Examining Predictors of Body Appreciation and Positive Well-Being Among Young Adults: Perspectives from Positive Psychology

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Abstract

Research examining factors that promote body appreciation and mental health through the positive psychology lens is in its infancy. Several factors that are inversely related to body dissatisfaction, including self-compassion and physical activity, can be facilitating factors for positive body image. However, research is required to confirm this, as well as to provide a broader and better-integrated model of multiple factors influencing positive body image and well-being than research to date has offered. The primary aim of the present research was to examine factors that contribute to positive body image and mental health in adults using a positive psychology framework; that is, adopting the perspective that optimal mental health is not simply the absence of symptoms, and that it can be achieved through promoting beneficial psychological constructs and processes rather than eliminating unhelpful ones. Factors examined included self-compassion and planned physical activity levels. This dissertation comprised three studies (cross-sectional, longitudinal, and experimental) designed to progressively build an evidence base to contribute to improvements in both theory and treatment. Results from this study indicated that factors including self-compassion and planned physical activity contributed to an enhancement in body appreciation and positive well-being; and prospectively, self-compassion and body appreciation showed partial support for a reciprocal model, though the effects over time were slightly stronger for self-compassion predicting body appreciation. However, there was limited support for the efficacy of a self-compassion meditation intervention, which must be interpreted with caution due to small effect sizes and some methodological limitations. Understanding how feeling good about one’s body – as opposed to not feeling bad about one’s body – has beneficial implications for one’s general well-being.

Declaration

I, Joshua Aaron Marmara, declare that the PhD thesis entitled "Examining Predictors of Body Appreciation and Positive Well-Being Among Young Adults: Perspectives from Positive Psychology" is no more than 80,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references, and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

I have conducted my research in alignment with the Australian Code for the Responsible Conduct of Research and Victoria University's Higher Degree by Research Policy and Procedures. All research procedures reported in the thesis were approved by the Victoria University Human Ethics Committee HRE19-092 and HRE21-028.

Signature **Date**

[redacted]

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Chapter 1: General Introduction

1.1. Synopsis

Body image is conceptualised as a multi-faceted construct encompassing several positive and negative ways in which people experience their bodies. For instance, negative body image includes perceiving oneself to have too much body fat, a desire to be thinner, a desire to be more muscular, or longing to be taller (Duncan et al., 2006; Martins et al., 2008) whereas positive body image includes appreciating one's body for how it naturally is and for the functions it offers (Tylka & Wood-Barcalow, 2015a). Contemporary literature has focused primarily on negative body image and its association with mental health issues and related behaviours. This focus on negative body image, however, has limited our broader understanding of body image (Tylka, 2011), resulting in clinicians being limited in how they address body images concerns in their clients (Tylka & Wood-Barcalow, 2015a). If clinicians treat body image issues by attempting to reduce negative perceptions and beliefs about the body but fail to encourage more positive aspects of body image, this may result in one having a neutral perception of their body by merely tolerating it (Tylka & Wood-Barcalow, 2015a). Consequently, there have been calls for the field to expand its focus to positive body image. Focusing research efforts in this direction will take interventions to a level that emphasises appreciating and honouring the body, rather than simply removing symptoms of body image disturbance.

Positive psychology, a standpoint embedded in hygiology (the promotion of health; Tylka, 2011), provides a conceptual structure to guide the study of positive body image; more specifically, by examining body appreciation as distinct from body dissatisfaction. A core principle of the positive psychology movement is that optimal psychological well-being in a broad sense is not merely defined by the absence of negative or unpleasant symptomatology, but also by the presence of favourable or pleasant experiences or characteristics (Seligman &

Pawelski, 2003). Similarly, the body image literature has focused on people's struggles with negative body image for many decades (Clifford, 1971; Lawler & Nixon, 2011; Mable et al., 1986; Stice & Whitenton, 2002; Tiggemann & Pickering, 1996), but has largely ignored the utility of enhancing positive body image, such as through promoting body appreciation. Negative body image itself is indeed problematic, as it is associated with poor mental health outcomes such as depressive and anxious symptoms (Barnes et al., 2020; Chan et al., 2020), which are then linked to adverse consequences, including restrictive food intake, and eating disorder symptomology (Jonstang, 2009; Tylka & Kroon Van Diest, 2013). However, it is unclear whether simply reducing negative body image is sufficient for optimising mental health; emerging research suggests that increasing a positive sense of body image is also important for improved mental health (Alleva et al., 2016a; Avalos et al., 2005; Dalley & Vidal, 2013; Marta-Simões et al., 2016; Ng et al., 2015; Raque-Bogdan et al., 2016; Swami et al., 2016; Swami et al., 2015; Tylka & Kroon Van Diest, 2013; Wasylkiw et al., 2012).

Body appreciation has been a core feature of research on positive body image (Andrew et al., 2016a; Tylka, 2011), which typically has focused on mental health outcomes of greater body appreciation as well as behavioural outcomes such as healthier eating (Avalos & Tylka, 2006; Oh et al., 2012). However, it is equally important to focus on factors that promote body appreciation, which in turn relates to indicators of positive well-being (Tylka & Kroon Van Diest, 2013). Several factors that have an inverse relationship to body dissatisfaction (Andrew et al., 2015; Carraça et al., 2012) may also act as facilitating factors for body appreciation and positive well-being. One such factor is self-compassion, which is associated with positive mind states, including optimism. This construct not only has a positive association with positive well-being (Neff, 2003a), but it buffers against body dissatisfaction (Albertson et al., 2014), in turn enhancing a sense of appreciation and respect for one's body. Another potential predictor of higher body appreciation is physical activity.

This is because physical activity improves fitness, increases awareness of physical capabilities, and raises self-efficacy. Physical activity has also been shown to have a positive association with positive well-being (Kavussanu & McAuley, 1995; Kim et al., 2016; Maher et al., 2015; Rebar et al., 2019; Teychenne et al., 2020) and contributes to a greater sense of appreciation for one's body (Mahlo & Tiggemann, 2016). The associations that both self-compassion and physical activity have with positive well-being, therefore, may be explained by the increases in body appreciation that they promote.

Whilst individual studies have shown relationships between self-compassion, positive well-being, body appreciation and physical activity, no study has investigated these links simultaneously, nor examined how physical activity and self-compassion might jointly contribute to body appreciation and, in turn, positive well-being in young adults. A primary objective of the present research, therefore, is to examine not only the potential predictors of body appreciation and positive well-being, but also the interrelationships between predictors. For example, self-compassion may prove helpful in understanding and promoting a physically active lifestyle by helping people bounce back from exercise slips or setbacks that often come with strict adherence to an exercise regimen (Mosewich et al., 2011; Semenchuk et al., 2018; Stetson et al., 2005). Self-compassion could encourage individuals to accept and be forgiving of their unsuccessful behaviour (e.g., lapses in an exercise regime) and move forward with re-establishing healthy patterns of physical activity. Enhancing self-compassion could lead to an increased sense of self-worth and autonomy, and augment one's motivations to partake in physical activity, which may improve one's body appreciation and positive well-being (Thall, 2014).

An additional factor that might explain the relationship between self-compassion and physical activity is an individual's motivations for exercising; in particular, intrinsic motivations. Intrinsic motivation is the most autonomous, or self-determined, order of motivation. Intrinsic motivation is characterised by performing activities that are executed solely for the enjoyment gained from the activities. Specifically, individuals who are intrinsically motivated to partake in activities do so for satisfaction, interest, pleasure, and enjoyment, which stems from executing those very activities (Levesque et al., 2010). Higher self-compassion may promote more intrinsic reasons for exercising, which in turn, encourages more engagement in physical activity. More specifically, those who are high in self-compassion are well suited to encourage themselves, as a way of being kind, to partake in healthy patterns or intrinsic reasons regarding partaking in physical activity. Exploring intrinsic motivations to exercise is important as it may in turn provide a better understanding of how self-compassion and physical activity predict body appreciation and positive well-being.

The program of research detailed in this dissertation was designed to test several relationships hypothesised in an explanatory model, described at the end of Chapter 2, and presented in Figure 1 (page 54). Throughout the Chapter 2, the proposed mechanisms underlying the relationships in this model, driven by theoretical and empirical literature, are explained. Theoretical and methodological limitations of current body image and well-being literature are also reviewed. Following this, the results of a large cross-sectional study testing the model in Figure 1 are presented and discussed in Chapter 3. Longitudinal data testing specific components of this model are presented in Chapter 4 to establish preliminary evidence of casual pathways. An experimental study investigating the outcomes of improving self-compassion via meditation training on body appreciation is then presented in Chapter 5. Finally, the theoretical and clinical applications of the research program are discussed in Chapter 6.

Chapter 2: Review of the Literature

2.1. Introduction

The positive psychology movement is critical of the deficit focus that mainstream psychology has demonstrated since its genesis. A core principle of the positive psychology movement is that well-being is not just about the absence of negative or unpleasant symptomatology, but also the presence of favourable or pleasant symptoms or characteristics (Seligman & Pawelski, 2003). Similarly, a shortcoming of much of the body image literature is that the primary focus has been on people's struggles with negative body image rather than on the benefits of having positive body image. Consequently, body dissatisfaction has been a focal point in the literature across many decades (Clifford, 1971; Lawler & Nixon, 2011; Mable et al., 1986; Stice & Whitenton, 2002; Tiggemann & Pickering, 1996). As previously stated, body dissatisfaction is indeed problematic as it is associated with poor mental health outcomes, which in turn can be linked to adverse consequences, including long term work absence, reduced employability, alcohol consumption, harm, abuse, and eating disorder symptomatology (Blank et al., 2008; Tylka, 2004; Weitzman, 2004). However, research that has investigated alleviating the symptoms of negative body image without considering how to promote positive body image, and the benefits of doing so, has therefore restricted our understanding of body image in all its forms (Smolak & Cash, 2011; Tylka & Wood-Barcalow, 2015a). This has resulted in clinicians being less than ideally equipped to promote health and well-being and to prevent and treat body image disturbances (Tylka & Wood-Barcalow, 2015a). If clinicians treat body image issues by attempting to reduce clients' negative perceptions of their bodies without making efforts to enhance more positive and accepting perceptions of their bodies, there is a risk of clients reaching only a neutral perception of their body by merely tolerating it (Tylka & Wood-Barcalow, 2015a).

In sum, understanding the factors that influence body image in a more balanced way can improve both theory and treatment. The present program of research, therefore, is an attempt to achieve this by examining variables that have been independently linked to positive body image in past research but have not yet been tested in a simultaneous model. From this, researchers may further understand how these factors work together to enhance positive well-being. Understanding how feeling good about one's body - as opposed to not feeling bad about one's body - has beneficial implications for one's general well-being. If researchers can understand the role body appreciation plays in positive well-being, they can guide further research and practice into more holistic treatments for body image concerns and related well-being.

In this chapter, a conceptualisation of body image entailing both negative and positive body image is discussed. This is followed by an overview of the positive psychology perspective and its relevance to body image and well-being. Research and theory pertaining to body appreciation, which is of central interest to this research, will then be reviewed. The proposed interrelationships between self-compassion, body appreciation, and positive well-being as they relate to the explanatory model are then presented, followed by a review of the interrelationships between physical activity, body appreciation, and positive well-being. The possible influence of exercise motivations – in particular, intrinsic motivations to exercise – in explaining the relationship between self-compassion and physical activity is then discussed in the context of body appreciation and positive well-being. A discussion of how the theoretical and methodological limitations of existing literature to date have informed the rationale for the present research is then presented, together with an explanation of how the present study will provide a useful step in documenting the collective predictors of body appreciation and positive well-being. Specific hypotheses arising from theoretical and empirical arguments presented through, and which inform, the proposed explanatory model presented in Figure 1, are then provided.

2.2. Defining Body Image

Body image research has an evolving and multifaceted history, which dates to 1935 when the concept was formulated. Dr Paul Schilder (1935/1950), a German neuropsychologist, characterised body image as “the picture of our own body which we form in our mind; that is to say, the way in which the body appears to ourselves” (p. 3). Over time, the definition has expanded, and has been referred to as “the picture we have in our minds of the size, shape, and form of our bodies; and our feelings concerning these characteristics and our constituent body parts” (Slade, 1988, p. 20). Later, Cash and Pruzinsky (1990) posited that body image reflects the full multifaceted psychological experience of embodiment, which does not merely centre on physical appearance. Cash and Pruzinsky (1990) even used the term “body images” (p. xi) as they argued for the multi-layered nature of the construct, “encompass[ing] one’s body-related self-perceptions and self-attitudes, including thoughts, beliefs, feelings, and behaviours” (Cash, 2004a). The multidimensional nature of body image has been conceptualised into two constructs proposed to represent one’s psychological experience of their body. These constructs include the perceptual and attitudinal psychological experiences of the body (Cash, 2012).

2.2.1. Perceptual Construct of Body Image

The perceptual construct of body image is characterised by one’s mental representation about the characteristics, size, and shape of their body, which may or may not differ from one’s ideal depiction of their body (Gardner, 1996). Moreover, body image perception is usually expressed as the precision in judging the physical attributes of one’s physical appearance in terms of how one’s subjective appraisal is congruent (or not) with objective measures (Cash, 2012). Errors in the perception of body image are seen as a distortion in one's perception. These misconceptions can involve the overestimation of one's levels of body fat, or an overall distortion in how one's body compares with others. Misconceptions regarding body fat and body proportions are commonly observed in women experiencing eating disorders (Cash & Deagle III, 1997; Mintz & Betz, 1988). Additionally, misconceptions of having too little muscle mass and tone, known as body dysmorphia, is prevalent in males. Some behaviours related to body dysmorphia include abuse of anabolic steroids, thorough attentiveness to dietary supplements and diet, and compulsivity in gym workouts (Phillips & Castle, 2001; Pope et al., 2000)

2.2.2. Attitudinal Construct of Body Image

The attitudinal construct of body image consists of several features, including the way one behaves, thinks, and feels regarding their body (Cash, 2012; Lox et al., 2016). For instance, one's attitude towards their body may incorporate positive or negative feelings about one's body (e.g., comfort or embarrassment; affective component), taking action in response to their perceptions and feelings towards their body (e.g., wearing particular clothes to avoid attention being drawn to their body; behavioural component), evaluating their appearance (e.g., appreciating one's body, or body dissatisfaction from comparing one's body to an ideal standard; cognitive component), and the distinction between what one thinks their body looks like compared to how they actually look (overweight, obese, thin, etc.; perceptual component; Lox et al., 2016). Some investigators of body image attitudes have used this multifaceted approach (Menzel et al., 2011; Thompson et al., 2004), mainly because it yields a testable and simple framework for understanding individuals' experiences of their bodies.

2.2.3. Cognitive-Behavioural Multidimensional View of Body Image

Whilst several studies have used this multifaceted approach in their investigations, there have been some difficulties regarding empirically distinguishing the dimensions.

Banfield and McCabe (2002) evaluated the efficacy of a multidimensional model via a quantitative methodology, comprising four dimensions. These dimensions were investigated via questionnaires, which included perceptual measures (e.g., The Body Image Assessment Procedure-Revised), affective measures (e.g., The Body Esteem Scale), cognitive measures (e.g., Eating Disorder Inventory), and behavioural measures (e.g., Body Image Avoidance Questionnaire). The multi-dimensional was analysed via a confirmatory factor analysis (CFA). Results revealed that a four-factor model was not supported, and the authors argued this was due to the inadequate conceptualisation of the construct. Additionally, cognitive, and affective factors approached singularity (r = 0.97). In contrast, a three-factor model obtained through an exploratory factor analysis (EFA), comprising Body Importance and Dieting Behaviour, Perceptual Body Image, and Cognitions and Affect Regarding Body, was the preferred model (Banfield & McCabe, 2002). Furthermore, several investigations have concluded that including the behavioural dimension in the construct of body image attitudes may be necessary but controversial, as behaviours relating to one’s body image may be a consequence or manifestation of other factors, including negative affect (Banfield & McCabe, 2002; Gleaves et al., 1995; Stice, Nemeroff, et al., 1996).

Cash (1994), however, presented an alternative conceptualisation of body image attitudes – a cognitive-behavioural multidimensional view of body image – for understanding the meaning that one attributes to their body, as opposed to describing or portraying body image attitude as a thought, feeling, or behaviour. Cash’s (1994) conceptualisation of body image attitudes is broken down into two distinct facets which shed light on understanding body image: body image investment and body image evaluations. Body image investment comprises the emotional, cognitive, and behavioural importance of one’s physical appearance (Cash, 2012), whereas body image evaluation refers to the level of dissatisfaction or satisfaction someone has with their body, and may contain cognitive or affective components

(Cash, 2004b; Cash, 2012). Regardless of the differences between varying operationalisations of body image in contemporary research, a major component carrying across all definitions is valence: specifically, negative body image and positive body image. The following section reviews and discusses these two different facets of body image.

2.2.4. Negative Body Image

Widespread research has been conducted on people's attitudes towards their physical appearance, and a large focus has been on negative body image. To understand its multifaceted nature, Thompson et al. (1999) defined negative body image as "a persistent report of dissatisfaction, concern, and distress that is related to an aspect of appearance ... [and] some degree of impairment in social relations, social activities, or occupational functioning ..." (p. 11). Consistent with this, a significant and longstanding body of literature has focused on pathology, aimed at understanding negative body image and associated poorer mental health and well-being (Cash, 2004c; Kostanski & Gullone, 1998; Smolak & Cash, 2011). For instance, Cash and Fleming (2002) investigated the relationship between body image dissatisfaction, psycho-social functioning, and well-being, and found that 35% of participants who had negative body image had reported an unfavourable effect on their ability to control their weight, 7% of participants reported that body dissatisfaction had a negative impact on their friendships, and 20% of women reported a negative impact on their general life satisfaction. Research has shown that there is a relationship between negative body image and several psychological outcomes, including lower self-esteem (Tiggemann, 2005), heightened anxiety (Kostanski & Gullone, 1998), and elevated depression (Blashill & Wilhelm, 2014; Johnson & Wardle, 2005). Blashill and Wilhelm (2014) examined the longitudinal associations between distorted body image and depression in adolescent boys. Boys who were average weight and viewed themselves as either very underweight or overweight reported greater levels of depressive symptomatology as opposed to boys who were accurate in their weight measurements. This effect remained constant over the entire 13-year study period – that is, boys who accurately perceived their weight as overweight or underweight also reported elevated levels of depression 13 years after baseline reports (Blashill & Wilhelm, 2014).

In addition, research has consistently established the connection between negative body image and problematic behavioural outcomes. Negative body image is a risk factor for the development of disordered eating patterns (Attie & Brooks-Gunn, 1989) and clinical eating disorders, including anorexia nervosa and bulimia nervosa, resulting from elevated dieting (Ricciardelli et al., 1997; Stice & Shaw, 2002). More specifically, Attie and Brooks-Gunn (1989) found that body fat was positively associated with eating problems in a sample of adolescent girls. Additionally, Attie and Brooks-Gunn (1989) explained that those who were of normal weight experienced disordered eating as throughout this pubescent age, females experience a rapid accumulation of body fat, in turn eliciting an attempt to undertake weight-loss diets. Years later, Stice and Shaw (2002) conducted a meta-analytic review on the role of body dissatisfaction and the onset of eating pathology, including anorexia nervosa and bulimia nervosa. They argued that those with negative body image undertake dieting as it is perceived as an effective weight control technique. This may then lead to anorexia nervosa if efforts in acquiring weight loss is successful and is reinforced by positive responses from those within one’s social environment, including friends and family (Stice & Shaw, 2002). Continuation of these weight loss efforts may place individuals at risk for the maintenance of binge eating and the onset of other eating disorders, including bulimia nervosa (Stice & Shaw, 2002).

Negative body image has also been associated with adverse physical outcomes. These include partaking in dangerous activities in achieving ideal body image, such as overexercising and anabolic androgenic steroid use (Cafri et al., 2006; Dittmar, 2005; Jampel, et al., 2016; Tantleff-Dunn, 2001). Cafri et al. (2006) found that young men who desired to increase their muscularity were significantly more likely to use anabolic androgenic steroids. Moreover, Jampel et al. (2016) found that those who perceived themselves as either very underweight or very overweight had undergone risky behaviours using anabolic androgenic steroids. Jampel et al. (2016) suggested that those who partook in this risky behaviour did so to either increase muscularity and/or reduce body fat.

