Table 10.17.

Table 10.17: Analysis of Personality Mediating Affect in a Model of SWB (N=854)

Pathways	**B**	**p**
Affect→MDT	.94	.000
Affect→Personality	.78	.000
MDT→SWB	.87	.000
Personality→SWB	.09	.069

Fit Statistics						
χ^2	**df**	**χ^2/df**	**GFI**	**AGFI**	**NNFI**	**SRMR**
552.09	216	2.56	.95	.93	.95	.04
RMSEA	**SMC**	**AIC**				
.04	.88	720.09				

Despite the significance in the MDT → SWB pathway, the above fit statistics indicate that the mediated model of SWB presented in Figure 10.4 does not fit the data as well as the affective model of SWB presented in Figure 10.3. This is suggested by the lower AGFI and NFI values, and the higher SRMR and Aikake Criterion values.

In conclusion, affect in SWB is not mediated by personality, confirming the reduced role of personality in the prediction of SWB. This result is consistent with the regression equations presented earlier in Sections 10.5 and 10.7. The affective model of SWB presented in Figure 10.3 is the best fitting model of SWB. It suggests that affect is the strongest component of SWB, giving rise to the high apparent contribution of neuroticism, extraversion, and discrepancy cognitions in the prediction of SWB. Affect is the driving force in the production of SWB and consequently provides an assessment of pleasant affect.

10.10 STANDARD MULTIPLE REGRESSION PREDICTING DEPRESSION BY AFFECT & MULTIPLE DISCREPANCIES THEORY

The dominance of pleasant affect in the affective model suggests that SWB may be used to assess emotional health. To further investigate this proposal, a series of analyses were conducted examining the association between affect, depression, and SWB. The first analysis in this series sought to determine affects which are most important in the prediction of depression and was conducted with a standard multiple regression of affect on the depression subscale of the DASS (Lovibond & Lovibond, 1995). Table 10.18 displays the R for the regression which was

significantly different from zero, F (24, 761) = 42.84, p < .001. *Happy* (sr^2 = -.11), *unhappy* (sr^2 = .11), *distressed* (sr^2 = .10), and *dissatisfied* (sr^2 = .06) contributed significantly to the prediction of depression. Altogether, 58% (56% adjusted) of the variability in depression was predicted by knowing affect scores.

Table 10.18: Standard Multiple Regression of Affect Terms on DASS Depression Scores (N = 785)

Affect	B	β	sr^2
Excited	.00	-.01	-.01
Happy	-.08***	-.22	-.11
Calm	-.01	-.03	-.02
Sleepy	.01	.02	.02
Bored	.00	-.01	-.01
Dissatisfied	.03*	.09	.06
Annoyed	.00	.00	.00
Active	-.03	-.08	-.04
Lively	-.01	-.02	-.01
Satisfied	.01	.02	.01
Relaxed	.03	.07	.04
Sluggish	.02	.05	.03
Exhausted	.00	.01	.00
Discontent	-.01	-.05	-.02
Nervous	.00	.00	.00
Aroused	.00	.00	.00
Enthusiastic	-.02	-.07	-.04
Content	-.03	-.09	-.04
At ease	.02	.06	.03
Unaroused	.01	.03	.02
Tired	.01	.05	.03
Unhappy	.07***	.22	.11
Distressed	.07***	.20	.10
Alert	-.01	-.02	-.01

**** p<.001, *** p<.005 R^2 = .58[a]
** p<.01, * p<.05 Adjusted R^2 = .56
[a]Unique variability = .04; shared variability = .54

The predictors of happy, unhappy and dissatisfied suggest that depression is best predicted by affect from the pleasant-unpleasant axis of the circumplex. The importance of the unpleasant-activated affect of distressed is also consistent with depressive symptomatology. This is because this type of affect is characteristic of symptoms of depression and anxiety which often present comorbidly.

10.10.1 Standard Multiple Regression Predicting Depression By Key Affect Terms

The previous analysis suggests that four key affect terms are powerful predictors of depression. To assess their predictive strength, the amount of variance explained in depression by all affective descriptors was compared to variance explained by the four affective descriptors of *happy*, *unhappy*, *distressed* and *dissatisfied.*

The R for the regression was significantly different from zero, F (4, 797) = 239.47, p<.001. Table 10.19 indicates that all four of the independent variables contributed significantly to prediction of depression: *happy* (sr^2 = -.22), *unhappy* (sr^2 = .14), *distressed* (sr^2 = .13), and *dissatisfied* (sr^2 = .07). The four independent variables in combination contributed another .46 in shared variability. Altogether, 55% (54% adjusted) of the variability in depression was predicted by knowing scores on these four independent variables of affect ratings.

Table 10.19: Standard Multiple Regression Predicting Depression by Key Affects (N = 801)

Affect	Depression	1.	2.	3.	B	β	sr^2
1. Happy	-.63				-.11**	-.30	-.22
2. Unhappy	.68	-.65			.08**	.26	.14
3. Distressed	.64	-.56	.79		.07**	.22	.13
4. Dissatisfied	.53	-.52	.64	.57	.03*	.09	.07
* p<.005; ** p<.001						R^2 = .55[a]	
[a]Unique variability = .09; shared variability = .46						Adjusted R^2 = .54	

The four key affects predict over 50% of the variance in depression and the addition of another 20 affect terms only contributed another 2% of explained variance. It is interesting to note that the antonyms of *happy* and *unhappy* both contribute unique variance and produce correlations with depression of approximate magnitude but in opposing directions. Altogether, the four key affects explain 55% of variance in depression scores confirming the strength of the affective component in SWB.

10.10.2 Analysis of Variance of Multiple Discrepancies Theory According to Depression

Affects selected from the unpleasant-pleasant axis of the circumplex were the best predictors of depression. However, affect is only one major component of the affective-cognitive model of SWB, with MDT forming the other major component. Discrepancies are expected to increase as depression increases. This proposal was investigated by a one-way, between groups analysis of variance of DASS depression scores on total discrepancies, assessed by totaling the 7 discrepancy items used to assess MDT. According to Lovibond & Lovibond (1995), normative data suggest that a DASS depression score of less than 10 represents the 78th percentile. A depression severity rating of 0-9 is described as normal, 10-13 as mild, 14-20 as moderate, 21-27 as severe, and 28 or greater as extremely severe. The large sample in this study enabled the creation of these depression score categories. Greater differentiation of low depression scores was created by splitting the 0-9 normal range into three separate groups of 0, 1-4 and 5-9.

There was a statistically significant difference at the p<.001 level in total level of discrepancy for the five depression groups according to the Welch statistic [Welch (6, 821) = 41.19, p = .000]. The Welch statistic is preferable to the F statistic when the assumption of equal variances does not hold. Means and standard deviations for these groups are presented in Table 10.20 below.

Table 10.20: Total MDT Discrepancy Scores According to DASS Depression Severity (N=828)

Depression Scores	Severity	Discrepancy Mean Score	Discrepancy SD	N
0	normal	20.96	9.29	223
1-4	normal	23.52	8.87	211
5-9	normal	26.69	9.31	152
10-13	mild	29.90	10.50	102
14-20	moderate	34.80	9.49	88
21-27	severe	40.77	12.58	31
28+	extremely severe	48.67	14.73	21

Post-hoc comparisons using the Dunnett T3 indicated that the mean score for all groups were significantly different from each other with four exceptions. Discrepancy scores were not significantly different between those with depression scores of 0 and 1-4, 5-9 and 10-13, 14-20 and 21-27, or between 21-27 and 28+.

Depression increases as individuals perceive greater discrepancies between what they have and wants, feels they deserve and need, what relevant other have, what they expect to have, the best they had in the past and the best they expect to have in the future.

10.10.3 Standard Multiple Regression Predicting Depression By MDT Items

The analysis of variance presented above indicates that total discrepancies increase as depression increases but does not indicate which items of discrepancy are the best predictors of depression. Thus, an additional standard multiple regression of each MDT item on was performed on DASS depression scores.

The R for the regression was significantly different from zero, F (7, 827) = 66.22, p<.001. Only two of the MDT items contributed significantly to the prediction of depression: discrepancies about general aspirations (sr^2 = .26) and current-past discrepancies (sr^2 = .09). The seven independent variables in combination contributed another .28 in shared variability. Altogether, 36% (35% adjusted) of the variability in depression was predicted by knowing scores on these MDT items.

Table 10.21: Standard Multiple Regression Predicting DASS Depression by Multiple Discrepancy Theory Items (N = 834)

Discrepancy Items	Depression	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Measure up to your general aspirations	.57							1.61**	.39	.26
2. Measure up to average for people your age	.42	.65						.13	.04	.03
3. The life you think you deserve	.42	.59	.50					.01	.00	.00
4. The life you think you need	.42	.55	.49	.76				.20	.06	.04
5. Compared to what you expected to have	.46	.63	.56	.67	.67			.16	.05	.03
6. What you expect 5yrs from now	.32	.40	.29	.39	.36	.46		.18	.05	.04
7. The best in your previous experience	.45	.57	.44	.55	.55	.60	.50	.41*	.12	.09

*p<.005; **p<.001 R^2 = .36[a]
[a]Unique variability = .08; shared variability = .28 Adjusted R^2 = .35

Discrepancies between general aspirations and current life, and past life with current life are the best predictors of depression. The general aspirations item is the best predictor of depression and is also the most abstract item. In total, the MDT items explained 35% of the variance in depression scores confirming the association between increased discrepancies and depression.

10.10.4 Analysis Of Variance of Personal Wellbeing According To Depression Scores

Given the link between depression and the separate affective and cognitive components of SWB, overall SWB is also expected to decrease with depressive symptomatology. The results presented in Study 1 revealed that depression was associated with a decrease in SWB consistent with the theory of SWB homeostasis. SWB was maintained at an approximate threshold of 70%SM in the presence of mild to moderate depression but unable to be maintained in the presence of moderate to severe levels. This was re-examined here and means and standard deviations for SWB are presented in Table 10.22 below.

Table 10.22: SWB Mean Scores According to DASS Depression Scores (N=825)

Depression Scores	Severity	SWB Mean Score	SWB SD	SWB Mean Increment	N
0	normal	80.31	10.62		222
1-4	normal	77.10	9.94	-3.13	210
5-9	normal	73.55	10.84	-3.55	152
10-13	mild	70.93	12.20	-2.62	101
14-20	moderate	62.87	12.10	-8.06	90
21-27	severe	53.74	16.48	-9.13	29
28+	extremely severe	41.36	16.09	-12.38	21

A one-way between groups analysis of variance was conducted to explore the impact of DASS depression scores on levels of SWB. There was a statistically significant difference at the p<.001 level in SWB scores for the five depression groups according to the Welch statistic [Welch (6, 817) = 50.26, p = .000]. Post-hoc comparisons using the Dunnett T3 indicated that the mean score for all groups were significantly different from each other with three exceptions. Mean SWB scores were not significantly different between those with depression scores of 5-9 and 10-13, 14-20 and 21-27, or 21-27 and 28+. SWB means are presented according to depression scores below in Figure 10.5.

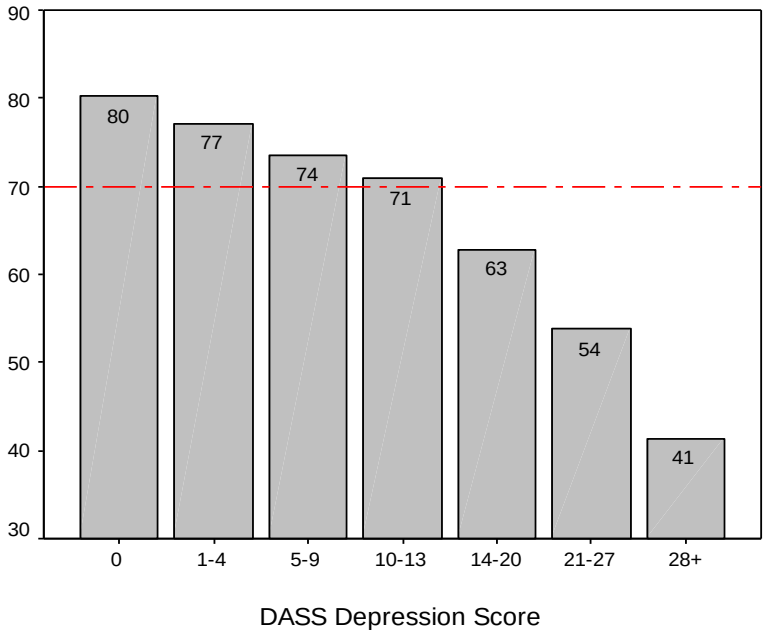


Figure 10.5: SWB and Depression Scores In Reference to Homeostasis

Increasing depression results in lowered Personal Wellbeing, consistent with the depression and SWB results presented earlier in Study 1. The dotted reference line indicates the approximate SWB homeostasis point of 70 suggested by Cummins (1995; 1998; 2000). These data are consistent with the proposition that SWB homeostasis is able to prevent a dramatic decrease in Personal Wellbeing with mild to moderate symptoms of depression but results in a steady fall in wellbeing with moderate to severe depression. This is confirmed when SWB scores are compared between those with no, mild or severe depression symptoms as presented in Table 10.23 below.

Table 10.23: SWB Mean Scores According to Moderate and Severe DASS Depression Scores (N=816)

Depression Scores	Severity	SWB Mean Score	SWB SD	N
0-9	normal	77.01	10.47	575
10-20	mild - moderate	67.14	12.78	191
21+	severe - extremely severe	48.54	17.29	50

SWB is approximately maintained at the international standard proposed by Cummins (1995; 1998; 2000) in the absence, or with mild to moderate symptoms of depression, but homeostasis fails in the presence of severe depression $F(2,813) = 104.00$, $p<.001$. Dunnett T3 post hoc analysis revealed significant differences between all three groups. Greater variance in SWB is also associated with increased depression severity. SWB scores were lower for individuals reporting mild-moderate levels of depression but remained close to the homeostatic levels of 70-80%SM. SWB was significantly reduced in the severely depressed group with the majority of SWB scores in this group ranging from 31-60, well below the homeostatic standard. The reduced variance in SWB scores in those with no or low depression symptoms suggests that SWB is held within a narrow band for the majority of the population, possibly indicating a threshold. In the absence of depression, most SWB scores ranged from 67-87, with few scores higher than 85%SM. Very few people have extremely high SWB and it is possible that feeling too good about your life has some negative consequences. For example, extreme levels of satisfaction with current life may lead to a lack in motivation for the future. Thus, either extreme, feeling life could not get any better or any worse could be associated with negative consequences on SWB, but feeling things are reasonably good but could improve may be the optimal level of SWB.

10.10.5 Standard Multiple Regression of SWB on Depression Scores

The above analysis of variance suggests that there is a strong negative relationship between depressive symptomatology and SWB. To investigate the overlap between these concepts a final standard multiple regression was conducted with DASS depression scores as the dependent variable and the seven domains of SWB as the predictor variables. The results of this regression are presented below in Table 6.24.