Body image concerns are prevalent across all age groups. In children, Smolak (2011) reported that there are shape and weight concerns amongst both boys and girls. However, there are notable differences in both girls and boys during this developmental stage of life, where boys are more concerned about muscularity, and girls are focused on remaining thin (Smolak, 2011). During adolescence, Ricciardelli and McCabe (2011) stated that boys tend to have a drive for muscularity with a desire to be lean, whilst wanting greater strength and muscle size. In the same year, Wertheim and Paxton (2011) argued that adolescent girls have a desire to remain thin, which intensifies as they reach adulthood and then remains stable over time. Some adolescent girls carry out extreme weight control techniques (including using laxatives, fasting, dieting, etc.) to remain thin. In adulthood, Grogan (2011) showed that women continue to report negative body image regarding their weight; and this dissatisfaction tends to remain stable in adulthood. In contrast, men place less importance on their appearance than women in adulthood (Grogan, 2011).

There are also social and cultural influences on negative body image. In Western culture, there is an emphasis on how a man's body *acts*, as opposed to how a woman's body *looks* (Murnen, 2011). This shows the consensus that appearance is emphasised more in woman than in men. Moreover, researchers such as Grogan (2012) and Hurd Clarke (2012) have maintained that women's physical appearance is culturally valued more than their experiences or abilities. Whilst not all women adopt the cultural standards of feminine beauty, Hurd Clarke (2012) and Murnen (2011) argued that women endorsing and attaining favourable appearance ideals do so to attract more appealing romantic and platonic partners along with acquiring employment. As there is an emphasis on appearance salient to women in Western culture, and because appearance ideals are typically very difficult to attain, it comes as no surprise that women are more dissatisfied with their bodies than men are across adulthood (Grogan, 2012; Tiggemann, 2004).

Although research into negative body image, including its antecedents and outcomes, has made important contributions to theory and practice, attending only to the issues of poor body image by mitigating the symptoms instead of considering the promotion of positive body image represents a one-sided approach to the understanding of body image (Smolak & Cash, 2011; Tylka, 2011; Tylka, 2012). Consequently, practitioners may not only struggle to prevent and treat their clients' poor body image, but they also may not recognise the need to advance their clients' overall health and well-being through improving positive body image. In response to this problem, a change in direction in research to pay more attention to positive body image, in particular body appreciation, has occurred in recent years. This has coincided with a growing interest in and focus on positive psychology more broadly. In a sense, the concept of positive body image can be said to emerge from the positive psychology approach. Thus, the following section explores the origins, principles, and applications of the positive psychology framework in general. The emergence of positive body image and its relation to the broader positive psychology framework is then discussed.

2.3. Positive Psychology and Well-being

Positive psychology is postulated to have originated from Aristotle's *Nicomachean Ethics*, in which he set out to analyse the nature of happiness (Kim et al., 2012). Within Nicomachean Ethics, Aristotle explored the question of how people should best live. Aristotle wrote of *hedonia*, which represents the satisfaction of desires and experience of positive emotional states. Aristotle also wrote of *eudaimonia*, which is a conceptualisation of well-being that extends beyond pleasure-driven happiness, capturing one's ability to remain true to themselves and working towards personal development (Disabato et al., 2016; Kim et al., 2012). More specifically, eudaimonia is related to good functioning regarding commitment, growth opportunities, and effort, where pleasure-driven happiness can be temporarily set aside following more important goals, including self-control, maturity, family relations, and good health (Delle Fave et al., 2011). Whilst hedonism is about "getting what you want", eudaimonia is about activities associated with self-realisation and expression of virtue (Ryan et al., 2008).

In the modern era of research, positive constructs are seen throughout psychological literature. In 1902, William James gave a presidential address to the American Psychological Association (APA), where he discussed the limits of human energy, and how this energy could be put to optimal use so that humans can reach their fullest of potentials (Froh, 2004; Kim et al., 2012). Froh (2004) also asserted that positive psychology stemmed from humanistic psychology, which was introduced in the 1950s in the United States and Europe. Humanistic psychology emerged through the pioneering work of Abraham Maslow, Carl Rogers, and Rollo May as an alternative to mainstream practices and theories, including behaviourism and deterministic Freudianism, which were dominant at the time (Schneider et al., 2014). Particularly, Maslow and May criticised behaviourism and deterministic Freudianism for "attempting to explain the full range of human nature in terms of mechanisms drawn from the study of neurotic patients and laboratory rats" (Schneider et al., 2014, p.3). Maslow envisaged humanistic psychology as a psychology of human beings; the study of creative, healthy, and fully functioning individuals (Schneider et al., 2014). Moreover, the study of humanistic psychology is very much person-centred (Rogers, 1986) and sees human beings in terms of their natural qualities and uniqueness and proposes the idea that everybody's experience of life is different and needs to be understood from the person's subjective point of view rather than the objective reality (Burton et al., 2009). Maslow in 1954 first coined the term "Positive Psychology" in the final chapter of his book titled "Toward a Positive Psychology" (Maslow, 1954, as cited by Froh, 2004). In this book, Maslow addressed the problem that the focus of psychology had been on the "darker, meaner half" (p.354), rather than one's aspirations, potentials, and virtues (Maslow, 1954, as cited by Froh, 2004).

The first formal introduction of positive psychology in the modern era of research was in Martin Seligman's 1998 APA Presidential Address, titled 'Building Human Strengths: Psychology's Forgotten Mission' (Kim et al., 2012). Seligman spent most of his career researching 'learned helplessness', whereby he investigated the association between negative emotions and depression. Seligman (1999) argued that the field of psychology had focused too much on mental illness as a disease to be treated, rather than using the accumulated wisdom of psychological research to help people reach a state of wholeness and joy. Moreover, Seligman (1999) noted several missions in "curing mental illness" (p. 559), including nurturing human strengths and making life more fulfilling, that the psychology field had largely neglected.

Seligman and Csikszentmihalyi (2000) summarised positive psychology as the scientific study of flourishing and positive human functioning on many levels, which aims to promote the factors that allow individuals and societies to thrive in a strengths-based field of study. Furthermore, Seligman and Csikszentmihalyi (2000) posited that the field of positive psychology comprises subjective, individual, and group levels. The subjective level pertains to cherished subjective experiences, including satisfaction, well-being, and contentment (past); happiness and flow (present); and optimism and hope (future). The individual levelpertains to positive individual traits, including the capacity for courage, aesthetic sensibility, talent, originality, forgivenss, love and vocation, spirituality, wisdom, perserverance, and future mindedness. Finally, the group level pertains to the institutions and civic virtues that move indiviudals toward being better citizens, including work ethic, responsbility, tolerance, nurturance, moderation, altruism, and civility (Seligman & Csikszentmihalyi, 2000).

These three levels of positive psychology map onto three central concerns known as "pillars" that make up the scientific endeavour of defining and understanding positive psychology: positive institutions (group level), positive individual traits (individual level), and positive experiences (subjective level; Seligman & Csikszentmihalyi, 2000). The first pillar in positive institutions involves the study of strengths that encourage the growth of efficient and harmonious communities, including responsibility, justice, parenting, civility, work ethic, nurturance, teamwork, leadership, tolerance, and purpose (Butts & Rich, 2013; Seligman, 2002; Seligman & Csikszentmihalyi, 2000). The second pillar in positive individual traits involves the study of personal strengths, including the capacity for love and work, resilience, compassion, curiosity, creativity, self-knowledge, courage, integrity, wisdom, moderation, and self-control (Butts & Rich, 2013; Seligman, 2002; Seligman & Csikszentmihalyi, 2000). The third pillar in positive experiences involves the study of satisfaction with the past; contentment, sensual pleasures, happiness, joy, and flow in the present; and constructive cognitions, faith, optimism, and hope for the future (Butts & Rich, 2013; Seligman, 2002; Seligman & Csikszentmihalyi, 2000). All three pillars are important for maximising human potential (Seligman & Csikszentmihalyi, 2000).

Seligman and Pawelski (2003) posited that being emotionally healthy does not only entail the absence of pathology or low levels of negative affect. For instance, high positive affect promotes altruistic behaviour, enhances interpersonal relationships, and improves cognitive control (Fredrickson, 2001; Tylka, 2012; Van der Stigchel et al., 2011). Proponents of positive psychology also claim that eliminating maladaptive or negative characteristics without simultaneously fostering adaptive and positive characteristics produces languishing: intermediate mental health typified by hollow feelings and a lack of flourishing (Fredrickson & Losada, 2005; Tylka, 2012). Flourishing is referred to as positive mental health (a state of well-being; World Health Organization, 2004), and is characterised by the presence of emotional liveliness that is exhibited in functioning well privately and socially, and actively engaging in life (Keyes & Haidt, 2003; Tylka, 2012). Seligman (2011) contended that the most well-established concept for understanding well-being is flourishing. Seligman (2011) also asserted that the overarching aim of positive psychology is to see the development of flourishing in individuals. There are five pillars contributing to flourishing that can be summarised by the mnemonic PERMA: Positive emotions (including optimism, hope, joy, and compassion); Engagement (a sense of being actively involved and present in life); Relationships (having positive and meaningful connections with others); Meaning (a sense of purpose in life and being part of something bigger than oneself); and Accomplishment (the experience of achieving desired goals and a sense of mastery). These foundations that make up flourishing are the essential bases for human well-being (Seligman, 2011).

Proponents of positive psychology argue that those who flourish can see beauty in varied forms within nature, others, and themselves (Fredrickson, 2004; Fredrickson & Losada, 2005; Tylka, 2012). This beauty that people see within themselves, and the characteristics of positive psychology and flourishing, are directly relevant to the conceptualisation of positive body image. The following section explores the positive psychology framework in terms of its relation to body appreciation, along with the role of facilitating factors that are proposed to promote body appreciation and positive well-being.

2.4. Body Appreciation

Positive body image is characterised as one's acceptance, love, appreciation, and respect for their body (Tylka, 2012). Individuals with a positive body image hold favourable opinions about all aspects of their body, reject societal ideals of an attractive body image, and appreciate the functions that their body can perform for them (Tylka, 2012; Tylka & Wood-Barcalow, 2015a). It must be noted, however, that appreciating positive characteristics of the body does not necessarily mean ignoring negative characteristics of the body or believing they do not exist. Conceptualising positive body image in this way is inadequate; just as conceptualising psychological flourishing, for instance, does not need to entail the absence of pathology (Seligman & Csikszentmihalyi, 2000). Similarly, reducing unpleasant symptomatology without promoting positive experiences will generate only intermediary mental health (Fredrickson & Losada, 2005).

The relatively recent focus on positive body image can be seen to have emerged from the broader positive psychology perspective and represents an area of great clinical importance for those who experience body dissatisfaction (Tylka, 2012). The developmental theory of embodiment – coined by Piran (2001; 2002) – is a feminist theory, which has been applied to the positive body image construct. Overall, embodiment has been referred to as providing an intimate, close, and connected relationship with one's body, where one is capable of efficiently respecting, knowing, and voicing bodily needs and expressions (Piran, 2002; Piran, 2016; Piran, 2017). Furthermore, individuals with high levels embodiment experience their body as an important aspect of their power and self-expression, and as an integral element to their physical and mental well-being. Gratifying engagement in physical activities can also improve one's embodied experiences, which will ultimately contribute to a more positive association with one's body (Piran, 2002; Piran, 2016; Piran, 2017). The role of physical activity in embodiment and body appreciation is discussed later in this chapter.

In recent times, there has been a shift in the field of body image where the emphasis on body image disturbance has diminished and the importance of understanding positive body image has risen. To discriminate between the two constructs, Williams et al. (2004) examined the correlates of positive body image in a sample of women with normative body image discontent (the notion that most women experience weight dissatisfaction, as a societal stereotype for women and men; Rodin et al., 1984) negative body image, and positive body image. These were identified based on a cluster analysis. Results from the study showed that those with a positive body image displayed lower body image distress, more appearance satisfaction, and their body image had a stronger and more positive influence on their life in contrast to women with normative body image discontent or negative body image. Particularly, those with a positive body image were able to cope more adaptively with threats directed toward their body and engaged in fewer appearance avoidance and fixation behaviours. Moreover, those with a positive body image reported higher optimism and self-esteem, along with less maladaptive eating behaviours. This study shed light on how positive body image was differently correlated with indicators of good mental health and was subsequently distinct from normal or negative body image (Williams et al., 2004).

Shortly after Williams and colleagues' (2004) study, Avalos et al. (2005) published a paper on the development of the Body Appreciation Scale (BAS), a measure of positive body image containing 13 items. The scale was based on earlier theories relating to positive body image assessing four key elements of body appreciation: (a) having favourable thoughts, feelings, and views towards one's body, irrespective of physical appearance; (b) accepting one's body regardless of its imperfections; (c) participating in behaviours which are healthy for the body; and (d) protecting the body in the face of unnatural body images promoted in by the media (Avalos et al., 2005). The publication of the BAS (Avalos et al., 2005) was the drive for the development and growth of research exploring body appreciation, as it offered investigators a psychometrically sound measure which operationalised this construct of positive body image. Since then, an upgraded body appreciation tool – the Body Appreciation Scale 2 (BAS-2; Tylka & Wood-Barcalow, 2015b) – has been introduced, which reworded BAS items by eliminating body dissatisfaction-based language and sex-specific versions. Both measures of body appreciation have been used in research. Understanding how body appreciation develops or can be promoted could take interventions to a level that emphasises appreciating and honouring the body, rather than solely eliminating poor body image symptomatology.

2.4.1. Body Appreciation in Research

Research has demonstrated that body appreciation is associated with various positive health outcomes, including sexual functioning (Satinsky et al., 2012), intuitive eating (eating based on satiety cues and physiological hunger as opposed to emotional and situational cues; Avalos & Tylka, 2006; Oh et al., 2012), cancer screening and sun protective actions, healthy weight-loss behaviour, and seeking medical attention when required (Andrew et al., 2016b). Of more interest to the present research, however, in correlational studies greater body appreciation has been shown to be associated with indices of positive well-being, such as life satisfaction, optimism, positive affect, and subjective happiness (Alleva et al., 2016; Avalos et al., 2005; Dalley & Vidal, 2013; Marta-Simões et al., 2016; Ng et al., 2015; Raque-Bogdan et al., 2016; Swami et al., 2016; Swami et al., 2015; Tylka & Kroon Van Diest, 2013; Wasylkiw et al., 2012). Importantly, these outcomes share similarities with the concepts outlined earlier which represent positive subjective and individual experiences in the positive psychology approach. One mechanism that may explain the positive relationship between body appreciation and indices of positive well-being is the sense of accomplishment that one has with how their body looks and, more importantly, its ability to perform and execute tasks. Again, in alignment with Seligman's (2011) conceptualisation of flourishing, accomplishment represents an aspect of positive psychology. Specifically, a fundamental aspect of positive well-being is a sense of mastery and competence (Ryff, 1989; Seligman, 2011). From a functionality-based approach, the relationship between body appreciation and positive well-being is strong, as those with greater body appreciation will be satisfied with how their body can perform and execute certain tasks related to its physical capacity (e.g., flexibility, walking, etc.; Alleva et al., 2015). This too will elicit feelings of mastery and competence.

The relationship between body appreciation and facets of negative body image has also been investigated. There is evidence to suggest that there are inverse associations between body appreciation and athletic-ideal and thin-ideal internalisation (Swami, 2009; Swami et al., 2010; Swami et al., 2012). Negative associations between body appreciation and self-objectification (Augustus-Horvath & Tylka, 2011; Avalos & Tylka, 2006; Oh et al., 2012), drive for thinness, body dissatisfaction, body checking, social physique anxiety, and body image avoidance (Swami et al., 2012), have also been established. In addition, body appreciation is inversely related to psychopathology, including maladaptive perfectionism (Iannantuono & Tylka, 2012), neuroticism (Swami et al., 2008), and eating disorder symptomology (Tylka & Kroon Van Diest, 2013). Lastly, there is a body of evidence to suggest that in experimental studies, there is protective effect of body appreciation against media induced-body dissatisfaction in samples of young women (Andrew et al., 2015; Halliwell, 2013). At this point, it is important to clarify that body appreciation is not simply the inverse of body dissatisfaction (Tylka & Wood-Barcalow, 2015a). Although they may show inverse relationships with several the outcomes reviewed thus far, conceptually, Tylka and Wood-Barcalow (2015a) asserted that they are not on the same continuum, nor should it be represented as low levels of body dissatisfaction. An earlier study by Pope et al. (2014) reinforced this notion, finding that African American adolescent girls identified self-perceived flaws with their bodies and areas they would like to change (which suggested a degree of body dissatisfaction), whilst simultaneously demonstrating positive feelings about their bodies.

Despite the increasing interest in body appreciation as a construct and the various consequences of having high or low body appreciation, few studies to date have examined *predictors* of body appreciation. While understanding body image-related risks for physical and mental health outcomes is crucial, it is equally important to focus on factors that promote body appreciation, which in turn relates to indicators of positive mental health (Tylka & Kroon Van Diest, 2013). Several factors which have shown to be inversely related to body dissatisfaction, including self-compassion and physical activity (Albertson et al., 2014; Carraça et al., 2012), are argued here to be facilitating factors for body appreciation. As self-compassion is associated with positive mind states, including optimism (Neff, 2003a; Neff & Vonk, 2009), it may not only buffer against body dissatisfaction, but also enhance a sense of appreciation and respect for one's body. Importantly, the construct of self-compassion has significant links to the positive psychology approach in general and the concept of body appreciation, given their shared underlying philosophy of appreciation and acceptance of the self. Moreover, as physical activity increases awareness of physical capabilities, improves fitness, and raises self-efficacy (e.g., one's belief in their capability of succeeding in certain circumstances; Bandura, 1982), physical activity will also contribute to a greater sense of appreciation for one's body. The following sections of this chapter describe the direct and indirect relationships proposed to exist between self-compassion, physical activity, and body appreciation and positive well-being, all within the context of positive psychology.

2.5. The Role of Facilitating Factors in Body Appreciation and Positive Well-being: Self-Compassion

One factor that promotes body appreciation is self-compassion, which is the extension of care, understanding, warmth, and kindness towards oneself (Neff, 2003b). Self-compassion is a way of engaging understanding toward oneself that is rooted in traditional Buddhist philosophy and Buddhist meditation (Neff, 2003b; Kabat-Zinn, 1994; Neff & Germer, 2013). Compassion, in a broad sense, is a key concept within Buddhism. Compassion incorporates the capacity to feel empathy, recognise the needs of others, and a sense of oneness during hardship with a yearning to act toward those feelings to mitigate anguish (Rinpoche, 2012). There is no distinction between compassion for oneself and compassion for others within Buddhist philosophy (Bennett-Goleman, 2001). It is theorised that for someone to be compassionate toward others, they must firstly apply compassion inwards.

Compassion is described as "being touched by the suffering of others, opening one's awareness to others' pain and not avoiding or disconnecting from it, so that feelings of kindness toward others and the desire to alleviate their suffering emerge" (Neff, 2003b, p. 86–87). Within the schools of Buddhism, one of the most important principles is learning to be compassionate, which is postulated to help individuals develop a capacity to encourage themselves towards meaningful change (Gilbert, 2009; Neff, Rude, et al., 2007). Compassion within Buddhism is a practice whereby individuals can train their minds, leading to an overall enhancement in enlightenment and well-being (Gilbert, 2009; Neff et al., 2007). Those that practice being compassionate progressively learn to manage confronting emotions with a greater degree of support, understanding, and self-directed care, which enables even the most challenging change (Gilbert, 2009; Neff, Rude, & Kirkpatrick, 2007; Pauley & McPherson, 2010).

Self-compassion contains the same components that make up compassion; however, these aspects are directed inwards to one's own distress and anguish (Zessin et al., 2015). According to Thall (2014), "the construct of self-compassion reflects an effort to bring the fullness of Buddhist compassion to bear in Western research addressing positive emotional affect and psychological well-being" (p. 16). Coined by Neff (2003a, 2003b), self-compassion consists of three concepts: *self-kindness*, characterised by understanding and being kind to oneself, as opposed to engaging in self-judgement and criticism; *common humanity*, defined as recognising that one's personal failure and suffering is experienced by all individuals, rather than a separating and isolating experience; and *mindfulness*, the practice of observing one's emotions as they are, rather than over-identifying with them or attempting to control or alter them (Neff, 2003b). It is important to understand the three components of self-compassion as they each have links with the body image concepts that are explored in the following section.