Table 10.24: Standard Multiple Regression Analysis for Variables Predicting Depression By SWB Domains (N = 826)

Variable	Depression	1.	2.	3.	4.	5.	6.	B	β	sr^2
1. Standard of living	-.42							-.03*	-.08	-.06
2. Health	-.35	.32						-.03**	-.09	-.08
3. Achieve in life	-.54	.54	.41					-.11***	-.27	-.19
4. Personal rel/ships	-.48	.43	.27	.55				-.07***	-.21	-.16
5. Safety	-.31	.31	.34	.30	.32			-.01	-.02	-.02
6. Comm. Connect	-.39	.37	.36	.46	.41	.45		-.02	-.05	-.04
7. Future security	-.42	.50	.41	.45	.38	.61	.51	-.04**	-.11	-.08

* p<.05; ** p<.01, ***p<.001 $R^2 = .38^a$

[a]Unique variability = .08; shared variability = .30 Adjusted $R^2 = .38$

The R for the regression was significantly different from zero, $F(7, 819) = 72.53$, $p<.001$. Table 6.24 indicates that five of the SWB domains contributed significantly to the prediction of depression. The SWB domain of satisfaction with achievements in life was the best predictor of depression scores ($sr^2 = -.19$), with an inverse relationship between productivity in life and symptoms of depression. Satisfaction with personal relationships explained a similar amount

of unique variance (sr^2 = -.16), while a smaller percentage of variance was explained by satisfaction with future security (sr^2 = -.08), health (sr^2 = -.08), and standard of living (sr^2 = -.06). The seven independent variables in combination contributed another .30 in shared variability. Altogether, 38% of the variability in depression was predicted by knowing scores on these SWB domains. However, it is important to note that this is an estimated based on a linear relationship between the SWB domains and depression, and Figure 10.5 indicates non-linearity.

10.10.6 Hierarchical Multiple Regression Predicting Depression from Affect, MDT and SWB

The key affects of *happy*, *unhappy*, *distressed* and *dissatisfied* explained 55% of the variance in depression, while MDT explained 36%, and the 7 domains of SWB explained 38%. In order to compare the predictive strength of each of these constructs in tandem, a final hierarchical regression was conducted. Variable entry was determined according to the affective-cognitive model of SWB which suggests that SWB is comprised of affect and MDT. Standardised regression coefficients of the model indicate that affect is the strongest component of the model while MDT has a reduced role in the explanation of SWB. The four key affects were entered at Step 1, totalled Multiple Discrepancies at Step 2, and SWB at Step 3. As SWB is thought to consist of mainly affect and MDT, the inclusion of SWB at Step 3 is not expected to provide a large proportion of additional variance

Table 10.25 indicates that ΔR^2 was significantly different from zero at the end of Step 1, Step 2 and Step 3. At Step 3 after all 6 independent variables were entered into the equation, $R = .75$, $F(6, 776) = 170.54$, $p < .001$.

Table 10.25: Hierarchical Multiple Regression Predicting Depression by Key Affect, Multiple Discrepancies, SWB (N = 782)

Variable	B	β	sr^2	ΔR^2
Step 1				
1. Happy	-.11***	-.29	-.22	.55***
2. Unhappy	.08***	.25	.13	
3. Distressed	.03**	.10	.08	
4. Dissatisfied	.07***	.21	.13	
Step 2				
1. Happy	-.08***	-.22	-.14	
2. Unhappy	.08***	.24	.13	.01***
3. Distressed	.03*	.08	.06	
4. Dissatisfied	.07***	.20	.12	
5. Multiple Discrepancies Total	.10***	.16	.12	
Step 3				
1. Happy	-.06***	-.16	-.10	.01***
2. Unhappy	.07***	.23	.12	
3. Distressed	.03*	.09	.07	
4. Dissatisfied	.06***	.19	.12	
5. Multiple Discrepancies Total	.07**	.11	.07	
6. SWB	-.08***	-.14	-.09	
				$R^2 = .57^a$
*p<.01; **p<.005; ***p<.001				Adjusted $R^2 = .57$
[a]Unique variability = .06; shared variability = .51				R = .75

This hierarchical regression is consistent with earlier regression analyses indicating that depression is largely an affective experience of unpleasant affect best described by feelings of dissatisfaction and loss of happiness. When added to the regression, MDT only contributed an additional 1% of explained variance. SWB contributed an additional 1% of variance beyond unpleasant affect and MDT, but did not contribute a large proportion of variance beyond affect and MDT.

SUMMARY

This chapter aimed to test a model of SWB incorporating the circumplex theory of affect, MDT and the FFM of personality. Progressive analyses in the earlier sections of the chapter helped to inform and explain the relationships between these concepts, which culminated in the final model of SWB. Initially, the circumplex model was tested, revealing an oval shape structure with the majority of affects clustering around the valence axis, confirming the results of Study 2. An investigation of these 24 different affects selected from each octant of the affective circumplex, revealed that five affective descriptors could explain 66% of the variance in life satisfaction. These key affects of *content*, *happy*, *satisfied*, *excited,* and *discontent* contributed unique variance in the regression of affect on life satisfaction. The regression of these five affects on life satisfaction explained as much variance as all 24 affective descriptors being included in the equation. Furthermore, these key affects are predominantly representative of the pleasant-unpleasant axis of the circumplex.

The FFM of personality did not contribute significant variance in life satisfaction scores beyond affect. Alone, the five factors explained 26% of the variance in life satisfaction scores, with neuroticism and extraversion acting as the best predictors. However, the only factors to explain unique variance were neuroticism which explained 11%, and extraversion which explained 3%. The five personality factors did not contribute any unique variance when they were added to the regression equation with the five key affects.

Multiple Discrepancies Theory was included in this study as an assessment of the cognitive component of SWB. These items predicted 55% of the variance in life satisfaction when they were entered into a regression of satisfaction with life as a whole. However, further investigation of MDT revealed that over 50% of the variance in total discrepancies was explained by the five key affects. Thus, MDT is also a highly affective construct in so far as it is able to explain satisfaction with life as a whole. Of all the discrepancies assessed by MDT, discrepancies in relation to general life aspiration explained 10% of the variance in life satisfaction. Discrepancies predicted less variance when combined with affect and the FFM of personality. This is because of the overlap between affect and MDT. In this regression, affect explained 66% of the variance in life satisfaction while discrepancies explained only an additional 2% of variance. The FFM did not explain any variance beyond affect and discrepancies, and altogether the equation explained 68% of the variance in life satisfaction scores.

These results lead to the proposal of an affective model of SWB using structural equation modelling. Initially, affect, MDT and the five factors of personality were included in the model. This model provided a good fit with the data, suggesting that affect is the driving force behind SWB. However, significant overlap exists in the concepts of affect, personality, MDT and SWB. This overlap resulted in a model of SWB with numerous covariate pathways. Squared multiple correlation indicated that 88% of the variance in SWB was explained by affect driving the FFM of personality, MDT and SWB. A final model of SWB confirmed that the FFM of personality does not play an important role in the maintenance of SWB, a finding inconsistent with the model proposed by Cummins, Gullone & Lau (2002). Affect is the driving force behind SWB.

The affective model of SWB suggests that wellbeing is a highly affective construct and this was confirmed when SWB was examined in relation to depression. A regression of all 24 affective descriptors on depression scores resulted in the explanation of 58% of variance. In particular, the key affects of *happy*, *unhappy*, *distressed* and *dissatisfied* contributed unique variance, and a second regression, which included only these four affects, explained 54% of the variance in depression scores. Thus, the concept of depression is best represented by the presence of unpleasant affect and the absence of pleasant affect. When the role of MDT was investigated in relation to depression, greater levels of perceived discrepancy were associated with increased depressive symptomatology. Individuals reporting more symptoms of depression recorded a greater level of discordance between what they have and want, feel they deserve and need, what relevant other have, what they expected to have, the best they had

in the past and the best they expected to have in the future. Discrepancies of general aspirations and the past-current comparisons were the most important MDT items in the prediction of depression, and discrepancy judgments explained 35% of the variance in depression scores.

The relationship between SWB and depression was found to be consistent with Study 1, where SWB homeostasis prevents a significant decrease in SWB in the face of mild to moderate depression. However, as depression severity increases to severe and extremely severe levels, SWB is compromised and a significant decline begins below the population average of 70-80%SM. The seven domains of SWB explained 38% of the variance in depression scores and satisfaction with achievements in life, personal relationships, future security, health and standard of living were the best predictors of depression.