2.5.1. Self-Compassion and Mental Health

Contemporary literature based off Neff's (2003a, 2003b) conceptualisation of self-compassion has explored the construct's relationship with other psychological concepts, along with investigating whether being self-compassionate contributes to having a more positive connection with oneself (Pauley & McPherson, 2010). Results from several investigations have consistently shown that self-compassion is negatively associated with indicators of poorer mental health (Neff, 2003a; Neff, Kirkpatrick, et al., 2007; Neff, Rude, et al., 2007). In one of the first cross-sectional studies testing the social psychological perspective of self-compassion, Neff (2003a) found that self-compassion had significant negative correlations with measures of depression, rumination, self-criticism, and anxiety. Neff (2003a) posited that individuals who are self-compassionate are more accepting of themselves, including their perceived flaws, and are less distressed when personal standards are not met.

More recently, Körner et al. (2015) investigated relationships between self-compassion (comprising the positive aspects of the self-compassion scale: mindfulness, common humanity, and self-kindness) “self-coldness” (comprising the negative aspects of the self-compassion scale: over-identification, isolation, and judgement), and levels of depressive symptomatology among German participants. Results revealed that the contribution of the positive subscales of self-compassion to the variance in depressive symptomatology was insignificant, but that the positive self-compassion subscales moderated the effect of over-identification, isolation, and judgment on severity of depressive symptoms (Körner et al., 2015). They also found that levels of self-coldness were significantly higher in those with a diagnosis of major depressive disorder than in those with depressive syndromes or no depressive symptoms. From these results, Körner et al. (2015) posited that self-compassion is a protective factor against depression, especially amongst those encountering elevated levels of self-coldness.

Prospective investigations have also assessed the relationship between self-compassion and poorer mental health. Over a five-month period, Raes (2011) investigated whether self-compassion would predict change in depressive symptomatology. Results indicated that those with higher levels of self-compassion at baseline experienced reductions in depressive symptomatology at five-month follow-up, suggesting a predictive association between self-compassion and decreases in depressive symptoms (Reas, 2011). Findings should be interpreted with caution, however, as the sample was predominantly female, thus limiting the generalisability of the findings. The results from this study, however, are consistent with previous literature suggesting that self-compassion is protective against aspects of psychopathology, including depression (Neff, 2003a).

More recently, Terry et al. (2012) investigated the role of self-compassion in moderating students' reactions to academic and social difficulties when transitioning into college. Prior to starting the college tenure, students completed a self-compassion questionnaire. Participants also completed measures of their academic and social struggles and their satisfaction regarding their choice in attending college, along with measures of depression and homesickness. Results indicated that students with higher levels of self-compassion were less homesick and less depressed and experienced less dissatisfaction about their choice in attending college (Terry et al., 2012). Moreover, the relationship between students' homesickness and satisfaction with their choice to attend college, along with their perception of life circumstances, were moderated by self-compassion. Students who reported lower levels of self-compassion experienced higher levels of homesickness, along with lower satisfaction when the circumstances of their life were not as they anticipated. Comparatively, students high in self-compassion reported to have been able to tolerate the difficulties faced in life (Terry et al., 2012). One limitation of this study, however, was the measurement of the outcome variable. Data collection occurred at two time points: before arriving at the university and at the end of the first semester. Measuring the outcome variables at several time points would have allowed the investigators to explore how self-compassion is related to the trajectory of perceived academic of social difficulties over time. Notwithstanding this limitation, this investigation yielded noteworthy results on the ameliorative effect of self-compassion on academic and social difficulties as well as depression and homesickness.

Self-compassion has also been shown to have a positive relationship with several psychological characteristics that are indicators of good mental health, including greater life satisfaction (Neff, 2003a), happiness (Hollis-Walker & Colosimo, 2011; Neff, Kirkpatrick, et al., 2007; Neff & Vonk, 2009), optimism (Neff, Kirkpatrick et al., 2007; Neff & Vonk, 2009), positive affect (Neff, Kirkpatrick et al., 2007; Neff & Vonk, 2009), wisdom (Neff, Kirkpatrick et al., 2007), emotional intelligence (Heffernan et al., 2010; Neff, 2003a), coping skills (Leary et al., 2007; Neff et al., 2005), greater self-improvement in motivation (Breines & Chen, 2012), and overall psychological well-being (Baer et al., 2012; Neff, Kirkpatrick, et al., 2007). In addition, Neff, Rude, et al. (2007) examined the relationships between self-compassion and several positive aspects of well-being (personal initiative, optimism, positive affect, curiosity and exploration, happiness, and wisdom) and personality factors in the five-factor model (extroversion, conscientiousness, openness to experience, neuroticism, and agreeableness). Results showed that self-compassion had a significant positive relationship with all measures of positive well-being along with extroversion, conscientiousness, and agreeableness Neff, Rude, et al. (2007). Furthermore, self-compassion had a significant negative relationship with neuroticism and negative affect. Neff, Rude, et al. (2007) also conducted regression analyses to establish whether self-compassion predicted unique variance in positive functioning over and above extroversion, conscientiousness, and agreeableness. Results from these analyses indicated that self-compassion was an independent predictor, suggesting that self-compassion taps into specific features of positive well-being which are not wholly explained by personality factors (Neff, Rude, et al. (2007).

It is important to consider underlying mechanisms and theoretical approaches in understanding the association between self-compassion and positive well-being. Gilbert (2005) posited that self-compassion enhances well-being as it helps individuals to feel emotionally calm, connected and cared for. Using social mentality theory – which draws on principles of attachment, neurobiology, and evolutionary biology theory – Gilbert (1989) proposed that self-compassion deactivates the threat system (associated with the limbic system and feelings of defensiveness and insecurity) and activates the self-soothing system (associated with the oxytocin–opiate system and feelings of safety and secure attachment). The self-soothing qualities of self-compassion are thought to produce capacities for exploration and successful coping with the environment, effective affect regulation, and intimacy (Gilbert, 1989; Gilbert, 2005; Neff, Kirkpatrick, et al., 2007).

Other goal or telic theories proposed by Zessin et al. (2015) assume that the development of well-being is a consequence of accomplishing certain goals (Emmons, 1986; Michalos, 1980; Zessin et al., 2015). Self-compassion facilitates the process of goal achievement by reducing the emotional negative influence of failure and setbacks (Barnard & Curry, 2011; Zessin et al., 2015). In other words, those high in self-compassion are better able to persist in goal pursuit even in the face of obstacles.

Cognitive approaches can also help to also explain the relationship between self-compassion and well-being through the influence of personality and positive memory bias (Diener & Biswas-Diener, 2011; Feist et al., 1995; Zessin et al., 2015). A person with a strong sense of well-being focuses more on positive situations and interprets events more positively in consideration of pleasant memories (Diener, 1984; Diener & Ryan, 2009; Zessin et al., 2015). Thus, from a top-down processing perspective, self-compassion helps to create a positive mindset and is related to well-being as it helps people feel secure and safe (Neff, 2011; Zessin et al., 2015). Through this cognitive mindset, individuals with a more positive mindset still manage to see positives in failures and mistakes (Zessin et al., 2015). Bottom-up approaches, in contrast, describe the development of well-being through perceptual processing as individuals interpret positive and negative experiences in their lives (Diener, 1984; Diener & Ryan, 2009; Feist et al., 1995; Zessin et al., 2015). How one evaluates their life can determine well-being, and this can be influenced by how an individual mentally "balances" the ratio of positive to negative experiences. Higher levels of self-compassion may mediate this balancing process by increasing the salience or subjective meaning of positive experiences, such as success, and weakening the effects of negative experiences, such as failures. As such, the balance of both positive and negative evaluations of life circumstances can result to be in favour of the positive, which in turn increases positive well-being (Zessin et al., 2015). These studies show that self-compassion not only buffers against poorer mental health, but it facilitates a more positive well-being via positively biased mindset.

2.5.2. Self-Compassion and Body Appreciation

Along with protecting against poor mental health and being associated with indicators of good mental health, contemporary research has suggested that self-compassion safeguards the effects of body dissatisfaction and body image avoidance. In particular, Ferreira et al. (2013) explored the relationships between self-compassion and drive for thinness, shame and body dissatisfaction in women who did and did not have an eating disorder. Results showed that women who had higher levels of self-compassion had lower engagement in disordered eating and lower levels of body dissatisafaction. In contrast, women who had lower levels of self-compassion showed higher engagement in disordered eating, and had higher levels of body dissatisafaction (Ferreira et al., 2013). Results established that lower levels of self-compassion are associated with increased psychopathology and disordered eating symptomatology. Research has also investigated associations between self-compassion and body image avoidance, characterised by refraining from entering situations that elicit concerns about one's physical appearance, such as being weighed, avoiding mirrors, and wearing fitting clothes (Rachel et al., 2020). Stapleton and Nikalje (2013) examined the relationship between self-compassion, intuitive eating, and self-esteem in body image avoidance behaviours. A sample of 137 female university students in Australia partook in the study, with the results revealing a significant negative relationship between self-compassion and body image avoidance. In addition, self-compassion explained unique variance in body image avoidance after accounting for self-esteem. However, when intuitive eating was added into the model, the relationship between self-compassion and body image avoidance dissipated (Stapleton & Nikalje, 2013). Tylka (2006) posited that being attuned to one's physiological cues is a core component of intuitive eating; it is also a core component of self-compassion. Based on previous findings (Neff, 2003a), it can be argued that intuitive eating in the study conducted by Stapleton and Nikalje (2013) captured the overall psychological self-awareness that was measured by the self-compassion scale. Additionally, it can be contended that intuitive eating "is based on allowing oneself to eat whatever the body desires, therefore intuitive eating in a sense captures self-kindness towards one's body; similarly, eating for physical reasons rather than using food to cope with emotional distress reflects being mindful of one's negative thoughts and feelings and not over-identifying with them" (Stapleton & Nikalje, 2013, p. 15). These two studies show the importance self-compassion has in buffering negative attitudes towards one's body image.

As the literature has shown that self-compassion buffers the negative effects of body dissatisfaction, the construct likewise improves one's respect and appreciation for their body. Cross-sectional studies have shown that self-compassion is positively associated with body appreciation (Homan & Tylka, 2015; Kelly & Stephen, 2016; Pisitsungkagarn et al., 2013; Schmidt et al., 2019; Wasylkiw et al., 2012). More specifically, Wasylkiw et al. (2012) investigated associations between self-compassion and positive and negative aspects of body image in 142 female undergraduate students. Results showed that self-compassion predicted fewer body concerns, weight worries, and preoccupation, and was positively associated with body appreciation.

More recently, in another female sample, Homan and Tylka (2015) examined whether body comparison and appearance contingent self-worth were more weakly associated with body appreciation when levels of self-compassion were high. Consistent with Wasylkiw et al. (2012), the results of the study showed that there was a positive association between self-compassion and body appreciation. Moreover, Homan and Tylka (2015) claimed that "staking one's self-worth in appearance" (p. 5) and encountering body-related social comparisons exhibited negative associations with body appreciation, and that self-compassion influenced the strength and direction of association between these constructs. Put simply, self-compassion helped participants to maintain body appreciation when confronted with two typical concepts that have been associated with adverse feelings about the body (Homan & Tylka, 2015). Participants who had higher levels of body appreciation were able to filter out unappealing forms of visual formation in a way that facilitated a positive outlook concerning their bodies. Self-compassion was suspected to have helped with this process. Rather than punitively judging the incongruities that stem from body-related comparisons, conceivably, self-compassion assists with a type of accepting and kind response that safeguards and promotes body appreciation. A mechanism that clarifies the positive association between self-compassion and body appreciation can be drawn back to one's perception of their body, in that those who are self-compassionate are more accepting of their shape and weight (Andrew, 2015). As the self-acceptance and non-judgmental stance is woven into the self-compassion process, this translates to a greater acceptance and appreciation of one's physical form and appearance as it is, rather than wishing they were different (Andrew, 2015).

Prospective research has also confirmed positive associations between self-compassion and body appreciation. Albertson et al. (2014) explored whether a self-compassion meditation training session over a three-week period would enhance body appreciation. In a sample of women with body image concerns and eating disorder symptomatology, those in an experimental group who were exposed to the self-compassion meditation experienced significantly greater decreases in appearance-dependent self-worth, body shame, and body dissatisfaction, and significantly greater increases in body appreciation and self-compassion, than those in the control group. All improvements were maintained when assessed three months later (Albertson et al., 2014). This study also investigated the influence of self-compassion on body appreciation through the frequency of the meditation podcasts. The results indicated that listening to the self-compassion podcasts more frequently was associated with increased body appreciation, although it did not affect levels of body dissatisfaction, body shame, and appearance-dependent self-worth. This suggests that self-compassion may not erase people's perceptions of flaws in their bodies or eliminate dissatisfaction with such flaws but is nonetheless an effective tool for enhancing greater acceptance of the body over time. Albertson et al. (2014) argued that body appreciation changes could predominantly rely on meditation exposure, which improves one's body awareness in a manner that is comforting and kind.

2.5.3. Self-Compassion, Body Appreciation, and Positive Well-being

The abovementioned studies have shown that there is a positive association between self-compassion and body appreciation. As discussed earlier, self-compassion also has positive relationships with indicators of positive well-being (Baer et al., 2012; Breines & Chen, 2012; Leary et al., 2007; Hollis-Walker & Colosimo, 2011; Heffernan et al., 2010; Neff, 2003a; Neff, et al., 2005; Neff, Kirkpatrick, et al., 2007; Neff, Rude, et al., 2007; Neff & Vonk, 2009). As part of building an integrated model for the present study, body appreciation is a mechanism that is proposed to explain the positive relationship between self-compassion and positive well-being. Specifically, higher levels of self-compassion are argued here to promote more positive well-being through the greater appreciation of one's body. As Gilbert (1989) posited that self-compassion deactivates the threat system and activates the self-soothing system, this allows those with higher levels of self-compassion to foster more positive well-being, in part because self-compassion encourages individuals to appreciate their body for what it already looks like and what it can do, rather than critiquing or criticising it. One pillar that makes up the self-compassion construct, self-kindness, is characterised by understanding and being kind to oneself, as opposed to engaging in self-judgement and criticism (Neff, 2003a). Having high levels of self-compassion allows individuals, regardless of their body shape or size, to be secure with their own figure, whilst avoiding self-judgement and criticism through the deactivation of feelings of insecurity and defensiveness. Moreover, rather than punitively judging one's body, which could stem from body-related comparisons, self-compassion conceivably assists with a type of accepting and kind response that promotes body appreciation (Andrew, 2015; Homan & Tylka, 2015). Greater positive well-being, therefore, can be fostered by appreciating one's body for what it is, rather than engaging in self-judgement and denigration. These more positive perceptions, in turn, emerge through greater self-compassion.

2.5.4. Self-Compassion and Physical Activity

Whilst research suggests direct associations between self-compassion and body appreciation, and between self-compassion and positive well-being, other factors can be examined more fully to understand the ways in which self-compassion relate to body appreciation and positive well-being. Particularly, physical activity has yet to be examined regarding its relationship to self-compassion and body appreciation, and how these relationships may interact to promote better positive well-being. Despite this, self-compassion is argued to be helpful in understanding and promoting a physically active lifestyle. Concern for one's well-being along with self-kindness are facets that likely motivate someone to make time to be physically active as a health enhancing behaviour. Moreover, Thall (2014) posited that "an increased sense of self-worth should legitimise time spent in personally gratifying behaviours and a sense of common humanity would lead to helping others to do the same" (p. 50). Moreover, those who are high in self-compassion avoid the need for performance evaluation, and encourage themselves, along with others who may not be experienced or comfortable in partaking in physical activity, to consider being active. In addition, self-compassion entails being understanding and warm toward ourselves when we feel inadequate, suffer, or fail, rather than flagellating ourselves with harsh judgement (Neff, 2003a). Exercise science literature has shown that even long-term exercisers sometimes experience exercise slips, relapse, or setbacks (Mosewich et al., 2011; Semenchuk et al., 2018; Stetson et al., 2005). Self-compassion is well suited to encourage individuals to accept their unsuccessful behaviour (e.g., relapse) and move forward with re-establishing healthy patterns regarding physical activity. Enhancing self-compassion is likely to foster an increased sense of self-worth and autonomy, and augment one's capabilities in partaking in physical activity, which in turn should result in an enhancement in body appreciation and positive well-being (Thall, 2014).

Recently, Hallion et al. (2019) performed a cross-sectional investigation of the association between self-compassion and physical activity and found that self-compassion was not significantly related to physical activity participation. However, one limitation that establishes part of the rationale for the present study was that the measurement of physical activity was measured in one's current engagement of physical activity through the International Physical Activity Questionnaire–Short Form (IPAQ-SF; Craig et al., 2003), which only measures one's involvement in physical activity in the past seven days, rather than one's consistency or maintenance in undertaking physical activity over an extended period. Additionally, research shows that only leisure physical activity is associated with improved well-being, and not occupational physical activity, or physical activity associated with travel (Rebar et al., 2019; Teychenne et al., 2020). As Hallion et al. (2019) examined the relationship between self-compassion and all domains of physical activity, this may explain why there was a null relationship to self-compassion.

Contemporary literature has shown that those who are more physically active over a longer period have a higher perceived health status, a more positive outlook on exercise, and higher levels of self-efficacy as opposed to those who are less consistent in partaking in physical activity (Amireault et al., 2013). Furthermore, Ulmer et al. (2010) discovered that those who partook in regular exercise had higher levels of acceptance and mindfulness – constructs which are closely linked to self-compassion. This suggests that the link between self-compassion and physical activity is stronger for those who are maintaining positive health behaviours as opposed to those who are less consistent (Hallion et al., 2019). This gap will be investigated in the present study through examining one's involvement in physical activity beyond a seven-day period, as well as focusing on physical activity performed for leisure reasons specifically, as this is likely to be more closely associated with self-compassion and well-being than overall levels of activity. The following section explores physical activity and its relation to self-compassion and body appreciation.

2.6. The Role of Facilitating Factors in Body Appreciation and Positive Well-being: Physical Activity

As described above, self-compassion and body appreciation incorporate self-care as a way for people to look after their bodies, and the functional component of body appreciation is about movement and physical activity. Physical activity – encompassing exercise, team sports, and movement for leisure – has been associated with a reduced incidence of Type 2 diabetes, cardiovascular disease, osteoporosis, hypertension, and several types of cancers, along with depressive and anxiety symptomatology (Dunn et al., 2001; Monshouwer et al., 2009; Pate et al., 1995; Rehor et al., 2001; Warburton et al., 2006; Wyshak, 2001). Moreover, there is substantial evidence suggesting that physical activity produces several physical and psychological benefits (Pan et al., 2009). As part of building an integrated model for the present research, the following section will explore the relationship between physical activity and mental health, along with the relationship between physical activity and body image constructs.

2.6.1. Physical Activity and Mental Health

Both cross-sectional and longitudinal studies have confirmed positive connections between physical activity and aspects of improved well-being (Kavussanu & McAuley, 1995; Kim et al., 2016; Maher et al., 2015; Morgan et al., 2013; Pasco et al., 2011; Schmalz et al., 2007). Research in this area began several decades ago. For instance, Kavussanu and McAuley (1995) recruited 188 participants to examine if those who were highly active were more optimistic, in addition to whether physical self-efficacy and trait anxiety mediated the relationship between exercise and optimism. Results from this study showed that as opposed to physically inactive/low active individuals, those who were highly active were more optimistic. Moreover, contrary to the inactive/low active group, those who were moderately or highly active reported lower levels of trait anxiety, as well as greater levels of physical self-efficacy. Further analyses demonstrated that physical self-efficacy, as well as trait anxiety, accounted for the significant unique variation in optimism (Kavussanu & McAuley, 1995). Earlier work by Thayer (1978) proposed a theoretical foundation for this possible relationship. He posited that high energetic arousal states that are produced through exercise are related to optimism. Later, Thayer (1987) provided some preliminary evidence to support this theory. In an investigation examining subtle changes in arousal with exercise and circadian rhythms, Thayer (1987) found that perceptions of happiness, pleasant physical feelings, and optimism were increased by moderate exercise, and that energetic feelings were associated with exercise. Thayer (1987) posited that energetic arousal had the strongest associations with optimism. Hence, it is conceivable that those who are highly active exhibit more optimism due to their energetic arousal states experienced by exercising (Kavussanu & McAuley, 1995).