A final hierarchical regression was completed to evaluate the relative contribution of unpleasant affect, MDT and SWB on depression. As expected, unpleasant affect, particularly feelings of unhappiness and dissatisfaction, was the best predictor explaining 55% of the variance in depression. MDT contributed an additional 1% of variance as did SWB and altogether these three components explained 57% of the variance in depression.

In conclusion, SWB is driven by pleasant affect, and over half of the variance in MDT is also explained by affect. The final affective model of SWB indicates that the four psychological constructs of affect, MDT, personality and SWB are all highly correlated, with poor discriminant validity resulting in difficulty in distinguishing each construct. However, the dominant affective component of MDT and SWB provides support for the use of SWB as a screening tool for assessing pleasant and unpleasant affect. This is supported in the analyses of depression, where greater discrepancies, and a reduction of pleasant affect, are associated with depressive symptomatology. Consequently, these results suggest that SWB can be employed as a measure of both wellbeing and illbeing.

CHAPTER 11: STUDY 3 DISCUSSION

SWB is primarily an affective concept. The results of the third study confirm this, leading to the proposal of a validated affective model of SWB. The affective background is the strongest component of the model and discrepancy judgments are assessed in the context of affect to produce an overall level of SWB. This chapter will discuss the circumplex structure of the affective component of SWB, MDT and the reduced role of personality in SWB. Finally, application of the model as a measure of mental health is discussed in relation to depression.

Affect, SWB and the Circumplex

Pleasant affect is the dominant emotion that is assessed when individuals are asked to provide an overall rating of life satisfaction. When asked to rate affects in relation to life as a whole, the pleasant affects of *satisfied*, *happy* and *content* produced the highest mean scores, confirming the results of Study 2. Thus, SWB or life satisfaction is largely a measure of pleasant affect. Pleasant-deactivated, activated, and pleasant-activated affects also produced high ratings, while affects with unpleasant valence produced the lowest mean ratings.

The inclusion of affect from each octant of the affective circumplex also enabled a further test of the circumplex model. The affect ratings produced an oval shaped model resulted when all 24 affective descriptors were plotted around the circumference because of the domination of the pleasant-unpleasant axis. The affects were located in approximately the expected order of the circumplex, but grouped together across the pleasant-unpleasant axis, in a manner similar to Study 2. Activated affects were located halfway between the activation and valence axes in the region of pleasant-activated affect. Similarly, deactivated affects were located halfway between the deactivation and valence axes within unpleasant-deactivated affect. All of the descriptors proposed as measures of activation/deactivation were located close to valence axis. Therefore, the affective component of SWB is mainly conceived as pleasant-unpleasant regardless of activation. These data are consistent with the results of Study 2, and suggest that the circumplex model is better represented as an oval, and not a circle, to represent the relevant strength of the two axes. A similar shaped circumplex model was described by Feldman (1995a) who found an oval shaped model was produced with high correlations between depression and anxiety affect terms, decreasing the importance of the arousal axis. In a discussion of the results of Study 2, it was further suggested that affect states are predominantly classified as good or bad, pleasant or unpleasant before activation is considered, consistent with the results of Feldman (1995a) and Huelsman, Nemanick & Munz (1998).

The Importance of Affect, Multiple Discrepancies Theory and the Five Factor Model of Personality in SWB

As has been stated, SWB is largely an affective construct. Twenty-four affective descriptors were able to explain 67% of the variance in satisfaction with life as a whole and five of these affects contributed unique variance. These affects, *content, happy, satisfied, excited* and *discontent*, explained the same amount of variance in life satisfaction as all 24 items, and on their own were renamed as key affects. All 3 pleasant descriptors were included in the key affect group with *content* acting as the strongest predictor. This confirms the proposal that SWB is predominantly an assessment of pleasant affect. This was also confirmed through hierarchical regression of the five key affects on life satisfaction. In this analysis, e*xcited* represents pleasant activated affect and is the only term which is defined as a combination of valence and activation. Perhaps feeling excited and pleasantly activated about life is necessary for motivation and purpose in life, and this is why SWB is held positive to about 75% of maximum. *Discontent* is negatively associated with life satisfaction. Study 2 found that when affects from opposite ends of the valence axis are assessed with unipolar response scales they are conceived of in a reciprocal relationship. Therefore, as content was found to be the strongest predictor, its antonym also made a contribution to the variance prediction. The antonyms of the other, weaker positive affects, failed to make such a contribution.

The Importance of the Five Factor Model of Personality in SWB

Affect is a very important component of SWB, yet any comprehensive model of SWB must also account for the role of personality. The FFM of personality was included in Study 3 because it was expected to be an important predictor of SWB. However, the five factors together explained only 26% of the variance in satisfaction with life as a whole. Neuroticism is strongly negatively related to life satisfaction, and of the five factors, it is the best predictor explaining 11% unique variance. Extraversion is the only other personality factor to contribute unique variance in life satisfaction, explaining 3% of unique variance. The remaining factors of openness, agreeableness and conscientiousness were not important predictors of life satisfaction and this general pattern of contribution is consistent with past research (Cummins, Gullone & Lau, 2002; Vitterso, 2001: Vitterso & Nilsen, 2002).

In the current study, the standardised regression weights between neuroticism and extraversion and SWB is -.38, and .20 respectively. This is similar to the regression weights of -.39 and .13 found by Vitterso (2001). In terms of zero order correlations, Cummins et al., (2002) found a stronger relationship between extraversion and SWB in their review of correlations between personality and SWB. They report average zero order correlations of -.34 and .32 between SWB with neuroticism and extraversion, suggesting nearly equal importance in the two major personality factors. In comparison with the current study, they found the correlation between SWB and neuroticism to be about the same, and the correlation with extraversion was higher. The current results found a correlation

of -.47 and .36 between SWB with neuroticism and extraversion. However, these authors included measures of positive and negative affect as indicators of SWB. Affect and personality will produce different correlations to SWB and personality because of the mixture of affect and cognition in SWB. The current results suggest that affect alone is an inadequate measure of SWB because SWB is not solely an assessment of affect. Structural equation modelling indicates that the assessments of multiple discrepancies, which include cognitive processes, are also an important component of SWB. The reduced strength of association found by Cummins et al., (2002) is probably because two of the nine measures of SWB included in the review were solely measures of affect. The proposed model of SWB incorporating affect and MDT indicates that affect is only one component of SWB and life satisfaction is an assessment of affective and cognitive processes.

The above anomalies highlight that difference in SWB assessment can account for inconsistencies in correlations between neuroticism and extraversion with SWB. Thus, the form of SWB assessment is an important factor to consider, especially when the FFM of personality has been suggested to be an important influence of SWB. However, the most important result here is that personality failed to make an independent contribution to the prediction of SWB when the additional contributions of affect, MDT and personality were examined. In a hierarchical regression of affect and personality predicting life satisfaction, the five key affects of *content*, *happy* and *satisfied*, *discontent* and *excited* all out-weighed the relative contribution of the five factors of personality. These results emphasise the affective component of SWB and suggest that considerable overlap may exist between affect and personality consistent with past research (Watson & Clark, 1984; Yik, Russell, Oceja, & Dols, 2000; Yik & Russell, 2001; Yik, Russell, & Suzuki, 2003).

The Importance of Multiple Discrepancies Theory in SWB

Multiple Discrepancies Theory was included in this study as a measure of the cognitive component of SWB. Seven discrepancy items were selected from Michalos (1985) and altogether these items explained 55% of the variance in life satisfaction. This is consistent with Michalos' (1985) original findings, and confirms the importance of discrepancy cognitions in SWB.

The best MDT predictor of life satisfaction was the item regarding discrepancies with general aspirations of life. When participants were asked to consider their life as a whole, the item "How does it measure up to your general aspirations or what you want?" accounted for 10% of unique variance in life satisfaction. This item produced the lowest mean discrepancy rating of all the MDT items, and suggests that there must be a fit between wants in life and current life for life satisfaction to be achieved. The fit between what you have, and what you want is not defined in absolute levels. It is usually difficult to define exactly what you aspired to have and measure this against what you currently have. However, a good level of fit between these cognitions is proposed by Michalos as necessary

to produce general feelings of contentment, satisfaction and happiness, which are the pleasant affects associated with life satisfaction.