More recent studies have confirmed the positive association between physical activity and psychological well-being, including optimism. In a cross-sectional study, Kim et al. (2016) investigated the effects of involvement in leisure time physical activity on loneliness in a sample of older adults. Results showed the role that physical activity had in promoting positivity amongst those experiencing loneliness. Kim et al. (2016) argued that as older adults partake in more physical activity, it provides them with opportunities to be sociable with others who too experience loneliness, and to have meaningful and positive connections with other older adults, which facilitates their psychological well-being. In support of this explanation, a qualitative investigation theorised that leisure could provide favourable environments where individuals can develop personal attachment and social support, facilitating positive feelings and dealing more effectively with negative life events (Kerstetter et al., 2008).

Additional cross-sectional studies have examined the association between physical activity and positive well-being, particularly positive affect. As part of the Geelong Osteoporosis Study, Pasco et al. (2011) recruited 276 women with osteoporosis who completed questionnaires as part of their eight-year follow-up assessment. Results revealed that there was a relationship between higher levels of being physically active and elevated mood. There are several mechanisms that are proposed to contribute to these positive associations. One such mechanism is exercise scheduling, where individuals adopt a productive routine of regularly engaging in physical activity, and this has been shown to be beneficial in managing mood (Cuijpers et al., 2007). Additionally, some potential psychological mechanisms may also account for the exercise-mood relationship, including enjoyment, improved self-efficacy and self-concept, increased sense of control, and “time out” from daily hassles and one’s routine (Berger & Motl, 2000). Furthermore, physiological mechanisms have been suggested to explain the relationship between exercise and positive mood. Daniel et al. (1992) provided some support of the endorphin hypothesis when examining the exercise-mood relationship. However, Yeung (1996) outlined that several studies regarding the endorphin hypothesis in humans and the exercise-mood relationship have failed, and methodological problems may account for the lack of significant results. More specifically, these null findings may be due to human endorphin levels, which may not correlate well with concentrations in the central nervous system.

A prospective investigation also confirmed the relationship between regular physical activity and positive well-being, including life satisfaction. In a longitudinal study, Maher et al. (2015) examined whether there was a positive association between physical activity and life satisfaction. Maher et al. (2015) conducted a daily diary study with a sample of adults over three 21-day measurement bursts. The results revealed that there was a positive relationship between physical activity and life satisfaction in middle and older adults, however, this relationship was not present in younger individuals. Commonly, on the days when participants would engage in physical activity, they would experience greater levels of life satisfaction (Maher et al., 2015). Maher et al. (2015) postulated the change in the relationship between physical activity and life satisfaction corresponded with the motivational theory of lifespan development (Heckhausen et al., 2010). This theory suggests as individuals progress through the lifespan, upholding their physical health along with functional independence is important (e.g., Callahan, 1992). Whilst mental and physical health play a part in optimising well-being and successful aging, (Chopik et al., 2015; Gerstorf et al., 2010) both decline with age (Blazer, 2003; Chopik et al., 2015). If individuals do not maintain good mental and physical health throughout the lifespan, the risk of lower life satisfaction increases. Indeed, finishing physical activity with feelings of contentment and enjoyment is a significant motivator for sustaining the activity (Brand & Ekkekakis, 2018).

2.6.2. Physical Activity and Body Appreciation

Not only is physical activity associated with benefits to mental well-being, research shows it also has positive relationships with body image. Participation in yoga, a particular form of physical activity, has been shown to be a facilitating factor for positive body image. In a cross-sectional study, Mahlo and Tiggemann (2016) examined associations between yoga participation, embodiment (a method of providing a cherished connection with the body, where one can efficiently voice bodily experiences; Piran, 2002, 2016), and body appreciation among experienced yoga practitioners and a comparison group of undergraduate women who did not practice yoga. Yoga practitioners had greater embodiment and body appreciation than non-yoga participants (Mahlo & Tiggemann, 2016). The authors posited that one of the mechanisms contributing to the positive relationship between greater embodiment and body appreciation, is that yoga is an activity that endorses a manner of worshiping the body and appreciating its health and functionality. Mahlo and Tiggemann (2016) also suggested that the practice of yoga includes elements of mindfulness – a component of self-compassion, which, as discussed earlier, is associated with body appreciation. The element of mindfulness teaches those practicing yoga to pay attention to the present moment with openness, curiosity, and without judgement. Likewise, Cox and McMahon (2019) prospectively examined the association between trait mindfulness and changes in body appreciation, along with changes in trait mindfulness and body appreciation in yoga participants (87% women) over a 16-week period. Over this period, there was a linear growth in trait mindfulness and body appreciation. Cox and McMahan (2019) explained that as the participants' trait mindfulness increased over the 16-week period their appreciation of their body's functions and unique characteristics had surfaced.

Finally, Halliwell et al. (2019) conducted a randomised control trial of a brief yoga-based body image intervention, attempting to improve body appreciation. A sample of young women was randomly allocated to a control group or a four-session yoga intervention. In contrast to the control group, those in the four-session yoga intervention group had documented improvements in mood, body satisfaction, connectedness, and appreciation at post-test, and at the four-week follow-up (Halliwell et al., 2019). These investigations demonstrate the association between yoga and body appreciation, albeit through an activity that more women engage in than men do. Whilst some research has examined the role of yoga on subjective well-being in men (Chow et al., 2012; Sointu & Woodhead, 2008; Walter & Routray, 2022; Walter et al., 2021), few studies have explored the role of physical activity in men's *body appreciation*. It is important to understand these relationships in men by broadening how scholars examine different types of movement.

Other types of physical activity, including aerobic and anaerobic exercise, have shown an association with improved body image in both women and men. A meta-analysis of correlational studies revealed those who participated in anaerobic and aerobic exercise had better body image (Hausenblas & Fallon, 2006). In addition, effect sizes for enhanced body image were larger for individuals who engaged in both anaerobic and aerobic exercise than those who engaged in only one type of exercise. Moreover, the magnitude of this association was significantly larger for men than women. Additionally, there was small effect size revealing that those who exercised had a better body image than non-exercisers. Hausenblas and Fallon (2006) posited that those who exercised were able to achieve an improved body image because of their activity levels closely resembling a muscular and lean physique for men and a fit and lean physique for women. This highlights the prevailing focus in the literature on body image in terms of how one looks. More research is needed on the relationship between non-yoga activities and body appreciation rather than more appearance-focused aspects of body image. As research has shown that leisure-time physical activity is a stronger predictor of well-being, this may also bear a stronger relation with body appreciation than non-leisure physical activity (Rebar et al., 2019; Teychenne et al., 2020).

2.6.3. Physical Activity, Body Appreciation, and Positive Well-being

As discussed, physical activity has been shown to have a positive relationship with indicators of positive well-being (Kavussanu & McAuley, 1995; Kim et al., 2016; Maher et al., 2015; Morgan et al., 2013; Pasco et al., 2011; Schmalz et al., 2007). As part of building an integrated model for the present study, body appreciation is another mechanism that is proposed to explain the positive relationship between physical activity and positive well-being. Those who partake in regular physical activity likely experience greater appreciation of their body because of their ability to perform certain bodily movements and execute tasks (e.g., stretching, pivoting, running, etc.; Alleva et al., 2015); Hausenblas & Fallon, 2006; Soulliard et al., 2019). For instance, those who partake in yoga are appreciative of their body's capabilities in executing bodily tasks including planks, stretches, and poses. Over time, regular yoga sessions will result in improvements in posture, balance, core strength, and flexibility, thereby fostering a sense of mastery and accomplishment (Ryff, 1989), and reinforcing appreciation for one's body as it is able to perform and execute specific tasks related to the activity, and the physical capacity that one's body possesses. The same process may occur for people who engage in other forms of activity (sports, gym exercise, etc.), but further research is needed to confirm this. That is, more research is required to broaden the perspective on physical activity and body appreciation beyond just yoga.

2.7. The Role of Facilitating Factors in Body Appreciation and Positive Well-being: Exercise Motivation (Intrinsic Motivation)

In addition to the lack of research examining physical activity and body appreciation outside the context of yoga, a further factor that has not been considered is motivations for exercising. It is argued here that differing motivations may account for the relationship between physical activity and self-compassion, in turn contributing to enhanced body appreciation and positive well-being. As self-compassion increases, one will tend to look after oneself both physically and mentally, which includes caring for the body through physical activity (Hallion et al., 2019; Sirois, 2015; Terry & Leary, 2011). However, this link may depend on one's motivations for exercise, such that the association between self-compassion and physical activity requires a motivation to exercise for the benefits of health and overall well-being, rather than for appearance reasons. Therefore, exercise motivation is a factor to that needs to be investigated to understand ways in which self-compassion and physical activity relate to body appreciation and positive well-being. In this section, established theories of motivation are reviewed to provide a framework for understanding exercise motivation specifically. This is followed by an account of how exercise motivation is proposed to fit into the model being tested in this program of research.

2.7.1. Self-Determination Theory

One conceptual framework that is valuable in understanding motivation within the physical activity domain is self-determination theory (SDT; Ryan & Deci, 2000). SDT is concerned with personality and human motivation, regarding people's psychological needs and inherent growth tendencies that are the basis for personality integration and self-motivation. SDT centres on the reasons behind one's choice in partaking in a particular activity without external interference and influence. (Ryan & Deci, 2000; Deci & Ryan, 2012; Ryan & Deci, 2017). SDT stemmed from studies that had compared intrinsic and extrinsic motivation, along with the role of intrinsic motivation on one's behaviour (e.g., Lepper et al., 1973). Intrinsic motivation embodies a tendency to be self-determined, self-motivated, and inspired by enjoyment and interest. In contrast, extrinsic motivation exemplifies one's tendency to perform a task to acquire an external goal or meet external pressures (Deci & Ryan, 1985). Another subtype of motivation, amotivation, is mostly associated with an individual who acts without intent or is uninterested in a particular activity (Deci & Ryan, 2002). From an empirical analysis of the literature, Deci and Ryan (1985) recognised three basic psychological needs that are necessary for personal well-being, growth, and social development. These three basic psychological needs are autonomy.

Autonomy is typified by genuine actions and behaviours that stem from one's free will (Ryan & Deci, 2017). When someone is given an opportunity for self-direction or has a sense of choice, intrinsic gratification from engaging in chosen activities is augmented. On the contrary, when an incentive is presented – generally as a reward – autonomy, learning, and feelings of self-motivation decrease (Rigby et al., 1992; Ryan & Deci, 2000). Moreover, self-determination theory predicts that if someone were to experience no autonomy, a host of undesirable consequences may ensue, including reduced persistence and interest in particular activities. Competence is characterised by feeling positive and confident in one's abilities to perform desired tasks or activities and is associated with an innate need for learning and mastering new abilities and skills (Deci & Ryan, 1985). Although competence is an important construct in other theories of motivation and behaviour, such as self-efficacy theory (Bandura, 1995), SDT describes the role of autonomy support in increasing competence. Specifically, SDT predicts that in environments in which individuals feel an optimal sense of autonomy, feelings of competence persist over time as individuals feel the freedom to continue engaging in tasks the engender and increase competence e (e.g., Black & Deci, 2000). Finally, relatedness is characterised by one's need to form proximal relationships to belong, care for others, and to feel connected (Baumeister & Leary, 1995; La Guardia & Patrick, 2008; Ryan et al., 2008). Thus, intrinsic motivation should be highest when individuals have the autonomy to choose activities, feel a sense of competence in those activities, and can engage with and interact with others in the process.

2.7.2. Cognitive Evaluation Theory and Organismic Integration Theory

Within the larger framework of SDT, there are several sub-theories including Cognitive Evaluation Theory (CET; Deci & Ryan, 1985), and Organismic Integration Theory (OIT; Deci & Ryan 1985; Ryan & Deci, 2000). Initial work in SDT focused on CET, which is concerned about the determinants of intrinsic motivation. Whilst CET is not concerned with the sources of intrinsic motivation, the construct centres on the conditions that facilitate it versus those that weaken it. CET particularly addresses how aspects including pressure, reward contingencies, communication, feedback, and deadlines hinder feelings of competence and autonomy, which in turn could lessen intrinsic motivation for a particular action (Ryan & Deci, 2000; Ryan & Deci, 2002; Ryan et al., 2009). Furthermore, as opposed to social-cognitive theory (e.g., Bandura, 1989), CET speculates that feelings of competence will not enhance or maintain intrinsic motivation unless it coexists with autonomy. Consequently, feelings of competence and autonomy are essential for the maintenance and enhancement of intrinsically motivated behaviour.

Along with CET, Deci and Ryan (1985) introduced the OIT, which addresses the process of internalisation and integration of various *extrinsic* motives on a continuum ranging from non-autonomous or controlled, to autonomous or self-determined. At the far left of the continuum, prior to extrinsic motives, is amotivation. Here, one lacks the intention to act. Next is external regulation, which is the first type of extrinsic motivation. Here, one’s actions are driven by externally controlled punishments and rewards (Ryan & Deci, 2002; Ryan et al., 2009; Wininger, 2007). The second type of extrinsic motivation on the continuum is introjected regulation. Here, individuals will engage in behaviours to improve self-worth and to avoid guilt or to attain ego boosts (e.g., pride). Introjected regulation is therefore based on punishments and rewards; however, it embodies more internalisation than external regulation (Ryan & Deci, 2002; Ryan et al., 2009; Wininger, 2007). The third type of extrinsic motivation on the continuum is identified regulation. Identified regulation is a more autonomous or self-determined form of extrinsic motivation. Here, one's motivation is based on conscious values, such that the action concerning one's personal well-being is acknowledged and serves as the motive (Ryan & Deci, 2002; Ryan et al., 2009; Wininger, 2007). The fourth and final type of extrinsic motivation is integrated regulation. Integrated regulation is the most autonomous or self-determined form of extrinsic motivation. Here, behaviours have been evaluated and have been brought into correspondence with one's goals and values, and needs are seen as being controlled through integration (Ryan & Deci, 2000; Wininger, 2007). At the far right of the continuum is a classic state of intrinsic motivation, which is the most self-determined or autonomous form of motivation. Intrinsic motivation is epitomised by performing activities that are executed solely for the enjoyment gained from the activities. Specifically, those that are intrinsically motivated to partake in activities do so for satisfaction, interest, pleasure, and enjoyment, which stems from executing those very activities (Levesque et al., 2010). The relative autonomy continuum organises the types of regulation with respect to self-determination theory (Deci & Ryan, 2002). It does not suggest that people progress through each stage of internalisation with respect to each kind of behaviour or activity (Deci & Ryan, 2002); rather, people can any kind of activity or task can be driven or regulated by any form of motivation along the continuum. Over time, people can experience changes in their motivations for the same activity. For instance, those who once participated in an activity for the intrinsic enjoyment may only continue to partake in this activity for the extrinsic reward (Deci & Ryan, 2002; Ryan, 1995; Ryan & Deci, 1991).

The types of motivation (amotivation, extrinsic motivation, and intrinsic motivation), and types of regulation within extrinsic motivation (external regulation, introjected regulation, identified regulation, and integrated regulation) described in the self-determination framework are useful for examining motivations in various applied domains, such as education (Miserandino, 1996), healthcare (Williams et al., 1996; Williams et al., 1998), intimate relationships (Blais et al., 1990), and physical activity (Chatzisarantis et al., 1997). Consistently, research has shown numerous benefits in being autonomously motivated, including more effective performance, better relationships in one's social groups, more persistence, and greater health and well-being (Deci & Ryan, 2002). SDT is an important concept that provides a gateway to understanding the motivations for exercising.

2.7.3. Exercise Motivations and Physical Activity

Accounting for the processes that facilitate motivational development, as well as the quality of motivation regulating behaviour (Deci & Ryan, 2002), SDT holds appeal for understanding why people initiate, persist, and terminate their involvement in various activities (Hagger & Chatzisarantis, 2007). In a systematic review of the literature, Teixeira et al. (2012) empirically studied 66 published articles (including cross-sectional, prospective, and experimental studies) on the relationship between physical activity, exercise, and motivation. In addition, they analysed SDT-based interventions aimed at increasing exercise behaviour. The results of this review revealed trends of identified regulation predicting initial or short-term physical activity more so than purely intrinsic motivation, but also of intrinsic motivation predicting long-term adherence to exercise. This suggests that the uptake of exercise may involve being motivated by one’s personal values and goals, but the longer one engages in regular exercise, the more it becomes motivated purely by enjoyment and satisfaction from doing the activity itself. The systematic review also showed that there was a positive relationship between intrinsic motivation and exercise participation across a range of setting and samples. Teixeira et al. (2012) posited that one of the mechanisms for these findings is that participants who were more intrinsically motivated to partake in physical activity, or who had goals associated with being physically active such as positive challenge, skill development, affiliation, and social engagement, partook in these activities more often.

Overall, the systematic review of the literature showed considerable evidence of the importance of SDT - particularly autonomous types of motivation (identified and intrinsic motivation) - and its relevance to greater participation in physical activity.

2.7.4. Self-Compassion, Intrinsic Motivations to Exercise, and Physical Activity

In the present research, intrinsic motivation to exercise is proposed to explain the positive relationship self-compassion and physical activity. While the theory of self-compassion partly involves being kind to oneself when confronted with personal shortcomings, Thøgersen-Ntoumani and Ntoumanis (2006) explained that self-compassion encourages one to be authentic and true to themselves - a process that involves unreserved feelings of self-worth. Neff et al. (2005) proposed that because being intrinsically motivated and self-compassionate reduces self-evaluation and promotes a greater sense of unconditional self-worth, such feelings of self-worth are cultivated and withstand or outlast situational difficulties. Furthermore, those with introjected and external motives behave because they feel that they must, not because they want to (Deci et al., 1994). Therefore, people who feel that self-worth is dependent upon objective success – a standpoint that is inconsistent with self-compassion – engage in self-evaluation to craft or maintain their self-worth (Sheldon et al., 2008).

A cross-sectional study by Magnus et al. (2010) used SDT as a theoretical basis to explore correlations among self-compassion, motivation for exercise, and exercise behaviour amongst women exercisers. Self-compassion was found to be inversely associated with introjected and external motivation, and positively associated with intrinsic motivation. In contrast, introjected and external motivations for exercise were negatively related to self-compassion, as this type of extrinsic motivation involves self-worth depending upon an outcome (Magnus et al., 2010; Ryan, 1982). From these findings, it is postulated that those who are self-compassionate are more autonomously and intrinsically motivated to be physically active to achieve a greater sense of self-worth, which in turn generates a healthier perception of one's body image and overall improved well-being. In short, those who are more intrinsically motivated to exercise, do so for feelings of enjoyment, executing particular skills, personal accomplishment, and excitement (Deci & Ryan, 2010).

2.8. Limitations of the Literature

Body image research has a long history, and has provided an understanding of the various predictors, consequences, and treatments of having a negative view of one's body (Cash, 2004a; Tylka & Wood-Barcalow, 2015a). Herein lies one of the theoretical limitations of body image literature, however: theory, research, and practice have largely focused on understanding, preventing, and healing negative features of body image (Tylka, 2011). This demonstrates a deficit approach or a pathology-driven side that has dominated body image research and clinical practice. Whilst research has provided a greater understanding of the predictors and consequences of negative body image (e.g., elevated depression; Blashill & Wilhelm, 2014) and disordered eating disorders (Cargill et al., 1999), as a body of literature, this negative focus has limited the field by proscribing a comprehensive understanding of body image (Tylka & Wood-Barcalow, 2015a) This has resulted in clinicians being less than ideally equipped to promote health and well-being in their clients presenting with body concerns, beyond preventing and treating body images disturbance (Tylka & Wood-Barcalow, 2015a). If clinicians who treat body image issues by attempting to reduce negative body image but fail to enhance aspects of positive body image, this will result in one having a neutral perception of their body by merely tolerating it (Tylka & Wood-Barcalow, 2015a). A paradigm shift, with a focus on positive body image – more specifically, body appreciation – is crucial for prevention and treatment efforts. Understanding how one can celebrate, respect, and appreciate their body, as opposed to not feeling bad about their body, has beneficial implications for treatment goals pertaining to body image, and for general well-being (Tylka & Wood-Barcalow, 2015a).

From a methodological standpoint, as a body of literature, the majority of articles presented in this review - particularly regarding body image, self-compassion, and physical activity research - have contained exclusively or predominantly female samples (Andrew et al., 2016; Avalos & Tylka, 2006; Carraça et al., 2012; Dalley & Vidal, 2013; Frayeh & Lewis, 2018; Magnus et al., 2010; Mahlo & Tiggamann, 2016; Mosewich et al., 2011; Oh et al., 2012; Stapleton & Nikalje, 2013; Wasylkiw et al., 2012). This has caused an underrepresentation of males, meaning that results from many body image studies are not indicative of the entire population. Placing equal importance on sampling men as well as women for research in this area allows for greater generalisability of findings.

Along with samples containing only females, several other studies have sampled only college/university participants (e.g., Avalos & Tylka, 2006; Iannantuono & Tylka, 2012; Tylka, & Kroon Van Diest, 2013; Oh et al., 2012; Stapleton & Nikalje, 2013; Soulliard et al., 2019; Williams et al., 2004; Wyshak, 2001). Student samples are extremely common in psychological studies due to the convenience of recruitment, lower cost of administration, and assumed lower response bias (Arnett, 2008). However, this bias towards student samples further challenges the generalisability of findings to the general population (Hanel & Vione, 2016).

Another methodological limitation identified from the literature review is the large portion of articles containing cross-sectional analyses (e.g., Ferreira et al., 2013; Hallian et al., 2019; Homan & Tylka, 2015; Kim et al., 2016; Magnus et al., 2010; Pan et al., 2009; Pasco et al., 2011; Pisitsungkagarn et al., 2013; Soulliard et al., 2019; Wasylkiw et al., 2012). Whilst there are benefits associated with cross-sectional analyses, including taking little time to conduct, the ability to assess many predictor and outcome variables, and producing results that create new theories or inform more in-depth research (Levin, 2006), there are several disadvantages. Cross-sectional analyses cannot analyse behaviour over time, which precludes casual relationships being established regarding proposed predictor and outcome variables. Consequently, this limits the inferences that can be made from many of the studies reviewed herein.

2.9. Present Research: Aims and Rationale

Research examining factors that promote body appreciation and mental health through the positive psychology lens is in its infancy. Several factors which have been shown to be inversely related to body dissatisfaction, including self-compassion and physical activity (Albertson et al., 2014; Carraça et al., 2012), may be facilitating factors for positive body image. However, research is required to confirm this, as well as to provide a broader and better-integrated model of multiple factors influencing positive body image and well-being than research to date has offered.

As identified earlier, a notable gap in current research is consideration of body image issues in young adults who are not students, and particularly in men. Current research indicates that there is an increasing number of men who experience negative body image (Barnes et al., 2020; McCabe & Ricciardelli, 2004; Murray & McLean, 2018; Olivardia et al., 2004; Rodrigues & Rodrigues 2022). Consequences that surface from this range from slight unhappiness (e.g., body dissatisfaction) to unhealthy and extreme thoughts and behaviours (e.g., steroid use, excessive exercise, and muscle dysmorphic disorder; Leone et al., 2005). The factors that facilitate body appreciation and mental health in men, as well as how they may differ for women, need to be further investigated. Doing so will provide an understanding of the interrelationships between a range of factors that not only buffer against body dissatisfaction but collectively promote body appreciation and positive well-being among men and women in the general population.

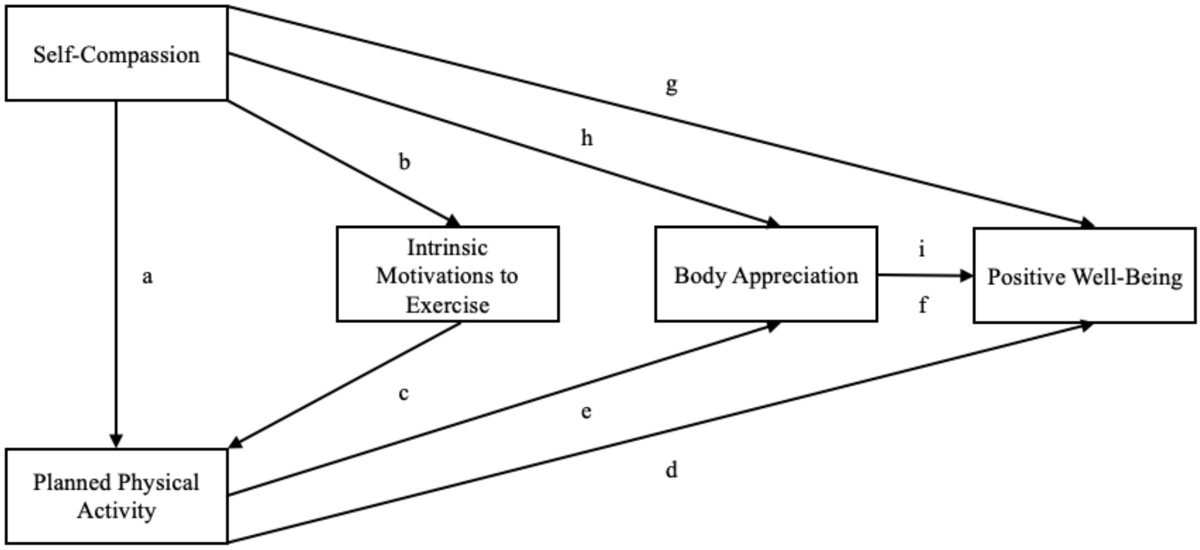
The literature review presented in this chapter suggests that self-compassion and engagement in physical activity buffer against body dissatisfaction, and potentially enhance body appreciation. More positive psychological well-being is also assumed to emerge from these factors. The main goal of the present research, therefore, is to empirically test a theoretical model integrating factors that have not previously been examined simultaneously. Specifically, the proposed relationship between self-compassion and positive well-being via body appreciation, and that between physical activity and positive well-being via body appreciation, has not been confirmed empirically. Likewise, the proposed relationship between self-compassion and physical activity as mediated by intrinsic motivations to exercise is tentative. As argued earlier, self-compassion is expected to promote a physically active lifestyle through concern for one's health and well-being and with self-kindness. Moreover, yoga has also been shown to be a protective factor for improving body image (Mahlo & Tiggemann, 2016); however, little research has examined protective effects of other types of physical activity. The present study will investigate how different forms of physical activity facilitate better body appreciation among young adult men and women. Intrinsic motivations to exercise need to be considered to more fully understand how self-compassion and physical activity relate to body appreciation and to positive well-being. Based on the literature and how components are proposed to fit together, these relationships establish the proposed model for the present study (refer to Figure 1; page 54).

The primary aim of the present research is to examine factors that contribute to positive body image and mental health in adults using a positive psychology framework; that is, adopting the perspective that optimal mental health is not simply the absence of symptoms, and that it can be achieved through promoting beneficial psychological constructs and processes rather than eliminating unhelpful ones. These factors include self-compassion and physical activity levels. First and foremost, Study 1 will test the overall model as illustrated in Figure 1. Then, using a prospective methodology with an initial baseline survey (Study 1; Chapter 3) and a three-month and six-month follow-up survey (Study 2; Chapter 4), this research will provide clarity as to which variable - self-compassion or body appreciation - has a greater longitudinal influence over the other. This will confirm the strength and direction of relationships between self-compassion and body appreciation and provide insight into whether one variable is more sensitive to change over time. Together, the findings of Studies 1 and 2 will help to inform the design of future intervention programs aimed at promoting positive body image and positive well-being. The final aim of the research is to employ an experimental technique to establish cause and effect; specifically, to explore whether improving self-compassion via meditation training enhances body appreciation, self-compassion, and positive well-being, and mitigate body dissatisfaction (Study 3; Chapter 5). It must be noted that young adults (aged 18-39 years) are the focal population of this research program, given contemporary literature has illustrated the population’s investment in their body image (Gattario & Frisén, 2019; Tylka & Wood-Barcalow, 2015a; Wood-Barcalow et al., 2010).

Understanding the factors that influence body image in a more balanced way can improve both theory and treatment. The present program of research, therefore, is an attempt to achieve this by examining variables that have been independently linked to positive body image in past research but have not yet been tested in a simultaneous model. From this, researchers may further understand how these factors work together to enhance positive well-being. Understanding how feeling good about one’s body – rather than not feeling bad about one’s body – has beneficial implications for one’s general well-being. If researchers can understand the role body appreciation plays in positive well-being, they can guide further research and practice into more holistic treatments for body image concerns and related well-being.

For brevity, the following paragraph will annotate the interrelationships among all variables as seen in Figure 1 on page 54. Concern for one's well-being along with self-kindness are facets that likely motivate someone to make time to be physically active as a health enhancing behaviour (a). Those who are self-compassionate are more autonomously and intrinsically motivated (b) to be physically active (c) to achieve a greater sense of self-worth, which in turn generates a healthier perception of one's body image (e) and overall improved well-being (f). In short, those who are more intrinsically motivated to exercise, do so for feelings of enjoyment, executing particular skills, personal accomplishment, and excitement (Deci & Ryan, 2010). Those who partake in regular physical activity likely experience greater appreciation of their body because of their ability to perform certain bodily movements and execute tasks (e.g., stretching, pivoting, running, etc.; Hausenblas & Fallon, 2006; Soulliard et al., 2019) (d). Perceptions of happiness, pleasant physical feelings, and optimism are increased by moderate exercise (Thayer; 1987) (f). A sense of mastery and accomplishment (Ryff, 1989), and reinforcing appreciation for one's body for being able to perform and execute specific tasks related to an activity and the physical capacity that one's body possesses, can be achieved through physical activity (d → e → f). Self-compassion is theorised to promote positive well-being through (1) social mentality theory – drawing on principles of attachment, neurobiology, and evolutionary biology theory (Gilbert, 1989), (2) goal or telic theories Zessin et al. (2015), and (3) cognitive approaches through the influence of personality and positive memory bias (Diener & Biswas-Diener, 2011; Feist et al., 1995; Zessin et al., 2015) (g). Rather than punitively judging the incongruities that stem from body-related comparisons, conceivably, self-compassion assists with a type of accepting and kind response that safeguards and promotes body appreciation (Andrew, 2015) (h). Greater positive well-being can be fostered by appreciating one's body for what it is, rather than engaging in self-judgement and denigration. These more positive perceptions, in turn, emerge through greater self-compassion (g → h → i).

Figure 1. Proposed model of the interrelationship between self-compassion, physical activity, intrinsic motivations to exercise, body appreciation, and positive well-being.



Chapter 3: Study 1

3.1. Introduction

The first study in the present program of research is cross-sectional and was designed to examine three key predictors of body appreciation and positive well-being in young adults aged 18-39 years: (a) self-compassion; (b) physical activity; and (c) exercise motivations, particularly intrinsic motivations to exercise. The proposed effects of these patterns were described earlier and illustrated in Figure 1 (refer to Chapter 2; page 54). Another purpose of Study 1 is to establish baseline data for the longitudinal analyses, which are explored in Study 2. The aim of this study was to demonstrate the interrelationship between self-compassion, planned physical activity, intrinsic motivations to exercise, body appreciation, and positive well-being simultaneously. Doing so will provide a better understanding of the interrelationships between a range of factors that not only buffer against body dissatisfaction, but collectively promote body appreciation and positive well-being.

Contemporary literature has found self-compassion to be inversely associated with external motivation, and positively associated with intrinsic motivation. In contrast, external motivations for exercise were negatively related to self-compassion, as this type of extrinsic motivation involves self-worth depending upon an outcome (Magnus et al., 2010; Ryan, 1982). From these findings, it is postulated that those who are self-compassionate are more autonomously and intrinsically motivated to be physically active to achieve a greater sense of self-worth, which in turn generates a healthier perception of one's body image and overall improved well-being. Consequently, whilst the hypothesised model does not encompass all areas of exercise motivations, specific hypotheses regarding intrinsic motivation and its relationship to self-compassion and physical activity require further investigation. The present study operationalised extrinsic motivation using the construct of external regulation, where one's actions are driven by externally controlled punishments and rewards (Deci &

Ryan, 2002; Ryan et al., 2009; Wininger, 2007). Additionally, intrinsic motivation was operationalised as intrinsic regulation, where one participates in activities for satisfaction, interest, pleasure, and enjoyment (Levesque et al., 2010).

Based on arguments presented in the literature review in sections 2.4.1., 2.5.1., 2.5.2., 2.6.1., and 2.6.2., it was hypothesised that, (a) self-compassion would be positively associated with body appreciation and positive well-being; (b) physical activity would be positively associated with body appreciation and positive well-being; and (c) body appreciation would be positively associated with positive well-being. Mediation pathways were also explored to explain the indirect relationships between self-compassion and physical activity, and between body appreciation and positive well-being. Based on arguments presented in the literature review in sections 2.5.4., 2.6.3., and 2.7.4., it was hypothesised that (a) intrinsic motivations to exercise would mediate the relationship between self-compassion and physical activity more strongly than extrinsic motivations; (b) body appreciation would mediate the relationship between physical activity and positive well-being; and (c) body appreciation would mediate the relationship between self-compassion and positive well-being.

3.2. Method

A total of 403 individuals participated in the online survey described below. From the 403 participants, only 394 provided complete information on the variables to be analysed in the present study. See Table 1 for demographic characteristics of the sample. In brief, participants consisted of 54.8% males, 43.1% females and 2% identifying as non-binary. Ages ranged from 18-39, with a mean age of 27.48 years (*SD* = 5.57). Most participants were from the United States of America (USA; 55.3%), Caucasian (57.9%), heterosexual (78.9%), were from non-urban areas (41.4%), had an undergraduate university degree (40.4%), and worked full-time (43.9%).

Table 1.

Sociodemographic Characteristics of Participants at Baseline (n = 394)

Baseline Characteristics	Total Sample	
	n	%
Gender		
Male	216	54.8%
Female	170	43.1%
Non-binary	8	2.0%
Country of origin		
Australia	34	8.6%
Canada	36	9.1%
Ireland	1	0.3%
New Zealand	3	0.8%
United Kingdom (UK)	102	25.9%
United States of America (USA)	218	55.3%
Ethnicity		
Caucasian	228	57.9%
Asian	55	14.0%
Arabic	1	0.3%
European	35	8.9%
Hispanic or Latino	28	7.1%
African	24	6.1%
Mixed	18	4.6%
Indigenous or Native	4	1.0%
Other	1	0.3%
Region		
Outer suburbs	163	41.4%
Capital city/Inner suburbs	152	38.6%
Rural areas	42	10.7%
Regional centres	37	9.4%
Highest education level		
Completed secondary school	126	32.0%
Completed tertiary diploma or trade certificate	44	11.2%
Undergraduate university degree	159	40.4%
Postgraduate university degree	42	10.7%
Some secondary school education	19	4.8%
Primary school education	4	1.0%
Employment		
Working full-time	173	43.9%
Working part-time	58	14.7%
Casual worker	25	6.3%
Student	59	15.0%
Household duties	10	2.5%
Receiving a pension	6	1.5%
Unemployed	56	14.2%
Other	7	1.8%
Sexual orientation		
Heterosexual	311	78.9%
Bisexual	48	12.2%
Homosexual	21	5.3%
Other	14	3.6%
BMI (Average)		25.25

3.3. Materials

An online survey measured the predictors of body appreciation and positive well-being in young adults. Participants answered demographic questions along with measures of their feelings, attitudes, beliefs, and behaviours regarding self-compassion, physical activity, exercise motivations, body appreciation, and positive well-being. Measures were presented in the order described below. See Appendix A for all items.

3.3.1. Demographics

A demographic questionnaire was used to assess key demographic characteristics of the participants, including age, body mass index (BMI), country of residence, education level, ethnicity, region (inner city, suburban, etc.), employment status, and sexual orientation.

3.3.2. Body Appreciation

The Body Appreciation-2 Scale (BAS-2; Tylka & Wood-Barcalow, 2015b) is an improved version of the original Body Appreciation Scale (BAS). This scale comprises 10 items, such as *"I respect my body"* and *"I am attentive to my body's needs"*, and the respondents are asked to indicate the extent to which the item is true about them using a 5-point scale which ranges from 1 (*"never"*) to 5 (*"always"*). Tylka and Wood-Barcalow (2015b) reported unidimensionality of the scale, good internal consistency (Cronbach's α = 0.97), and three-week test–retest reliability (r = 0.90) in college and community samples of women and men. Adequate construct validity was demonstrated through correlations with body image-related variables and psychological well-being indices (Tylka & Wood-Barcalow, 2015b). The reliability of this scale in the present study was acceptable (Cronbach's α = 0.95).

3.3.3. Self-Compassion

The 26-item Self-Compassion Scale (SCS; Neff, 2003a) was used to measure levels of self-compassion. Participants indicate their responses on a 5-point scale ranging from 1 (*"almost never"*) to 5 (*"almost always"*). Items are worded to represent both positive and negative dimensions of the construct, which are divided into the following six subscales: self-kindness (α = 0.78; e.g., *"I am tolerant of my own flaws and inadequacies"*), self- judgment (α = 0.77; e.g., *"I am disapproving and judgmental of my own flaws and inadequacies"*), common humanity (α = 0.80; e.g., *"I try to see my failings as part of the human condition"*), isolation (α = 0.79; *"When I fail at something important to me I tend to feel alone in my failure"*), mindfulness (α = 0.75; e.g., *"When something painful happens I try to take a balanced view of the situation"*), and over-identification (α = 0 .81; e.g., *"When I fail at something important to me I become consumed by feelings of inadequacy"*; all alpha values cited from Neff, 2003a). An overall self-compassion score is calculated by reverse coding negatively worded responses for the self-judgment, isolation, and over-identification subscales, calculating the means for each subscale, then summing the means to obtain a total score. An internal consistency coefficient of α = 0.92 was established from the sample for the 26-item SCS (Neff, 2003a). In the present analysis, a high level of internal consistency was obtained (α = 0.93).

3.3.4. Physical Activity

The Brunel Lifestyle Physical Activity Questionnaire (BLPAQ; Karageorghis et al., 2005; Vencato et al., 2017) measures planned physical activity (PPA) and unplanned physical activity (UPA). PPA is measured using six items that tap into the frequency (number of times per week someone is engaged in physical activity), duration (how many minutes someone is engaged in physical activity), and intensity (*"very light"* through to *"very hard"*) of such activity. The type of planned physical activity the individual participates in is also explored (e.g., running, cycling, golf, swimming weightlifting, tennis, football, soccer, etc.). Likewise, UPA is measured using three items that tap into frequency (number of times per week someone is engaged in physical activity), duration (how many minutes someone is engaged in physical activity), and intensity (*"very light"* through to *"very hard"*). The type of unplanned physical activity the individual participates in is also explored. The initial development of the BLPAQ indicated that the instrument exhibited internal consistency (Cronbach's α estimates of 0.90 for the PPA subscale and 0.68 for the UPA subscale, which has only three items; Karageorghis et al., 2005). Vencato et al. (2017) established test-retest reliability of the BLPAQ for gymnasium users, undergraduate students, and university staff members, and intraclass correlations were calculated for each item. Factor scores ranged from 1 to 5, with higher scores indicating higher engagement in PPA. Pearson's product-moment correlations ranged from $r = 0.95$ to $r = 0.96$ for the PPA subscale, and $r = 0.93$ to $r = 0.98$ for the UPA subscale. Intraclass correlations ranged from R = 0.52 to R = 0.99 for PPA and R = 0.87 to R = 0.99 for UPA. In the present analysis, a high level of internal consistency was obtained for the PPA subscale ($\alpha = 0.90$), however, the reliability for the UPA subscale was $\alpha = 0.60$. The present study only includes the PPA subscale as previous research has found that leisure-time physical activity is associated with improved well-being, and not occupational physical activity, or physical activity associated with travel (Rebar et al., 2019; Teychenne et al., 2020).