Even the earliest SWB research suggested that discrepancies between aspirations and current situation threatened happiness (Campbell et al., 1976; Wilson, 1967) and extremely high or low levels of aspiration have been associated with lowered SWB (Csikszentmihalyi, 1990; Emmons, 1992). It is possible that some level of positive cognitive bias is necessary for an individual to find a match between aspirations and current conditions. If an individual feels their current life is of a lower standard than they aspire to, positive biases could come into effect by lowering recalled aspirations. If their current situation is better than expected, then recalled aspirations may become higher to maintain some level of discrepancy between aspirations and current life. Such discrepancy could facilitate achievement directed behaviour by motivating people to achieve life goals. The positive biases of self-worth, perceived control and optimism first described by Taylor & Brown (1988, 1994) may have an important role in discrepancy evaluations. These biases may influence discrepancy assessments between actual and aspired conditions to keep people motivated for goal achievement. Too great a distance between actual-aspired goals could create a sense of apathy or helplessness. In comparison, too little distance between actual-aspired goals may curtail goal directed behaviour. If such a relationship was confirmed, it would further support Cummins & Nistico's (2002) argument that positive cognitive biases are necessary for the maintenance of life satisfaction.

The most powerful predictors of life satisfaction were discrepancies of general life aspirations and discrepancies between past-current life. Furthermore, these items were also produced the lowest and highest mean discrepancy ratings respectively. The second most powerful predictor of life satisfaction was discrepancy between current and-best life experienced in the past. This discrepancy is argued to be caused by a halo effect (Feeley, 2002; Thorndike, 1920) which is activated when people reminisce about their past lives. The experience of pleasant affect could facilitate positive recall or perhaps memories are biased towards recall of pleasant episodes from the past in order to maintain high levels of overall SWB. However, everyday life is filled with both pleasant and unpleasant experiences which are easily recalled because of the recency of the events. Discrepancies result when recall of these mixed experiences is compared to the biased pleasant memories of the past.

The match between current life and the life people think they deserve is also an important predictor of life satisfaction. It is possible that this item accesses thoughts and feelings associated with self-esteem. This is because self-esteem is defined as an evaluation indicating whether an individual believes they are capable and worthy (Coopersmith, 1967; Rosenberg, 1965). This is also consistent with the high correlations of r = .50 or greater found between SWB and self-esteem (Cummins & Nistico, 2002; Lucas et al., 1996). If thoughts about what a person deserves reflect self-evaluations, then individuals with greater self-respect are more likely to be dissatisfied with situations that do not meet their

basic needs. In contrast, a person with low self-worth may be satisfied with poor conditions because they do not feel they deserve any better.

These results are only somewhat consistent with those described by Michalos (1991) in his global study of over 9000 students. This author found that aspirations or self-want discrepancies had the greatest impact on life satisfaction and there is little consistency in the predictive strength of the others. Social comparison discrepancies had the greatest impact on life satisfaction after self-want in Michalos' student sample, but was not an important predictor of life satisfaction in the current sample. The mean social comparison discrepancy score was slightly lower than the average level of discrepancy for all MDT items and did not contribute any unique variance. This is an unexpected result, especially given the current climate of consumerism in today's society. Perhaps people are less concerned with what others their age are experiencing and more concerned with themselves and their own wellbeing. This could be explained by societal changes in the last decade since Michalos' data were first published or it is also possible that the importance of discrepancies change across the lifespan. The societal values of today encourage status anxiety and over consumption, through cleverly designed marketing and advertising campaigns (de Botton, 2004; Hamilton, 2003). It is also possible that social comparison is more important in younger people but decreases with age as self-identity is firmed, and individuals become more secure in themselves. Eighty percent of Michalos' (1991) global student sample was aged between 17 and 25 years whereas over 60% of the current sample was aged between 36 and 65 years. A trend towards greater social discrepancies in the younger age groups emerged in this study despite a lack of statistically significant difference. An unequal spread of numbers in the age groups may have prevented this result reaching significance.

Perhaps most interestingly, the current data revealed that 53% of the variance in MDT was explained by the key affects of *content, happy, excited, satisfied* and *discontent.* Thus, MDT is also a highly affective construct. This is consistent with the original proposal by Michalos (1985) of MDT as an explanation of happiness and satisfaction. However, the description of MDT argues for the dominance of cognitive processes in the assessment of discrepancies. The unexpected affective component of MDT lead to a review of the hypothesised model of SWB and the final proposed model suggests that SWB and MDT are both largely driven by affect.

THE AFFECTIVE MODEL OF SWB

SWB has long been considered to comprise both affect and cognition (Campbell et al., 1976). However, this study indicates that cognition is less important than affect, and SWB is essentially driven by core affect. Furthermore, core affect also produces the significant variance explained by MDT and the affective personality factors of neuroticism and extraversion, the most important personality factors in the explanation of SWB. A simplified diagram of the affective model of SWB without covariances is presented in Figure 7.1 below.

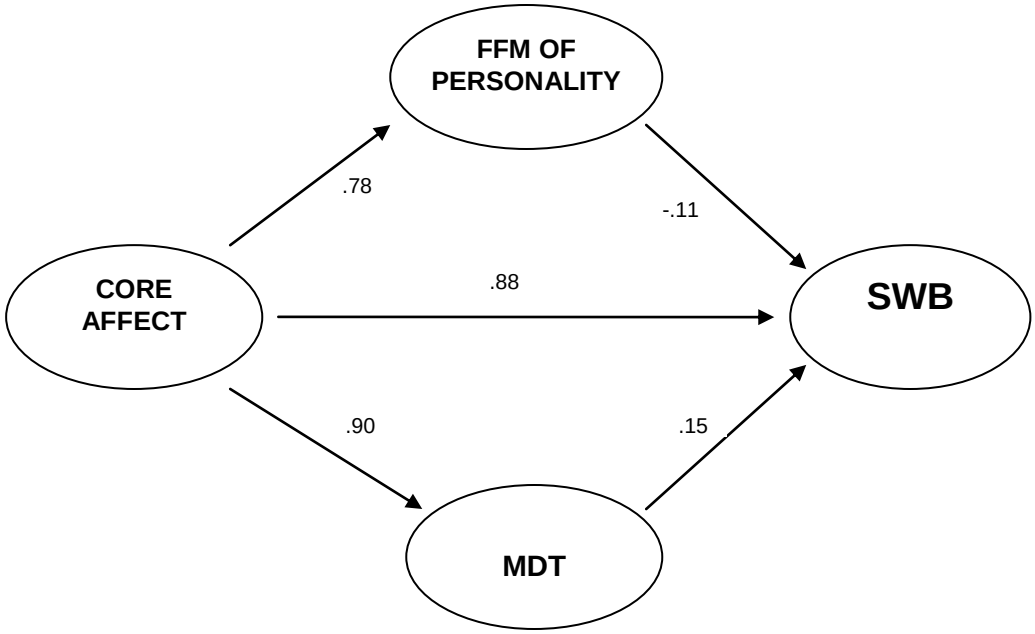


Figure 11.1: Simplified Affective Model of SWB

Core affect is the major component of SWB and it is mainly the affective content of MDT and personality that justifies their importance in SWB investigations. In the affective model of SWB, the key component is pleasant affect, and satisfaction ratings about life tap into feelings of contentment, happiness and satisfaction. Hierarchical regression indicates that MDT only added an additional 2% of explained variance beyond that contributed by affect. This is consistent with the smaller regression coefficient of .15 between MDT and SWB in Figure 7.1, while the regression coefficient between core affect and MDT is significantly higher at .90. These results indicate shared variance between the factors, and MDT is less cognitive in nature than hypothesised. Consequently, a regression of affect on MDT revealed that over 50% of these discrepancies were explained by the key affects of *content, happy, excited, satisfied* and *discontent.*

Core Affect

It is very difficult to define the difference between the terms emotion and affect, but a distinction can be made in relation to the presence of an object (Russell & Feldman Barrett, 1999; Russell, 2003). Typically, emotions involve an object and are described in relation to something else, thereby involving cognitive processes. In comparison, core affect is object free and free-floating. According to Russell (2003), core affect is a neurophysiological state that can be consciously accessed and is a blend of hedonic (pleasant-unpleasant) and arousal values (activation-deactivation). It is commonly referred to as a feeling, and is an assessment of an individual's current condition. It is similar to felt body temperature in that it is always there, can be assessed when you are asked about

it, extremes are most obvious, and it existed before the words used to describe it. Moods are prolonged periods of core affect, are not caused by an object, and are commonly referred to as feelings.