3.3.5. Exercise Motivations (Intrinsic and Extrinsic Motivations to Exercise)

Intrinsic and extrinsic motivations to engage in exercise were measured using the third version of the Behavioural Regulation in Exercise Questionnaire (BREQ-3; Markland & Tobin, 2004; Wilson et al., 2006), which consists of 24 items with a five-point Likert scale, ranging from 0 (*"Not true for me"*) to 4 (*"Very true for me"*). However, only the 8 items from the intrinsic regulation and external regulation subscales were used in the present analysis. The other 16 items measure amotivation (e.g., *"I don't see why I have to exercise"*), introjected regulation (e.g., *"I feel guilty when I don't exercise"*), identified regulation (e.g., *"It's important to me to exercise regularly"*), and integrated regulation (e.g., *"I exercise* *because it is consistent with my life goals"*). The BREQ-3 has been reported as valid and reliable (Duncan et al., 2010) and measures external regulation (e.g., *"I exercise because other people say I should"*) and intrinsic regulation (e.g., *"I exercise because it's fun"*) of exercise behaviour based on Deci and Ryan's (1985) and Ryan and Deci's (2000) continuum conception of extrinsic and intrinsic motivation. Participant responses are scored by calculating the mean of each set of items pertaining to intrinsic regulation and external regulation. High levels of internal consistency for the BREQ-3 were obtained (α = 0.88) in the current study. Additionally, the reliability of both intrinsic and external regulations in the present study was acceptable (α = 0.93 and α = 0.84, respectively).

3.3.6. Positive Well-being

The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS; Tennant et al., 2007) is a 14-item scale that measures positive aspects of mental health. The scale includes statements such as *"I've been feeling useful"*, *"I've been feeling relaxed"*, and *"I've been dealing with problems well"*. Participants select the option that best describes their experience of each statement within the last two weeks, using a 5-point Likert-type scale. These options range from 1 (*"none of the time"*) to 5 (*"all the time"*). The overall score is calculated by summing the scores from each item, with the minimum overall score being 14 and maximum score being 70. A higher score indicates a higher level of positive well-being. The reliability of this scale in the present study was acceptable (Cronbach's α = 0.94), and consistent with that found within the literature (Cronbach's α = 0.93; Marmara et al., 2018).

3.4. Procedure

The Victoria University Human Ethics Committee (VUHEC) provided approval for the student investigator to collect data (Application ID: HRE19-092). The ethics approval document is shown in Appendix B. Data collection commenced on October 9 2019 and concluded on October 12 2019. The present study recruited participants through a crowd sourcing platform, Prolific.co. Eligible participants included those who had an existing Prolific.co account, were from Australia, Canada, Ireland, New Zealand, UK, or the USA, and were between 18 and 39 years of age. Eligible participants received an email invitation to participate directly from Prolific.co when the study was launched. This email contained a direct link to the online survey itself, hosted by Qualtrics. Participants were required to indicate by checking a box at the bottom of the first page of the survey that they read and understood all the information provided about the nature and potential risks of the study, and that they consented to participate. Participants were also informed that completing the survey was voluntary and that all responses were anonymous. In the event participants experienced any discomfort or distress from participating in the survey, they were encouraged to contact free, confidential, and anonymous telephone counselling services (e.g., Lifeline, National suicide prevention lifeline, etc.). All services were provided in the information statement (see Appendix C). At the end of the survey participants were invited to provide their anonymous and unique Prolific.co email address so that they could be contacted to complete follow-up surveys for Study 2 (see Chapter 4). The average completion time was 20 minutes and participants were compensated (£1.66 GBP; $3.00 AUD) for completing the survey.

3.5. Analysis

Data were analysed using IBM Statistical Package for the Social Sciences (SPSS) 25 and 26, and RStudio version 1.3.959 for the structural equation modelling (SEM) analysis and mediation analyses using the Lavaan and semTools package. Correlation matrices were generated to examine bivariate relationships between the variables, and linear regression analyses were performed to examine the individual effects of all predictors (planned physical activity and self-compassion) and mediator variables (intrinsic motivations to exercise and extrinsic motivations to exercise) on the outcome variables (body appreciation and positive well-being. SEM path analysis was then employed to test the overall model illustrated in Figure 1 (refer to Chapter 2; page 54). It was initially planned to use age as a covariate in this analysis given its relationship with several key variables, as identified in previous research (e.g., body appreciation and self-compassion; Albertson et al., 2014). However, given age was not significantly related to any variables of interest in the present research, the analysis was conducted with no covariates.

Before conducting the data analysis, all variables were screened for missing data and deviations from accepted statistical standards. There were no missing data present in the sample, with 403 participants respondents who submitted the survey completing all items. The data were also screened for univariate outliers via standardised scores, with a cut-off of ± 3.29 indicating the presence of an outlier (Field, 2013). Three scores across the positive well-being variable, two scores across body appreciation variable, and four scores across the exercise motivation variable (extrinsic regulation subscale) were identified as univariate outliers. These outliers were removed from subsequent analysis via listwise deletion (Tabachnick & Fidell, 2014), leaving 394 remaining participants. According to Kline (2005) $n \geq 100$ guideline, sample size for the present study was sufficient for SEM analysis.

Multivariate outliers were examined utilising Mahalanobis distance and Cook's distance statistics. Examination of the Mahalanobis distance revealed no scores that exceeded the critical χ^2 cut-off of 22.46 for six predictors (α = 0.01; Mahalanobis distance = 19.50). Further, an examination of the Cook's distance statistics (Cook's D = 0.29), revealed that no scores were close to exceeding the cut-off score of 1. Therefore, multivariate outliers were not considered likely to influence the parameter estimates of the regression models (Tabachnick & Fidell, 2014). Examinations of the skewness and kurtosis across the variables were used to evaluate the assumption of univariate normality (see Table 2). The distributions of all variables yielded skewness statistics of less than absolute 3 (skewness = 0.95), and kurtosis statistics of less than absolute 8 (kurtosis = -0.73; Field, 2013; Kline, 2005). Therefore, the assumption of univariate normality was met for this study. Multicollinearity was assessed using the variance inflation factor (VIF) and tolerance statistics. According to Bowerman and O'Connell (1990), a VIF greater than 10 indicates a problem with perfect collinearity, while a tolerance ≤ 0.1 may also be indicative of an assumption violation. All tolerance scores in the data exceeded 0.7, and the largest VIF was 2.13, demonstrating that the assumption of no multicollinearity was satisfied.

Prior to examining the relationships between variables via SEM, an exploratory factor analysis (EFA) was employed to determine the factor structure of the data (a grouping of variables based on strong correlations). Generally, an EFA prepares the variables to be used for cleaner a SEM (Costello & Osborne, 2005). The factorability of the items from the BAS-2, SCS, BLPAQ (PPA subscale), BREQ-3 (intrinsic regulation and external regulation subscale), and the WEMWBS were investigated. Before extraction the factors (the process of deciding how many factors to keep for cleaner SEM; Field, 2013), several assumptions needed to be met to assess the suitability of the respondent data for factor analysis; these tests include the Kaiser-Meyer-Olkin (KMO) measure of Sampling Adequacy and Bartlett's test of sphericity. KMO was 0.94, above the commonly recommended value of 0.6 (Allen & Bennett, 2010), and Bartlett's test of sphericity was significant (χ^2 = 14295.01, df = 1378, p < 0.05), which indicated that the data was acceptable for factor extraction. Principal components analysis was used to extract the factors given its role in reducing the number of variables of a dataset, whilst preserving as many factors as possible (Field, 2013). Moreover, factor rotation (via oblique rotation, which can accurately model uncorrelated and correlated factors; Osborne, 2015) was employed to improve the interpretation and discriminate between the factors more clearly (Field, 2013).

After completing the EFA, a confirmatory factor analysis (CFA) was performed to verify the factor structure of the set of observed variables extracted in the EFA. CFA is frequently used as a first step to assess the proposed measurement model in an SEM. Specifically, the objective of the CFA is to examine whether the data fits a proposed measurement model (Figure 1). In CFA, several statistical tests are used to determine how well the model fits to the data. Absolute fit indices establish how well a priori model fits the sample data (McDonald & Ho, 2002), and how valid the model fit is. Common absolute fit indices include the Chi-Squared (χ^2) test, standardised root mean square residual (SRMR), and the root mean square error of approximation (RMSEA).

The χ^2 value is the conventional measure for calculating model fit, and a good model fit would provide a non-significant p-value at 0.05 (Barrett, 2007). However, it is sensitive to sample size, meaning that the χ^2 statistic will almost always reject the model when there are larger sample sizes (> 200; Bentler & Bonett, 1980; Jöreskog & Sörbom, 1993; Jöreskog & Sörbom, 1996, as cited by Awang, 2016). Subsequently, the RMSEA and SRMR are the preferred measures for calculating model fit. Values ≤ 0.10 (RMSEA) and ≤ 0.11 (SRMR) are indicative of acceptable fit (Hu & Bentler, 1999; MacCallum et al., 1996; Themessl-Huber, 2014). Incremental fit indices compare the χ^2 value of a baseline model to that of χ^2 value in its raw form. Within this group are the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI). The CFI analyses the fit of the model by investigating the difference between the hypothesised model and the data (Gatignon, 2010). Values of ≥ 0.90 indicate good fit (Hu & Bentler, 1999), and is rarely influenced by sample size (Fan et al., 1999). Additionally, the Normed Fit Index (NFI) analyses the difference between the χ^2 value of the null model and the χ^2 value of the hypothesised model (Bentler & Bonett, 1980); however, this index is sensitive to small sample size (< 200; Bentler, 1990; Mulaik et al., 1989). This matter was remedied by the Non-Normed Fit Index (NNFI), also known as the Tucker-Lewis

Index (TLI), an index preferring simplistic models. Due to its non-normed nature, values can go beyond 1 (Byrne, 1998). Hu and Bentler (1999) argued that values < 0.90 indicate a need to respecify the model. Though several varying opinions exist, Kline (2005) recommends reporting χ^2, RMSEA, CFI, and SRMR, as these statistical tests accurately reflect good fit of a proposed model.

Path analysis was then facilitated through SEM. Path analysis is a statistical technique that allows researchers to examine patterns of effect within a set of variables (Allen, 2017). Path analysis is one of several types of the general linear model, which explores the impact of several predictor variables on several dependent variables. Furthermore, path analysis is like multiple regression where the effect of several predictors on an outcome variable is evaluated. However, in contrast to multiple regression, two or more outcome variables can be examined simultaneously (Allen, 2017). Finally, the components of the model that proposed mediation effects were then analysed.

3.6. Results

Table 2 presents the descriptive statistics for body appreciation, self-compassion, planned physical activity, exercise motivations (intrinsic regulation and external regulation), and positive well-being.

Table 2.

Descriptive Statistics, and Skewness and Kurtosis Scores for BAS-2, SCS, BLPAQ (PPA Subscale), BREQ-3 (IR Subscale), BREQ-3 (ER Subscale), and WEMWBS (n = 394)

	M	*SD*	Min	Max	Skewness	Kurtosis
BAS-2	3.19	0.89	1.00	5.00	-0.17	-0.43
SCS	2.83	0.65	1.00	4.73	0.20	0.35
BLPAQ (PPA subscale)	3.19	1.05	1.00	5.00	-0.71	-0.35
BREQ-3 (IR subscale)	2.01	1.10	0.00	4.00	-0.19	-0.73
BREQ-3 (ER subscale)	0.83	0.87	0.00	3.50	0.95	0.02
WEMWBS	42.83	10.62	14.00	70.00	-0.16	-0.02

Note: BAS-2 = Body Appreciation Scale-2; SCS = Self-Compassion Scale; BLPAQ = Brunel Lifestyle Physical Activity Questionnaire; PPA = Planned Physical Activity; BREQ-3 = Behavioural Regulation in Exercise Questionnaire-3; IR = Intrinsic Regulation; ER = External Regulation; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale.

On average, participants reported moderate levels of body appreciation, self-compassion, planned physical activity, and intrinsic regulation for motivation, as well as moderate levels of positive well-being. However, participants reported low levels of external regulation for exercise motivation.

3.6.1. Correlations

Bivariate correlations were computed to identify associations between variables before examining the associations further in multivariate analyses (see Table 3). The correlation between self-compassion and body appreciation was positive, significant, and moderate in magnitude. However, self-compassion had a positive and significant but relatively weaker relationship with planned physical activity. Additionally, self-compassion had a stronger relationship (albeit still relatively weak) with intrinsic regulation, but a much stronger correlation with positive well-being. Significant positive associations were found between planned physical activity and body appreciation and between planned physical activity and positive well-being. Additionally, there was a positive, significant, and moderately strong association between body appreciation and positive well-being. Finally, there was a very small and non-significant relationship between external regulation and all other variables.

It is also worth noting that a t-test was conducted to illustrate the mean difference in all variables among men and women (8 participants identified as "other" and were not included in the analysis). Only self-compassion elicited a significant difference among men and women, with men reporting significantly greater self-compassion than women (men: M = 2.95, SD = 0.66; women: M = 2.70, SD = 0.60, $t(384) = 3.85$, $p < 0.001$, d = 0.40).

Table 3.

Bivariate Correlations Between BAS-2, SCS, BLPAQ (PPA Subscale), BREQ-3 (IR Subscale), BREQ-3 (ER Subscale), and WEMWBS Scores (n = 394)

	1	2	3	4	5	6
1. BAS-2	-	0.62**	0.32**	0.41**	0.00	0.64**
2. SCS		-	0.27**	0.32**	0.06	0.64**
3. BLPAQ (PPA subscale)			-	0.57**	0.02	0.34**
4. BREQ-3 (IR subscale)				-	-0.08	0.41**
5. BREQ-3 (ER subscale)					-	0.03
6. WEMWBS						-

Note: $p < 0.01^{**}$. Body Appreciation Scale-2; SCS = Self-Compassion Scale; BLPAQ = Brunel Lifestyle Physical Activity Questionnaire; PPA = Planned Physical Activity; BREQ-3 = Behavioural Regulation in Exercise Questionnaire-3; IR = Intrinsic Regulation; ER = External Regulation; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale.

3.6.2. Exploratory Factor Analysis

The factorability of the items from the BAS-2, SCS, BLPAQ (PPA subscale), BREQ-3 (intrinsic regulation and external regulation subscale), and the WEMWBS were investigated. After extraction, all variables were attributable to a separate factor (i.e., items from the BAS-2 were attributable to the factor, BAS-2; items for the Intrinsic Regulation subscale of the BREQ-3 were attributable to the factor, Intrinsic Regulation, etc.); however, a total of 10 items were eliminated from the SCS (items 7, 9, 10, 14, 17, 18, 20, 23, and 24) and one item from the WEMWBS (item 5) because they did not contribute to the factor structure (the intercorrelations among the variables being tested in the EFA; Watson, 2017), and failed to meet a minimum criterion of having a primary factor loading of 0.4 or above, and no cross-loading of 0.3 or above. The factor structure presented in its entirety in Appendix D for brevity.

3.6.3. Confirmatory Factor Analysis

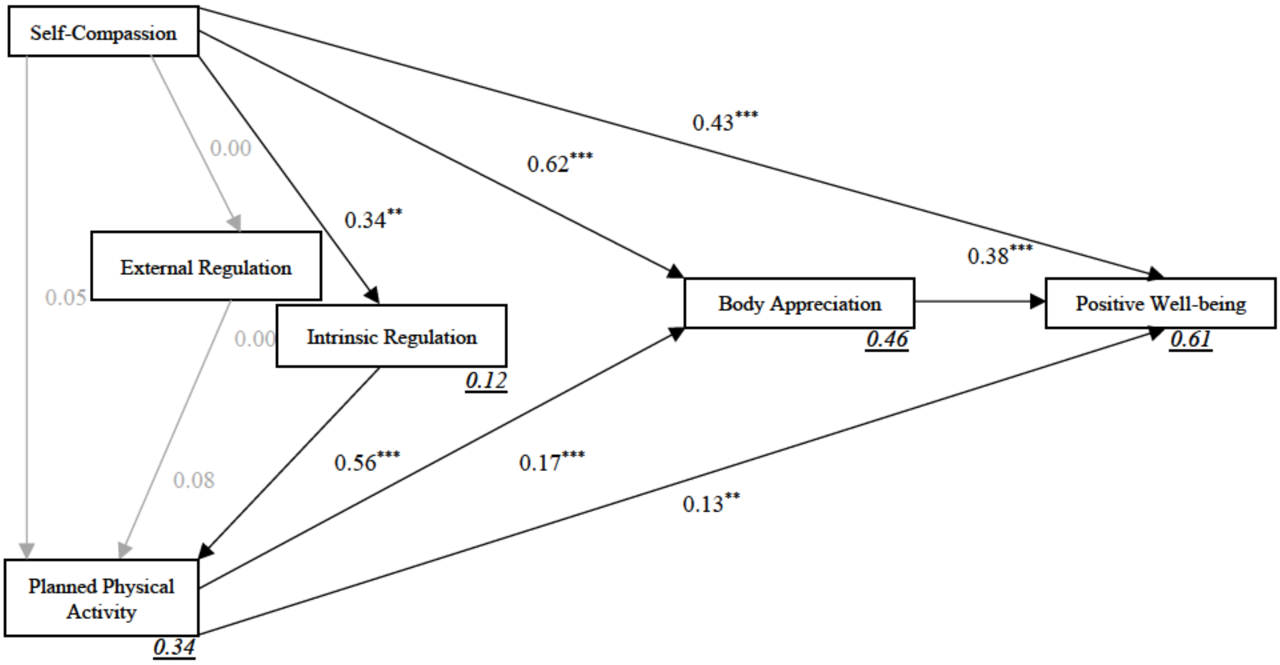
Six CFAs were conducted to confirm the verify the factor structure of a set of observed variables. As established by a CFA, the BAS-2 demonstrated acceptable fit (χ^2 = 101.27, df = 35, p < 0.001, CFI = 0.98, TLI = 0.97, RMSEA = 0.07, SRMR = 0.02). The SCS demonstrated acceptable fit (χ^2 = 210.62, df = 103, p < 0.001, CFI = 0.95, TLI = 0.94, RMSEA = 0.05, SRMR = 0.05). The BLPHQ (PPA subscale) demonstrated acceptable fit (χ^2 = 22.40, df = 7, p < 0.001, CFI = 0.99, TLI = 0.97, RMSEA = 0.08, SRMR = 0.03). Four items (2 and 5, and 1 and 3) on the scale were co-varied to improve the RMSEA. It should be noted that goodness-of-fit can be improved if items are covaried, so long as there is a theoretical justification for doing so. Given these items were extracted onto the same factor (as addressed in the EFA), they are measuring the same construct, and therefore, covarying items is acceptable (Brown, 2006). The BREQ-3 (intrinsic regulation subscale) demonstrated acceptable fit (χ^2 = 3.52, df = 2, p = 0.17, CFI = 1.00, TLI = 0.99, RMSEA = 0.04, SRMR = 0.01). The BREQ-3 (external regulation subscale) demonstrated acceptable fit (χ^2 = 0.08, df = 1, p = 0.77, CFI = 1.00, TLI = 1.02, RMSEA = 0.00, SRMR = 0.00). Two items (18 and 24) on the scale were co-varied to improve the RMSEA. Finally, WEMWBS demonstrated acceptable fit (χ^2 = 231.36, df = 65, p < 0.001, CFI = 0.93, TLI = 0.92, RMSEA = 0.08, SRMR = 0.04). All six constructs illustrated good fit, indicating that they were suitable for testing the proposed model as outlined in Figure 1.

3.6.4. Structural Equation Modelling: Path Analysis

SEM was employed to facilitate the path analysis outlined in the hypotheses. Results for the present analysis are displayed in Figure 2 with standardised regression (β) weights for the model.

3.6.4.1. Model 1 Iteration

Figure 2. Structural equation model: Path analysis (Model 1). Direct pathways hypothesised between self-compassion, planned physical activity, external regulation, intrinsic regulation, body appreciation, and positive well-being tested within Model 1. Standardised (β) regression weights and R^2.



Note: $n = 394$. $^{**}p < 0.01$, $^{***}p < 0.001$; Measured variables are indicated with rectangles; black boldface arrows denote a significant path; grey boldface arrows denote a non-significant path; R-square values are underlined.

Table 4.

Unstandardised (B) and Standardised (β) Regression Weights, and Confidence Intervals for Model 1 (n = 394)

Regression Path	*B*	*β*	95% CI
SC → ER	0.01	0.00	-0.10-0.11
SC → IR	0.41	0.34	0.26-0.59
ER → PPA	0.06	0.08	-0.08-0.20
IR → PPA	0.46	0.56	0.37-0.55
SC → PPA	0.04	0.05	-0.05-0.14
PPA → BA	0.13	0.17	0.06-0.20
SC → BA	0.48	0.62	0.39-0.58
SC → PWB	0.42	0.43	0.30-0.53
PPA → PWB	0.13	0.13	0.05-0.20
BA → PWB	0.47	0.38	0.33-0.61

Note: SC = Self-Compassion; ER = External Regulation; IR = Intrinsic Regulation; PPA = Planned Physical Activity; BA = Body Appreciation; PWB = Positive Well-being.

Model 1 was evaluated to determine how well the data fit the proposed model, through evaluation of incremental fit indices and absolute fit measures in accordance with guidelines outlined by Hu and Bentler (1999), Joreskog and Sorbom (1996), MacCallum et al. (1996), and Shadfar and Malekmohammadi (2013). Examination of the CFI (0.91) and TLI (0.91) suggested that the data did fit the model well, with all recorded indices being on or above the benchmark of 0.90 (Hu & Bentler, 1999; Shadfar & Malekmohammadi, 2013). Moreover, SRMR (0.06) and RMSEA (0.05) further consolidated the strength of the model as values were ≤ 0.11 and 0.10, respectively (Hu & Bentler, 1999; MacCallum et al., 1996;

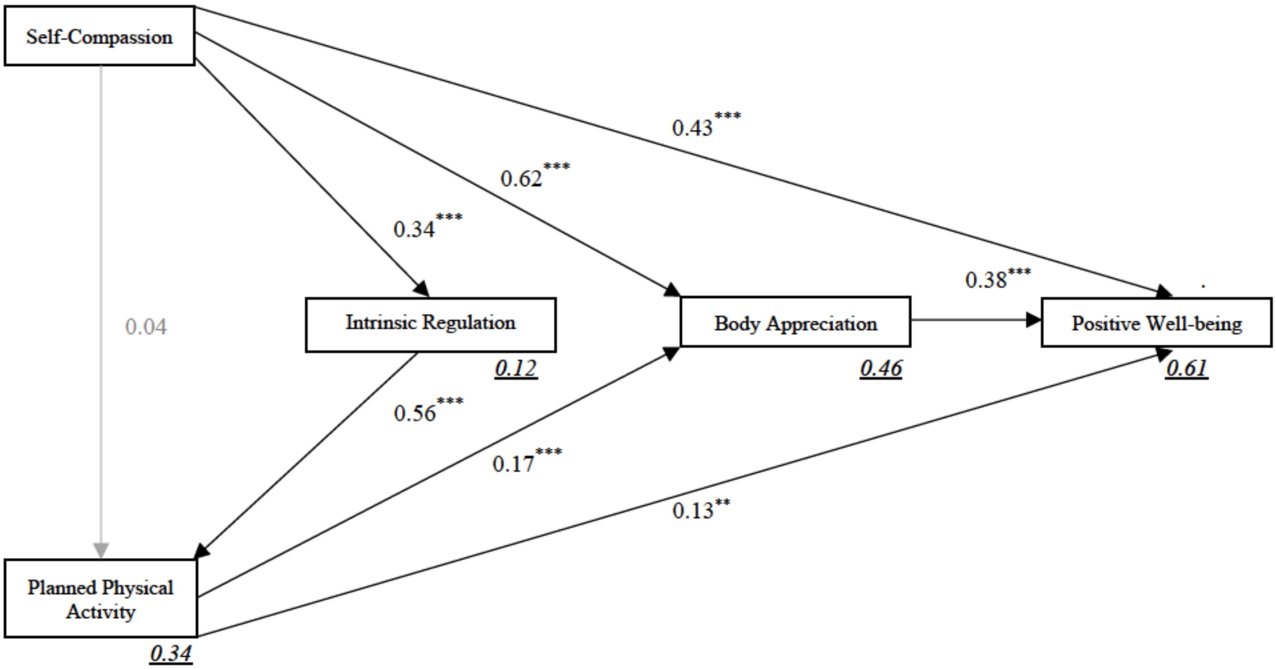
Themessl-Huber, 2014). As seen in Model 1 (Figure 2 and Table 4), the direct effect of self-compassion on positive well-being was significant. Moreover, there was a significant positive relationship between self-compassion and body appreciation. The regression path between self-compassion and planned physical activity was non-significant; however, the regression path between self-compassion and intrinsic regulation was significant. Furthermore, the regression path between self-compassion and external regulation was non-significant.

There was a direct effect of planned physical activity on positive well-being, and a significant relationship between planned physical activity and body appreciation. Additionally, the direct effect of external regulation on planned physical activity was non-significant; however, there was direct effect of intrinsic regulation on planned physical activity. Finally, the direct effect of body appreciation on positive well-being was significant in this model.

3.6.4.2. Model 2 Iteration

Whilst the fit indices for Model 1 suggest that data did fit the model well, the proposed model may be improved upon by removing redundant pathways. A second iteration was generated without the redundant pathways (external regulation) for a more parsimonious model (see Figure 3).

Figure 3. Structural equation model: Path analysis (Model 2). Direct pathways hypothesised between self-compassion, planned physical activity, intrinsic regulation, body appreciation, and positive well-being in adults aged between 18 to 39 tested within Model 2. Standardised (β) regression weights and R^2.



Note: $n = 394$. $^{**}p < 0.01$, $^{***}p < 0.001$; Measured variables are indicated with rectangles; black boldface arrows denote a significant path; grey boldface arrows denote a non-significant path; R-square values are underlined.

Table 5.

Unstandardised (B) Path Coefficient and Product, Standardised (β) Regression Weights, and Confidence Intervals for Indirect Pathways in Model 2 (n = 394)

Indirect Path	*B* Path Coefficient and Product	*β*	95% CI
SC → IR → PPA	(0.54) x (0.51) = 0.28	0.17	0.18-0.37
SC → BA → PWB	(0.84) x (0.69) = 3.95	0.24	2.94-4.96
PPA → BA → PWB	(0.27) x (0.07) = 1.89	0.18	1.27-2.50

Note: SC = Self-Compassion; IR = Intrinsic Regulation; PPA = Planned Physical Activity; BA = Body Appreciation; PWB = Positive Well-being.

Model 2 was evaluated to determine how well the data fit the proposed model through evaluation of incremental fit indices and absolute fit measures. Examination of the CFI (0.91) and TLI (0.91) suggested that the data did fit the model well, with all recorded indices being on or above the benchmark of 0.90. Moreover, SRMR (0.06) and RMSEA (0.05) further consolidated the strength of the model as values were ≤ 0.11 and 0.10, respectively (Hu & Bentler, 1999; MacCallum et al., 1996; Themessl-Huber, 2014).

The direct pathways reported in Table 4 from Model 1 are identical to those in Model 2, and therefore are not shown again – only the indirect effects are reported as illustrated in Table 5. As seen in Model 2 (see Figure 3) the direct effect between self-compassion and positive well-being was significant in this model. Moreover, there was a significant relationship between self-compassion and body appreciation. The regression path between self-compassion and planned physical activity was non-significant, however, the regression path of self-compassion on intrinsic regulation was significant.

There was a direct effect of planned physical activity on positive well-being, and a significant relationship between planned physical activity and body appreciation.

Additionally, there was direct effect of intrinsic regulation on planned physical activity. Finally, the direct effect of body appreciation on positive well-being was significant in this model.

The components of the model that proposed mediation effects were then analysed. Three mediation analyses were conducted to explain the relationships between self-compassion and planned physical activity, and body appreciation and positive well-being. The first mediation analysis investigated the relationship between self-compassion and planned physical activity via intrinsic regulation. The standardised regression coefficient between self-compassion and intrinsic regulation was statistically significant, as was the standardised regression coefficient between intrinsic regulation and planned physical activity. Thus, the indirect effect of self-compassion on planned physical activity via higher levels of intrinsic regulation was statistically significant, as determined by the absence of zero in the 95% confidence intervals.

The second mediation analysis investigated the relationship between self-compassion and positive well-being via body appreciation. The standardised regression coefficient between self-compassion and body appreciation was statistically significant. Likewise, the standardised regression coefficient between body appreciation and positive well-being was also statistically significant. Thus, self-compassion had a significant indirect effect on positive well-being via higher body appreciation.

The third mediation analysis investigated the relationship between planned physical activity and positive well-being via body appreciation. The standardised regression coefficient between planned physical activity and body appreciation was statistically significant. Further, the standardised regression coefficient between body appreciation and positive well-being was statistically significant. Thus, the indirect effect of planned physical activity on positive well-being via greater body appreciation was statistically significant.

3.7. Discussion

This study examined the predictors of body appreciation and positive well-being; namely, self-compassion, planned physical activity, and exercise motivations – particularly intrinsic motivations to exercise (operationalised as intrinsic regulation) – in young adults aged 18-39 years. Based on arguments presented in Chapter 2, it was expected that (a) self-compassion would be positively associated with body appreciation and positive well-being, (b) planned physical activity would be positively associated with body appreciation and positive well-being, and (c) body appreciation would be positively associated with positive well-being.

Mediation pathways were explored to explain the relationships between self-compassion and planned physical activity, and body appreciation and positive well-being. It was expected that (a) intrinsic regulation would mediate the relationship between self-compassion and planned physical activity more strongly than external regulation, (b) body appreciation would mediate the relationship between planned physical activity and positive well-being, and (c) body appreciation would mediate the relationship between self-compassion and positive well-being.

Results indicated that all hypotheses were supported. Firstly, self-compassion was a significant positive predictor of positive well-being. This is consistent with a large body of literature (e.g., Baer et al., 2012; Neff, Kirkpatrick, et al., 2007; Neff, Rude, et al., 2007). Self-compassion was also a significant positive predictor of body appreciation, again consistent with previous studies (e.g., Albertson et al., 2014; Homan & Tylka, 2015; Pisitsungkagarn et al., 2013; Wasylkiw et al., 2012). In short, being able to turn toward and recognise one's challenging feelings and thoughts (such as confusion, anger, sadness, and inadequacy) with a spirit of curiosity and openness is associated with being more appreciative of one's body and a heightened experience of positive psychological well-being.

Secondly, planned physical activity levels significantly predicted positive well-being. This is consistent with findings from several previous cross-sectional studies (e.g., Kavussanu & McAuley, 1995; Kim et al., 2016; Pasco et al., 2011; Rebar et al., 2019; Teychenne et al., 2020) as well as those from a prospective study (e.g., Maher et al., 2015). Higher planned physical activity levels also significantly predicted greater body appreciation, as has been found in other recent studies (e.g., Halliwell et al., 2019; Mahlo & Tiggemann, 2016). Thus, it appears that engaging in more planned physical activity promotes a stronger sense of appreciating one's body as it is, in addition to fostering greater well-being. Additionally, it could also be argued that higher levels of physical activity make one more aware of what one's body can do, which in turn fosters greater body appreciation and greater well-being.

Thirdly, greater body appreciation significantly predicted higher positive well-being. Again, this is consistent with previous research (e.g., Alleva et al., 2016; Dalley & Vidal, 2013; Marta-Simões et al., 2016; Swami et al., 2015; Wasylkiw et al., 2012). All these results regarding direct relationships between variables support the theoretical model presented in Figure 1 (page 54).

Regarding the results of the mediation analyses, the relationship pathways between self-compassion, planned physical activity, and intrinsic regulation are consistent with previous literature in which self-compassion was theorised to promote a physically active lifestyle (Thall, 2014). Higher self-compassion appears to promote more intrinsic reasons for exercising, which in turn encourage more engagement in planned physical activity. Those who are high in self-compassion are well suited to encourage themselves to partake in healthy patterns or intrinsic reasons regarding partaking in planned physical activity. Furthermore, those who are more intrinsically motivated to exercise do so for feelings of enjoyment, executing particular skills, personal accomplishment, and excitement (Deci & Ryan, 2010). Additionally, to different degrees, recreational sport and exercise can be performed for the associated enjoyment or challenge of participating in an activity (Teixeira et al., 2012). People who are kind to themselves are more likely to participate in activities for reasons pertaining to the execution of one's skills, excitement, feelings of enjoyment, and personal accomplishment. It should be noted that the current research showed the positive effects of planned physical activity and self-compassion beyond yoga. This is important as most previous studies examining self-compassion and physical activity tended to be related to mind-and-body exercises, like yoga (Cox & McMahon, 2019; Wong et al., 2021). This study sheds light on self-compassion and its relationship with other forms of physical activity. Participants reported to have undertaken in a combination of individual activities and sporting activities, including running, cycling, golf, swimming weightlifting, tennis, football, soccer, etc. Additionally, it is important to highlight the non-significant role of external regulation on levels of self-compassion and planned physical activity. This is consistent within the context of SDT, where research has shown that external motivations for exercise are negatively related to self-compassion, as this type of extrinsic motivation involves self-worth depending upon an outcome (Magnus et al., 2010; Ryan, 1982).

As previously mentioned, planned physical activity significantly predicted both body appreciation and positive well-being; moreover, further analyses revealed that body appreciation partially mediated the relationship between planned physical activity and positive well-being. This suggests, as expected, that being physically active fosters positive well-being at least partly through enhanced appreciation of one's body in terms of the ability to perform certain bodily movements and execute tasks (e.g., stretching, pivoting, running, etc.; Hausenblas & Fallon, 2006; Soulliard et al., 2019). Being physically active has been shown to endorse feelings of appreciation for one's body through its capabilities in performing tasks related to its physical capacity (Alleva et al., 2015). Partaking in regular planned physical activity has been shown to improve one's well-being, which is explained through a sense of mastery, accomplishment (Ryff, 1989), and appreciation for one's body to perform and execute specific tasks, and the physical capacity that one's body possesses.

Body appreciation also partially mediated the relationship between self-compassion and positive well-being. This finding supports the notion that higher levels of self-compassion promote more positive well-being through the appreciation and acceptance of one's body as it is rather than critiquing or criticising it. Having high levels of self-compassion allows individuals, regardless of their body shape or size, to be secure with their own figure, whilst avoiding self-judgement and criticism through the deactivation of feelings of insecurity and defensiveness. Moreover, rather than punitively judging one's body, which could stem from body-related comparisons, self-compassion conceivably assists with a type of accepting and kind response that promotes body appreciation (Andrew, 2015; Homan & Tylka, 2015). By increasing self-compassion, one can appreciate the body for what it is, rather than engaging in self-judgement and denigration. This in turn fosters greater positive well-being.

Overall, the findings provide empirical support for the theoretical model described and presented in Chapter 2, and this study is the first to test and support all these proposed relationships simultaneously. Based on these findings, physical activity, intrinsic motivations to exercise, and especially self-compassion, all seem to be important factors to consider in explaining levels of body appreciation and well-being. This lends support to the argument about the importance of viewing body image through the positive psychology lens.

There were some limitations to this study. First, the higher-order structure of the SCS comprising six dimensions failed to fit due to cross-loadings with other items as analysed within the EFA. Rather than containing the complete 26 items, the SCS instead consisted of 16 items conceptualised into two general factors – self-compassion and self-coldness. Additionally, one item from the WEMWBS was removed from analysis due to cross-loadings issues. Subsequently, construct and content validity of the SCS and WEMWBS may be compromised given self-compassion and positive well-being was not represented in its entirety. Thus, researchers should interpret with some caution the findings regarding self-compassion and positive well-being and their relationships with planned physical activity, intrinsic motivations to exercise, and body appreciation.

Second, pertaining to planned physical activity, there was no objective measure of physical fitness, including cardiorespiratory endurance, body composition, muscular strength, flexibility, speed, and agility levels. So, it was unknown if the relationship between planned physical activity, body appreciation, and positive well-being was significant because the sample was physically fit. Additionally, this study did not *separately* explore the different types of planned physical activities (e.g., football, swimming, golf, etc.) on body appreciation and positive well-being, as several participants indicated that they were involved in many types of planned physical activities. What's more, if the type of planned physical activities were explored separately (e.g., subjects *exclusively* participating in either football or swimming, etc.), this would have posed an issue to statistical power, as according to Kline (2005), a sample size of $n < 100$ is not sufficient for an SEM analysis. Ultimately, given the complexity of the model (refer to Figure 1; page 54) and potential sample size issues, it would not have been practical to have separately examined the different types of planned physical activities and their relationships with body appreciation and positive well-being.

Last, this study employed a cross-sectional design. Whilst the present study provides strong support for the proposed theoretical model, it does now allow for strong causal inferences. Therefore, the second study of this research program is a cross-lagged longitudinal study designed to enable causal interpretations of some relationships. This was designed to provide further insight into which predictor variables have a direct or indirect effect on the outcome variables and rule out possible bidirectional effects. Moreover, longitudinal analyses help to clarify which factors contribute to an increase or decrease in the outcome variables, and whether these variables change or are stable over time (Tabachnick & Fidell, 2014).

Despite the limitations, to the author's knowledge, this study is the first to demonstrate this pathway of relationships between self-compassion, planned physical activity (inclusive of a range of physical activities), intrinsic motivations to exercise, body appreciation, and positive well-being simultaneously and makes a new contribution by demonstrating the interrelationship between these factors.

Chapter 4: Study 2

4.1. Introduction

As the direct ($\beta = 0.64$) and indirect relationships ($\beta = 0.24$) of self-compassion and body appreciation yielded the strongest effects within the set of other variables, this study was designed to examine the temporal stability of self-compassion and body appreciation. Specifically, this study investigated whether self-compassion or body appreciation is the more stable predictor over a three and six-month period. Cross-sectional associations between self-compassion and body appreciation have been reported previously (Homan & Tylka, 2015; Kelly & Stephen, 2016; Pisitsungkagarn et al., 2013; Schmidt et al., 2019; Wasylkiw et al., 2012), and were also demonstrated in Study 1 of the present research program. However, longitudinal associations between self-compassion and body appreciation have not been adequately explored. It is unclear whether greater self-compassion contributes to higher body appreciation, whether greater body appreciation leads to elevated self-compassion, or whether self-compassion and body appreciation are reciprocally related. Therefore, a longitudinal study design – particularly, through a cross-lagged panel design – was employed to enable causal interpretations of the relationship between self-compassion and body appreciation and help elucidate which variables remain stable or contribute to change in the outcome variables.

Although there is limited research on the longitudinal and reciprocal associations between self-compassion and body appreciation, one prospective analysis looked at the roles of self-compassion, body surveillance, and body appreciation in predicting intrinsic motivation for physical activity within a yoga context (Cox & McMahon, 2019). Latent growth curve analyses revealed that change in self-compassion predicted changes in body surveillance and body appreciation over a 16-week period. Given the adaptive role of self-compassion in predicting increases in body appreciation, the application of some aspects of self-compassion to one's body may be an effective approach to support positive body image either within or outside the context of yoga (Cox & McMahon, 2019). Relatedly, in a randomised controlled trial, a sample of women undertook a three-week self-compassion meditation intervention (Albertson et al., 2014). Those that were assigned to the experimental group experienced significantly greater increases in body appreciation, which were maintained three months later (Albertson et al., 2014).

Taken together, these findings suggest that changes in self-compassion are more likely to influence changes in body appreciation over time than the inverse. Also, from a theoretical standpoint, self-compassion is a construct that broadly applies to all domains of life, whereas body appreciation is specific to the body. Therefore, it could be argued theoretically that higher self-compassion is more likely to promote more appreciation of and kindness towards one's body, than body appreciation is to promote self-compassion across other life domains. However, whether greater body appreciation leads to elevated self-compassion, or whether the association between self-compassion and body appreciation is entirely reciprocal, is unknown. The present study was designed to provide clarity as to which variable – self-compassion or body appreciation – has a greater longitudinal influence over the other. This will confirm the strength and direction of relationships between self-compassion and body appreciation and provide insight into whether one variable is more sensitive to change over time. Refining our understanding of how self-compassion and body appreciation are related over time could have important implications for improving and maintaining a positive body image more broadly.

Based on arguments presented in sections 2.5.3., along with findings from previous investigations on self-compassion and body appreciation over time, it was expected that greater self-compassion would be associated with higher body appreciation over three time-points. However, the possibility that the relationship is inverse, or reciprocal was also be explored.