The definition of core affect by Russell & Feldman Barrett (1999) and Russell (2003) is consistent with the affective cognitive model of SWB. The affective component of SWB is core affect and provides the affective background on which cognitions are made. Core affect is evaluated in terms of valence and activation but is a neurophysiological state that occurs even if we are not conscious of it occurring.

It is possible that the process of evolution has naturally selected individuals who experience a level of core affect which corresponds to 75% pleasant or positive. Perhaps the stability of SWB homeostasis (Cummins, 1995, 1998, 2000a, 2003) is a reflection of the evolutionary advantage of generally experiencing pleasant core affect. For example, perhaps an individual reporting feelings of contentment, satisfaction and happiness is more likely to attract and keep a partner, and consequently reproduce. At times when pleasant core affect is reduced and unpleasant affect is experienced, individuals with this evolutionary advantage return to their predominant pleasant core affect. This is the adaptive range of core affect described in Cummins (2000, 2003) theory of SWB homeostasis.

The Relationship Between Core Affect and Temperament

In this thesis it is argued that the amount of pleasant core affect experienced by an individual appears to be fixed early in life and is described as temperament in other areas of psychology. Temperament describes how a child acts or reacts as compared to what a child does, is biologically based, and visible from a very early age (Sanson, Prior, Oberklaid, & Smart, 1999). The pioneers in temperament research are Thomas, Chess, Birch, Hertzig & Korn (1963) who identified nine dimensions of temperament on which infants and young children differ. Characteristic styles appear across contexts and differ according to the dimensions of approach-withdrawal, adaptability, quality of mood, intensity of reaction, distractibility, persistence or attention span, rhythmicity, threshold of responsiveness and activity level. More simply, temperament refers to behavioural and attention self-regulation or individual differences in emotional, motor and attentional reactivity to stimulation (Sanson, Hemphill, & Smart, 2002). In the last decade temperament research has also incorporated neuroscientific enterprise with the amygdala linked to reactivity, motor activity and inhibition (Kagan, 1998; Kagan & Snidman, 1999) and left and right frontal brain activity associated with approach/avoidance and positive/negative affect (Carver & White, 1994; Fox & Davidson, 1988; Gray, 1987).

The above definitions of temperament describe a constitutional predisposition observable in infants before language development, and the definition of the FFM of personality is thought to be synonymous with temperament (McCrae et al., 2000). Consequently, personality, as described by Costa, McCrae and colleagues,

is largely set before significant cognitive development begins. Thus, a large part of the definition of temperament in infants is arguably a description of core affect. For example, infants are primarily described as content and happy or unsettled and demanding. This is consistent with the easy-difficult categorisation system developed by Thomas et al., (1963) in their original temperament model where difficult children are negative in mood, withdrawing, unadaptable, very intense and arrhythmic. Both everyday and theoretical descriptions of temperament are largely descriptions of core affect patterns. Furthermore, considering the stability of personality across the lifespan (Costa & McCrae, 1994, 1997), the pattern or type of core affect with which an infant is born probably remains relatively constant throughout life.

In summary, core affect is synonymous with definitions of temperament, and is set early in life and this describes the affective component of SWB. However, the hypothesised model of SWB proposes that MDT combines with core affect accounting for both affective and cognitive components of SWB.

The Combination of Core Affect and Multiple Discrepancies Theory

When people were asked to consider perceived gaps between what they have and want, relevant others have, and the best one has had in the past, expected in the past, expected in the future, deserves, and needs, the mean level of discrepancy was 38%. These cognitions are made in the presence of core affect and together result in overall levels of SWB. The association of pleasant core affects and excitement with these levels of discrepancies suggests that some level of discrepancy is healthy. This is confirmed in the depression results where even non-depressed individuals with high SWB report discrepancies. Perhaps individuals need to believe they are achieving a substantial proportion of what was hoped for, to enhance feelings of self-esteem, optimism and positive feelings about the future. At the same time, some discrepancy needs to exist to encourage motivation and drive for goal directed behaviour in relation to the future.

MDT was included in the model of SWB because it was believed to measure the cognitions associated with SWB. However, regression analyses revealed that over 50% of MDT was explained by core affect, suggesting the concept is a mixture of affect and cognition. The large affective component of MDT was unexpected, yet it is consistent with Michalos' (1985) original conception of the theory.

Personality and the Affective Model of SWB

Significant overlap exists between core affect, MDT and the FFM of personality. Individually, core affect explained 66% of the variance in SWB, MDT explained 55% of SWB, and the FFM of personality explained 26% of SWB. However, when all three components were entered into a regression equation only core affect and MDT contributed towards the prediction of life satisfaction, and was subsequently confirmed with structural equation modelling. This suggests that

personality is not a key predictor of SWB, and inflated correlations between SWB and personality have resulted due to inconsistencies in the definition of SWB.

The FFM of personality is not a key component of SWB, and only the affective content of extraversion and neuroticism aid in the prediction of SWB. Structural equation modelling indicates that personality only becomes an important predictor of SWB when personality is driven by core affect. Even then, the role of the FFM in the explanation of SWB is dominated by the factor weightings of neuroticism and extraversion, the personality factors that largely comprise affective descriptions.

Depression and SWB

SWB is able to be maintained with mild symptoms of depression but severe symptoms of depression are associated with significantly reduced SWB. The affect involved in the prediction of depression was distress, unhappiness and dissatisfaction while feelings of happiness are negatively related to the experience of depression. Altogether, these four affects explained 55% of the variance in depression scores and explained significantly more variance in depression than MDT. Discrepancies increased with more severe symptoms of depression; however, MDT explained only 35% of the variance in depression. Core affect remains an important component of depression, as it is in SWB, but discrepancy cognitions are less important in the prediction of depression than they are in SWB.

The co-occurrence of increased discrepancies and unpleasant affect appears to be an important aspect of depression and Olsen & Evans (1999) found a similar pattern when investigating affective consequences of social comparisons. Using the Rochester Social Comparisons Record (Wheeler & Miyake, 1992) these authors found that upward comparisons were associated with a significant decrease in positive affect as measured by the PANAS (Watson et al., 1988). Pleasant-activated affect terms such as *proud*, *happy*, *enthusiastic*, *inspired* and *determined* decreased with upward comparisons but increased with downward comparisons. Thus, direction of comparison may help to explain why increased discrepancies are associated with higher depression scores. Perhaps depressed individuals are more likely to make upward comparisons than downward comparisons. The negative thinking associated with depression might lead to a focus on upward comparisons. Alternatively, a tendency to compare upwards may lead to feelings of discrepancy precipitating depression.

The investigation of depression in relation to unpleasant affect, MDT and SWB confirms the overlap between these concepts consistent with the affective model of SWB. Affect and MDT accounted for 55% of the variance in depression scores and the inclusion of SWB to the equation contributed only another 2% to the prediction. Thus, a significant proportion of variance in depression scores could not be accounted for by affect, MDT or PWB, though some may be explained by error variance. However, clinical diagnosis of depression relies on several physical symptoms in addition to unpleasant affect and negative thinking.

Weight and appetite changes, insomnia/hypersomnia and psychomotor agitation/retardation are all included as symptoms of depression in addition to depressed mood (American Psychiatric Association, 1994). These somatic features are important for the diagnosis of depression and it is likely that they account for some of the unexplained variance in depression scores.

The association between affect, SWB and depression has important consequences. Average population SWB levels remain close to 75%SM (Cummins, 1995, 1998, 2003) and the affective model of SWB indicates that pleasant affect is key to predicting wellbeing. However, SWB decreases substantially in the presence of depression, and in these conditions unpleasant affect becomes more important to the prediction of SWB. Symptoms of depression represent the loss of pleasant affect and a predominance of unpleasant affect which is consistent with clinical definition. This suggests that SWB levels that meet the population average of close to 75%SM are most likely to be representative of individuals who are not experiencing significant depressive symptoms. In comparison, it is likely that individuals who report low SWB are experiencing depression and the unpleasant affect associated with it. Thus, SWB can be used as a measure of wellbeing if SWB conforms to general population norms, or a measure of illbeing if low levels of SWB are reported. Low SWB warrants further investigation for symptoms of depression. This may be useful in situations where individuals are reluctant to admit depression or a simple screening procedure is required.

STUDY 3 CONCLUSIONS

The major component of SWB is core affect as presented in the affective model of SWB. In particular, the subjective experience of wellbeing is the presence of core affect and low levels of discrepancies. Core affect is argued to be the driving force behind SWB because patterns of core affect described as temperament occur before language development and cognition, and continue throughout life. Consequently, the stability of core affect is argued to be responsible for the consistency in SWB ratings described by Cummins (1995, 1998, 2000, 2003) in his theory of SWB homeostasis.

CHAPTER 12: OVERVIEW

This thesis investigates the affective nature of Subjective Wellbeing (SWB), which, since its inception, has been considered an amalgamation of both affective and cognitive processes. Surprisingly, however, few investigations have tested for these separate components. My research addresses this issue by investigating SWB as an affective construct that is consistent with circumplex theory.

A review of the affect literature confirmed the strength of the circumplex as the most comprehensive theoretical understanding of affect to date. This theory has been developed over the past half century and proposes that all affects can be plotted around the perimeter of a circle surrounding two orthogonal axes of valence and activation (Blumenthal, 1975; Rosensohn, 1963; J. Russell, 1980; Schlosberg, 1952). The circumplex theory was supported by my research, although the valence axis dominated, resulting in an elliptical shaped circumplex. Few affects approximated the activation axis. However, a circumplex model does not suggest an even spread of affect around two axes; hence, the elliptical shape is consistent with the circumplex model of affect. The strength of the valence axis also supports the dominance of pleasant and unpleasant affect in historical theories of emotion by Freud (1917), Wundt (Blumenthal, 1975; Rosensohn, 1963), Woodworth (Woodworth & Schlosberg, 1938), and Scholsberg (Schlosberg, 1941, 1952, 1954; Woodworth & Schlosberg, 1938).

Considerable argument has focused on whether the affects that are located at the poles of these axes exist as unipolar or bipolar continua, and how such determination is influenced by the response scale (Feldman Barrett & Russell, 1998, 1999; Green et al., 1993; Green & Salovey, 1999; Green et al., 1999; J. Russell & Carroll, 1999a, 1999b; Tellegen, Watson, & Clark, 1999; Watson & Tellegen, 1999). Unipolar response formats are recommended by Russell & Carroll (1999a) because they independently assess each half of the continuum, whereas bipolar response formats enforce bipolarity. For a correlation of -1.0 to occur with unipolar scales, Russell & Carroll (1999a) suggest that the information provided by one unipolar scale would need to be the complete inverse of the scores on the other unipolar scale, such that a change in one would necessitate a proportional change in the other. Thus, each independent unipolar scale supplies the same information. For example, if happy and sad are bipolar opposites, then those who rate themselves as moderately sad, would also rate themselves as moderately happy.

The affect terms of satisfaction and dissatisfaction are also representatives of the valence axis of the circumplex. Satisfaction is located close to happiness on the pleasant pole of the valence axis (Fabrigar, Visser, & Browne, 1997), therefore the direct antonym of dissatisfaction is expected to be located 180° apart. Study 1 investigated affect theory in relation to SWB by examining the relationship between life satisfaction and dissatisfaction, and how this relationship is influenced by the response scale. The unipolar scale employed for rating satisfaction ranged from (0) "not at all" to (10) "completely satisfied", and the unipolar scale for dissatisfaction ranged from (0) "not at all dissatisfied" to (10) "completely dissatisfied". Alternatively, the bipolar scale employed for both satisfaction and dissatisfaction ranged from (0) "completely dissatisfied" to (10) "completely satisfied". A reciprocal relationship was found between life satisfaction and dissatisfaction using a unipolar response scale, producing an average correlation of -.85 indicating a strong inverse relationship. For example, the mean score for life satisfaction was 72.63 while the mean score for life dissatisfaction was 27.16. Alternatively, when assessed with a bipolar response scale, a positive correlation of .41 resulted and similar ratings were provided for both life satisfaction and dissatisfaction. Therefore, it seems likely that participants were unable to assess life dissatisfaction using a bipolar scale. From these results it is concluded that the reciprocal affect balance relationship between life satisfaction and dissatisfaction can be assessed with a unipolar scale but not with a traditional bipolar scale.

The reciprocal relationship between life satisfaction and dissatisfaction, assessed with a unipolar scale, supports the argument that two opposite emotions can be experienced at the same time. Thus, this finding directly links SWB to the current affect theory debate. It is consistent with the idea that, in general, high levels of satisfaction co-exist with low levels of dissatisfaction, forming an affect balance relationship similar to Bradburn's (1969) Theory of Affect Balance. This finding also concurs with the results of Diener & Iran-Nejad (1986), Schimmack (2001) and Larsen, et al., (2001) who have argued for the ability to simultaneously experience opposing emotions. Thus, while the pleasant affects of contentment, satisfaction and happiness dominate the experience of SWB, they can co-exist with unpleasant affects such as upset, unhappy and distressed. When SWB drops to substantially low levels, such as during the experience of depression, unpleasant affects dominate and pleasant affect decreases to the reciprocal level.

The ratios of life satisfaction and dissatisfaction illustrate that the majority of the population experiences more pleasant than unpleasant affect. The population average ratio between pleasant and unpleasant affect is approximately 75:25 during SWB homeostasis (Cummins, 1995, 1998, 2000a, 2003). However, individual differences are expected, such that some people may experience ratios of 80:20, 75:25; 70:30 or 65:35 between pleasant and unpleasant affect during SWB homeostasis. Thus, while the goal of homeostasis is to achieve a predominance of pleasant affect, the ratio of pleasant: unpleasant affect will be determined by individual set points. These normal set-point ratios of pleasant:

unpleasant affect, are dramatically altered when SWB homeostatic failure occurs during the experience of moderate to severe depression.

The subsequent drop in SWB associated with the affective disorder of depression suggested that SWB may be more affective than cognitive in nature. This, together with the finding of similar relationships between response scales in both affect and SWB, lead to the prediction that SWB is largely a measure of affect. Study 2 addressed this issue by investigating the amount of variance in SWB that could be explained by affect. It was found that over 60% of the variance in satisfaction with life as a whole was explained by affect terms representing each octant of the circumplex. In particular, the pleasant affects of *content*, *satisfied* and *happy* were the best predictors of the global life satisfaction item.

The pleasant affects of *content*, *satisfied* and *happy* produced the highest mean scores when people rated their feelings about life, while affects with an unpleasant valence produced the lowest mean scores. This suggests that response scales that rely on pleasant affective descriptors for their highest anchor point adequately assess SWB. This applies to Cantril's (1965) Self-Striving Ladder, Bradburn's (1965) Affect Balance Scale and Campbell, Converse & Rogers' (1976) satisfaction rating scale. However, the specific adjectival descriptors used in the seven point Delighted-Terrible response scale introduced by Andrews & Withey (1976) are inconsistent with the mean scores of affect ratings. The Delighted-Terrible scale ranges from *delighted*, *pleased*, *mostly satisfied*, *mixed* (about equally satisfied and dissatisfied), *mostly dissatisfied*, *unhappy* and *terrible*. However, Study 2 found that *delighted* (ranked 13th M=58.52) is rated at a strength that is well below *pleased* (ranked 4th M=66.67), and *satisfied* (ranked 3rd M=68.37) which is similar to the authors' choice of *mostly satisfied*. Moreover, these latter two terms of *pleased* and *satisfied* produce very similar ratings. Consequently, the Delighted-Terrible scale is flawed because the order of the adjectival descriptors on the scale does not accord with the hierarchy of affects in question. This confirms the utility of the 11-point end defined scale (Jones & Thurstone, 1955) used in this thesis. SWB should be rated according to a unipolar response scale of pleasant affects such as *content*, *satisfied*, *pleased* or *happy* which reflect that SWB is an affective construct.

The data from Study 2 confirm that pleasant affect is an integral part of SWB. Indeed, the affective contribution is so large that I propose that SWB is comprised mainly of pleasant affect, and not an approximately equal mix of affective and cognitive processes as is commonly assumed (Campbell et al., 1976; Diener, Emmons et al., 1985; Diener, Napa Scollon, & Lucas, 2004; Felce & Perry, 1995; Rapley, 2003; Vitterso, 2001). It is those affects that are representative of the valence axis of the circumplex model that are the most important predictors of SWB. These affects describe core affect, consistent with Russell's (2003) definition of this construct as free-floating, object free feelings. Considering the dominance of affect in the model, I propose that core affect provides the affective background on which cognitive assessments and discrepancy ratings are made.

The dominance of affect within the SWB construct also provides a theoretical explanation for the stability of SWB ratings. Core affect, as the major component of SWB, is argued to be temperament, whereby the level of pleasant core affect experienced by an individual represents an adaptive operating level which, on average, is set at 75/100. This level is largely genetically determined and, like body temperature, is managed by a homeostatic system. The stability of the affective processes described by temperament explains why SWB ratings remain constant over time (Cummins, 1995, 1998, 2000a, 2003). Certainly, the levels of emotions vary when life circumstances change, but these object-directed variations are normally only short-lived. As homeostatic adaptation to the new situation occurs, the idiosyncratic, set-point level of core affect becomes dominant once more.

Despite this accordance with the homeostatic theory, the affective model of SWB is only somewhat consistent with the homeostatic model proposed by Cummins et al., (2002). This is because the Five Factor Model (FFM) of personality is not an important predictor of SWB. These authors suggested that personality is responsible for the stable levels of abstract wellbeing cognitions and affect, which in turn influence the perception of met needs and the cognitive buffers of self-esteem, perceived control and optimism. This is not supported by the affective model because personality is not an independent predictor of SWB. Instead, SWB is being predominantly driven by core affect. Thus, it appears that core affect underlies the SWB homeostatic system by influencing personality and the cognitive buffers. In this new model, personality works in conjunction with the cognitive buffers to maintain SWB. These components represent the mixture of cognitive and affective processes that are evident in measures of SWB. This model described in Figure 12.1 below.

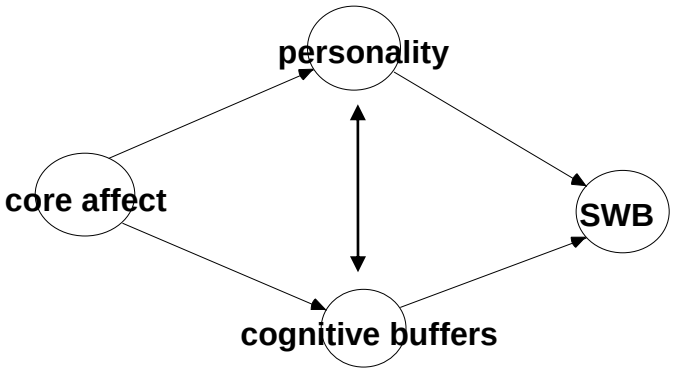


Figure 12.1: An Affective Model of SWB Incorporating Cognitive Buffers

As predicted by this model, significant overlap would be expected between these components because they are all under the dominating influence of core affect. This is why the literature is replete with studies showing high to moderate correlation between SWB and extraversion, neuroticism, and almost any variable that comprises affect, cognition, or some combination of them all. All such variables are driven by core affect. Thus, fundamentally, SWB is simply a product of core affect.

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APPENDIX 1

PSYCHOMETRIC PROPERTIES OF THE DEPRESSION ANXIETY STRESS SCALES

The 21 item Depression Anxiety Stress Scales (DASS) were employed because the authors of the scale claim that it can effectively differentiate between depression, anxiety and stress symptoms (Lovibond & Lovibond, 1995). To investigate this, the DASS were subjected to principal components analysis to assess the factor structure of the measure. Inspection of the correlation matrix revealed the presence of many coefficients of .3 or greater. The Kaiser-Meyer-Oklin value was .94 and the Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of four components with eigenvalues greater than 1, explaining 40.23 per cent, 7.53 per cent, 6.78 per cent and 4.99 per cent. An inspection of the screeplot revealed a clear break after the third component and it was decided to retain three components for further investigation. To aid the interpretation of these three components Oblique rotation was performed producing three correlated factors (presented in Table A1) with two exceptions. Stress item 8 "I felt that I was using a lot of nervous energy" also loaded on the Anxiety factor, and Anxiety item 2 "I was aware of dryness in my mouth" loaded on the Stress factor and failed to load on the Anxiety factor. All Depression items loaded on the Depression factor without any cross-loadings. The three factor solution explained a total of 54.53 per cent of the variance, with Component 1 explaining 40.23 per cent, Component 2 explaining 7.5 per cent and Component three explaining 6.7 per cent. The correlations between factors were: Depression-Anxiety r = -.44; Anxiety-Stress r = .42; and Depression-Stress r = -.51. The correlations supported greater association between anxiety and stress than between depression, anxiety and stress.

The interpretation of the DASS was consistent with previous research (Lovibond & Lovibond, 1995) with clear separation between Depression items on Component 2 from the Stress items on Component 1 and Anxiety items on Component 3.

Table A1: Oblique rotation of Three Factor Solution for DASS Items (N = 515)

Item	Component 1 Stress	Component 2 Depression	Component 3 Anxiety
Hard to wind down	.76		
Tend to over-react	.61		
Using a lot of nervous energy	.47		.36
Getting agitated	.61		
Difficult to relax	.69		
Intolerant of anything in my way	.67		
Was rather touchy	.71		
Couldn't experience positive feeling		-.65	
Difficult to initiate things		-.44	
Nothing to look forward to		-.81	
Felt downhearted and blue		-.65	
Unable to become enthusiastic		-.76	
Felt I wasn't worth much		-.83	
Felt life was meaningless		-.89	
Dryness of the mouth	.39		
Breathing was difficult			.77
Experienced trembling			.62
Worried about situations			.49
Felt close to panic			.52
Awareness of action of heart			.73
Felt scared without good reason			.51
% of variance explained	40.23%	7.5%	6.7%

Note. Only loadings above .3 are displayed

In summary, the 21-item Depression Anxiety and Stress Scales factored as expected using oblique rotation. Depression items loaded only on the depression factor without any cross-loadings on anxiety and stress and the highest factor loadings for depression were on the items "I felt life was meaningless" (-.89), "I felt that I wasn't worth much" (-.83) and "I felt that I had nothing to look forward to" (-.81). Only one stress item "I felt that I was using a lot of nervous energy" produced a lower cross-loading on anxiety and only one anxiety item "I was aware of dryness in my mouth" loaded on the stress factor instead of the intended anxiety factor. The high ratings and clear factor of depression suggests that the subscale items for depression could also be used on their own independently of the anxiety and stress items.

THE END