4.2. Method

At the end of survey in Study 1, participants were invited to provide their Prolific.co email address so that they could be contacted to participate in Study 2, which involved follow-up surveys at three months and six months after the original survey. Two-hundred and forty-two people participated in all three surveys. Demographics of all 242 participants are given in Table 6. There were no appreciable demographic differences between the original sample from Study 1 and the smaller sample in Study 2.

Table 6.

Sociodemographic Characteristics of Participants who Participated in all Three Waves of Data Collection (n = 242)

Note: Mean age: 28.69 (*SD* = 5.73).

Baseline Characteristics	Subsample with complete data at all waves	
	n	%
Gender		
Male	125	51.7%
Female	111	45.9%
Non-binary	6	2.5%
Country of origin		
Australia	23	9.5%
Canada	22	9.1%
Ireland	0	0.0%
New Zealand	3	1.2%
United Kingdom (UK)	71	29.3%
United States of America (USA)	123	50.8%
Ethnicity		
Caucasian	147	60.7%
Asian	34	14.0%
Arabic	1	0.4%
European	17	7.0%
Hispanic or Latino	13	5.4%
African	15	6.2%
Mixed	10	4.1%
Indigenous or Native	2	0.8%
Other	3	1.2%
Region		
Outer suburbs	96	39.7%
Capital city/Inner suburbs	88	36.4%
Rural areas	30	12.4%
Regional centres	28	11.6%
Highest educational level		
Completed secondary school	69	28.5%
Completed tertiary diploma or trade certificate	24	9.9%
Undergraduate university degree	111	45.9%
Postgraduate university degree	25	10.3%
Some secondary school education	12	5.0%
Primary school education	1	0.4%
Employment		
Working full-time	111	45.9%
Working part-time	31	12.8%
Casual worker	8	3.3%
Student	30	12.4%
Household duties	6	2.5%
Receiving a pension	3	1.2%
Unemployed	33	13.6%
Other	20	8.3%
Sexual orientation		
Heterosexual	193	79.8%
Bisexual	28	11.6%
Homosexual	14	5.8%
Other	7	2.9%
BMI (Average)		25.35

4.3. Materials

An online survey was utilised to assess the longitudinal relationship between self-compassion and body appreciation. At both the three-month and six-month time points, participants completed the same questionnaire as they completed for Study 1 (refer to Chapter 3.3 and Appendix A).

4.4. Procedure

The Victoria University Human Ethics Committee (VUHEC) provided approval for the student investigator to collect data (Application ID: HRE19-092; see Appendix B). Data was collected across three waves. Time 1 (T1) commenced on October 9 2019 and concluded on October 12 2019 (see Chapter 3, Study 1). Time 2 (T2) commenced on January 17 2020 and concluded on January 31 2020. Finally, Time 3 (T3) commenced on April 19 2020 and concluded on May 3 2020. Participants at T1 were asked to include their unique and anonymous Prolific.co email address, so that they could be contacted again for the two forthcoming waves of the study. Participants who provided their email addressed received an email invitation to participate directly from Prolific.co when Study 2 was launched. This email contained a direct link to the online survey itself, hosted by Qualtrics. Participants were given a two-week period to complete the survey. Those who did not complete the survey in the allocated period, were omitted from the study and were not contacted to participate in the final wave of the study (T3). Participants who did participate in the final two waves were required to indicate by checking a box at the bottom of the first page of the survey that they read and understood all the information provided about the nature and potential risks of the study, and that they consented to participate. Participants were also informed that completing the survey was voluntary and that all responses were anonymous. In the event participants experienced any discomfort or distress from participating in the survey, they were encouraged to contact free, confidential, and anonymous telephone counselling services (e.g., Lifeline, National Suicide Prevention Lifeline, etc.). All services were provided in the information statement (see Appendix C). The average completion time was 18 minutes and participants were compensated (£1.66 GBP; $3.00 AUD) for their completing the survey.

4.5. Analysis

Of the 394 participants who completed T1, 304 (77%) participants completed T2, and of these, 242 (61%) participants completed T3. According to Kline's (2005) $n \geq 100$ guideline, the sample size for the present study was sufficient for SEM analysis. Data were collated and analysed using IBM SPSS Statistics 25 and 26 for descriptive statistics and correlation analysis, and RStudio version 1.3.959 for longitudinal measurement invariance (LMI) and Cross-Lagged Panel Modelling (CLPM) using the Lavaan and semTools package. CLPM was used to estimate the longitudinal relationships between self-compassion and body appreciation across the three study waves.

Before conducting the data analysis, all variables were screened for missing data and deviations from accepted statistical standards. There were no missing data present in the sample, with 242 participants respondents who submitted the survey completing all items. The data were also screened for univariate outliers via standardised scores, with a cut-off of ± 3.29 indicating the presence of an outlier (Field, 2013). No participants exceeded this cut-off. According to Kline (2005) $n \geq 100$ guideline, sample size for the present study was sufficient for SEM analysis. Multivariate outliers were examined utilising Mahalanobis distance and Cook's distance statistics. Examination of the Mahalanobis distance revealed no scores that exceeded the critical χ^2 cut-off of 22.46 for six predictors ($\alpha = 0.01$; Mahalanobis distance = 21.34). Further, an examination of the Cook's distance statistics (Cook's D = 0.28), revealed that no scores were close to exceeding the cut-off score of 1. Therefore, multivariate outliers were not considered likely to influence the parameter estimates of the regression models (Tabachnick & Fidell, 2014). Examinations of the skewness and kurtosis across the variables were used to evaluate the assumption of univariate normality. The distributions of all variables yielded skewness statistics of less than absolute 3 (skewness = -0.33), and kurtosis statistics of less than absolute 8 (kurtosis = -0.50; Field, 2013; Kline, 2005). Therefore, the assumption of univariate normality was met for this study. Multicollinearity was assessed using the variance inflation factor (VIF) and tolerance statistics. All tolerance scores in the data did not fall under 0.1, and the largest VIF was 5.73, demonstrating that the assumption of no multicollinearity was satisfied. Another important assumption was made when fitting a CLPM: stationarity (Kenny, 1979). Stationarity means that the relations of the variables are invariant (via longitudinal measurement invariance [LMI]) over time.

LMI establishes if the same fundamental construct is being measured across different time-points (pre-test, post-test, and follow-up) or different groups (child and adult participants, or men and women; Bialosiewicz et al., 2013). In short, LMI is concerned about the comparability of measured attributes across different subgroups (Davidov et al., 2014; Wang et al., 2018). LMI is important to psychological research as it compares group means (Putnick & Bornstein, 2016) and is examined using Multigroup Confirmatory Factor Analysis (MCFA), which tests the change in the goodness-of-fit index (GFI) when cross-time (e.g., three time-points) constraints are executed on a measurement model (Cheung & Rensvold, 2002). The MCFA procedure seeks to establish invariance of the items of a psychometric test across different time-points. The most assessed aspects of LMI include configural, metric, and scalar invariance (Miller & Sheu, 2008), which are presented hierarchically, building on one another (Zhou et al., 2019). Configural invariance is tested by comparing the number of factors and establishing that the factor loading patterns between latent variables among groups are equal. For instance, the BAS-2 demonstrates a unidimensional construct of body appreciation; hence, configural invariance would support a one-factor structure across time (Stavropoulos et al., 2018). Subsequently, metric invariance is tested by constraining the factor loadings (factors of the latent constructs) to be equal among time-points. Support for metric invariance is demonstrated by equality across groups regarding the strength of relationships between the items and their respective latent construct (Stavropoulos et al., 2018). Scalar invariance builds upon metric invariance by constraining the item intercepts to be equal among time-points (Putnick & Bornstein, 2016; Stavropoulos et al., 2018; Zhou et al., 2019). Configural, metric, and scalar invariance (as discussed in section 3.6.4.) should be tested during LMI to validate that the factor structure and loadings are sufficiently equivalent across all time-points, otherwise the composite variables (body appreciation and self-compassion) will not useful given they are not actually measuring the same underlying latent construct across time. Whilst there are several fit indices (as discussed in section 3.6.4.), the CFI and RMSEA are the best indices to test invariance as they are the most regularly reported indices due to their adequate statistical properties (Counsell et al., 2020; Jackson et al., 2009). For testing invariance, a change of ≥ 0.01 in CFI, complemented by a change of ≥ 0.015 in RMSEA would indicate non-invariance (Chen, 2007).

CLPM was then used to estimate the longitudinal relationship between self-compassion and body appreciation over three time-points (baseline, three-month follow up, and six-month follow-up). The CPLM simultaneously examined cross-sectional, autoregressive, and cross-lagged associations between SCS and BAS-2 scores across three waves of assessment. Autoregressive associations tested the stability of self-compassion and body appreciation over repeated assessments. Cross-lagged associations estimated the relationship between (a) self-compassion at each assessment point and body appreciation at the following point; and (b) the relationship between body appreciation at each assessment point and self-compassion at the following point (Deschênes et al., 2016).

4.6. Results

Table 7 presents the descriptive statistics for BAS-2 and SCS scores over three time-points.

Table 7.

Descriptive Statistics for BAS-2 and SCS Scores Across Three Time-Points (n = 242)

Variable	T1					T2					T3				
	M	*SD*	Min	Max	*α*	*M*	*SD*	Min	Max	*α*	*M*	*SD*	Min	Max	*α*
BAS-2	3.19	0.89	1.00	5.00	0.95	3.15	0.92	1.00	5.00	0.95	3.14	0.93	1.00	5.00	0.96
SCS	2.83	0.65	1.00	4.73	0.92	2.85	0.69	1.00	4.92	0.94	2.88	0.71	1.00	4.77	0.94

Note: BAS-2 = Body Appreciation Scale-2, SCS = Self-Compassion Scale, *α* = Cronbach's alpha.

Overall, participants reported moderate BAS-2 and SCS scores across three time-points. Additionally, the mean for BAS-2 scores became negligibly lower across time-points, and there was a negligible increase in SCS scores from baseline through to the six-month follow-up.

4.6.1. Correlations

Bivariate correlations were computed to find preliminary evidence of associations between variables before examining the associations further in multivariate analyses. Table 8 presents the correlations between the BAS-2 and SCS scores across three time-points.

Table 8.

Bivariate Correlations between BAS-2 and SCS Scores Across Three Time-Points (n = 242)

	1	2	3	4	5	6
1. BAS-2 T1	-	0.83^{**}	0.83^{**}	0.62^{**}	0.56^{**}	0.67^{**}
2. BAS-2 T2		-	0.88^{**}	0.61^{**}	0.65^{**}	0.67^{**}
3. BAS-2 T3			-	0.63^{**}	0.67^{**}	0.72^{**}
4. SCS T1				-	0.82^{**}	0.81^{**}
5. SCS T2					-	0.88^{**}
6. SCS T3						-

Note: $^{**}p < 0.01$. BAS-2 = Body Appreciation Scale-2; SCS = Self-Compassion Scale.

The positive correlation between BAS-2 scores at T1 through to T3 was large and significant. Similarly, the positive correlation between SCS scores at T1 through to T3 was strong and significant. BAS-2 scores showed a moderate and significant positive correlation with SCS scores at all three time-points, however, the incremental increases in the correlation coefficient were quite small.

It is also worth noting that a t-test was conducted to illustrate the mean difference in all variables among men and women at T1, T2, and T3 (6 participants identified as “other” and were not included in the analysis). As identified on page 69, self-compassion (at T1) elicited a significant difference among men and women, with men reporting significantly greater self-compassion than women (men: M = 2.95, SD = 0.66; women: M = 2.70, SD = 0.60, $t(384) = 3.85$, $p < 0.001$, $d = 0.40$). Self-compassion at T2 also elicited a significant difference among men and women, with men reporting significantly greater self-compassion than women (men: M = 2.96, SD = 0.72; women: M = 2.73, SD = 0.63, $t(296) = 2.88$, p =

0.004, $d = 0.33$). There were no significant differences among gender pertaining to body appreciation at all time points, and self-compassion at T3.

4.6.2. Confirmatory Factor Analysis Outcomes

A CFA was performed to verify the factor structure of the set of the observed variables (body appreciation and self-compassion) among each three time-points. As established by a CFA, the BAS-2 at T1 demonstrated acceptable fit ($\chi^2 = 101.27$, $df = 35$, $p < 0.001$, CFI = 0.98, TLI = 0.97, RMSEA = 0.07, SRMR = 0.02). The BAS-2 at T2 also demonstrated acceptable fit ($\chi^2 = 109.40$, $df = 35$, $p < 0.001$, CFI = 0.96, TLI = 0.95, RMSEA = 0.08, SRMR = 0.03). Finally, the BAS-2 at T3 demonstrated acceptable fit ($\chi^2 = 67.73$, $df = 35$, $p < 0.001$, CFI = 0.98, TLI = 0.98, RMSEA = 0.06, SRMR = 0.02).

Then, a CFA on the SCS was employed at T1. To achieve acceptable fit, several covariances were unconstrained pertaining to self-kindness, mindfulness, and common humanity (self-compassion) subscales. Additionally, items from self-judgment, isolation, and over-identification (self-coldness) subscales were also covaried (Brown, 2006). See Appendix E for full syntax and output.

The SCS at T1 demonstrated acceptable fit ($\chi^2 = 473.06$, $df = 243$, $p < 0.001$, CFI = 0.94, TLI = 0.92, RMSEA = 0.05, SRMR = 0.08). At T2, there were further co-variances among items required to achieve acceptable fit. See Appendix F for full syntax and output. The SCS at T2 demonstrated acceptable fit ($\chi^2 = 458.88$, $df = 241$, $p < 0.001$, CFI = 0.94, TLI = 0.92, RMSEA = 0.05, SRMR = 0.08). At T3, there were further co-variances among items to achieve acceptable fit. See Appendix G for full syntax and output. The SCS at T3 demonstrated acceptable fit ($\chi^2 = 328.41$, $df = 220$, $p < 0.001$, CFI = 0.96, TLI = 0.94, RMSEA = 0.04, SRMR = 0.08).

4.6.3. Longitudinal Measurement Invariance

Following the CFA test of model fit we tested for LMI. An LMI test was performed to examine the measurement and scaling properties of both the BAS-2 and SCS over three time-points, so that it could be meaningfully examined for the CLPM.

4.6.3.1. Longitudinal Invariance Measurement Outcomes for BAS-2

Configural invariance was firstly computed to examine if the BAS-2 remained invariant across three time-points. The resulting scale had an acceptable fit (χ^2 = 553.42, *df* = 372, $p < 0.001$, CFI = 0.97, TLI = 0.97 RMSEA = 0.06). Metric invariance was then calculated. The resulting scale had an acceptable fit (χ^2 = 576.38, *df* = 390, $p < 0.001$, CFI = 0.97, TLI = 0.97, RMSEA = 0.04). Finally, scalar invariance was computed. The resulting scale had an acceptable fit (χ^2 = 596.67, *df* = 410, $p < 0.001$, CFI = 0.97, TLI = 0.97, RMSEA = 0.04). As there was no change beyond ≥ 0.01 in CFI and ≥ 0.015 in RMSEA, this indicated that there was invariance among time-points, and the assumption of stationarity was met. Overall, these tests outline that the constructs do not have different meaning or structure on different measurement occasions in the same sample, and so the constructs can be meaningfully tested or construed across time via CLPM (see Table 9).

Table 9.

Test of Invariance: BAS-2 Score Across Three Time-Points (n = 242)

	χ^2	*df*	*p*	CFI	ΔCFI	TLI	RMSEA	Δ RMSEA
Configural: loadings + intercepts free	553.42	372	< 0.001	0.97		0.97	0.05	
Metric: loadings fixed + intercepts free	576.38	390	< 0.001	0.97	0.001	0.97	0.04	0.001
Scalar: loadings + intercept fixed	596.67	410	< 0.001	0.97	0.000	0.97	0.04	0.001

Note: BAS-2 = Body Appreciation Scale-2. Δ = Change.

4.6.3.2. Longitudinal Invariance Measurement Outcomes for SCS

Configural invariance was firstly computed to examine if the SCS remained invariant across three time-points. There were several co-variances among subscales an in attempt to achieve configural invariance. See Appendix H for full syntax and output. The resulting scale had an indifferent fit where CFI did not achieve the benchmark of ≥ 0.90, however, RMSEA was below the recommended cut-off of 0.10 (χ^2 = 4357.30, *df* = 2636, *p* < 0.001, CFI = 0.85, TLI = 0.83, RMSEA = 0.05). Metric invariance was then calculated. There were several co-variances among subscales an in attempt to achieve metric invariance. See Appendix I for full syntax and output. The resulting scale had an indifferent fit where CFI did not achieve the benchmark of 0.90, however, RMSEA was below the recommended cut-off of 0.10. (χ^2 = 4427.36, *df* = 2636, *p* < 0.001, CFI = 0.85, TLI = 0.83, RMSEA = 0.05). Furthermore, as there was no change beyond ≥ 0.01 in CFI and ≥ 0.015 in RMSEA, this indicated that there was invariance among time-points. Finally, scalar invariance was computed. There were several co-variances among subscales an in attempt to achieve scalar invariance. See Appendix J for full syntax and output. The resulting scale had an indifferent fit where CFI did not achieve the benchmark of 0.90, however, RMSEA was below the recommended cut-off of 0.10. (χ^2 = 4490.38, df = 2738, p < 0.001, CFI = 0.85, TLI = 0.84, RMSEA = 0.05). Moreover, as there was no change beyond ≥ 0.01 in CFI and ≥ 0.015 in RMSEA, this indicated that there was invariance among time-points, and the assumption of stationarity was met. Overall, these tests outline that the constructs do not have different meaning or structure on different measurement occasions in the same group, and so the construct can be meaningfully tested or construed across time via CLPM (see Table 10).

Table 10.

Test of Invariance: SCS Score Across Three Time-Points (n = 242)

	χ^2	df	p	CFI	ΔCFI	TLI	RMSEA	Δ RMSEA
Configural: loadings + intercepts free	4357.30	2636	< 0.001	0.85		0.83	0.05	
Metric: loadings fixed + intercepts free	4427.06	2686	< 0.001	0.85	0.002	0.83	0.05	0.000
Scalar: loadings + intercept fixed	4490.39	2738	< 0.001	0.85	0.001	0.84	0.05	0.001

Note: SCS = Self-Compassion Scale. Δ = Change.

4.6.4. Improving Fit: Confirmatory Factor Analysis and Longitudinal Measurement Invariance with the 16-Item SCS

As shown in the LMI testing, the SCS remained invariant across time-points, however, the overall goodness-of-fit indices for the 26-item SCS presented a model that poorly represented the relationships that were observed in the sample matrix. To improve the goodness-of-fit, it is encouraged to covary items; however, it is also argued that improving the goodness-of-fit can be achieved by removing certain items within the scale (Brown, 2006). In Study 1, an EFA was employed to determine the factor structure of the model (see Figure 1). Ten items were eliminated from the SCS because they did not contribute to the factor structure and failed to meet a minimum criterion for inclusion in a factor (e.g., having a primary factor loading of 0.4 or above, and no cross-loading of 0.3 or above; see Appendix D). Given that 10 items were removed from the previous model, a CFA, longitudinal invariance test, and CLPM were conducted with the 16 remaining items of the SCS. The goodness-of-fit and longitudinal associations between self-compassion (represented by both the 26 and 16-item versions of the SCS) and body appreciation were investigated and compared.

As established by a CFA, the 16-item SCS at T1 demonstrated acceptable fit (χ^2 = 210.62, *df* = 103, *p* < 0.001, CFI = 0.95, TLI = 0.94, RMSEA = 0.05, SRMR = 0.05). The 16-item SCS at T2 also demonstrated acceptable fit (χ^2 = 180.69, *df* = 103, *p* < 0.001, CFI = 0.96, TLI = 0.95, RMSEA = 0.05, SRMR = 0.05). Finally, the 16-item SCS at T3 demonstrated acceptable fit (χ^2 = 144.67, *df* = 103, *p* < 0.001, CFI = 0.97, TLI = 0.97, RMSEA = 0.04, SRMR = 0.04).

Following the CFA test of model fit, configural invariance was firstly computed to examine if the 16-item SCS remained invariant across three time-points. Firstly, configural invariance was computed. There were several co-variances among subscales to achieve configural invariance. See Appendix K for full syntax and output. The resulting scale had an acceptable fit (χ^2 = 1574.32, *df* = 97, *p* < 0.001, CFI = 0.90, TLI = 0.89, RMSEA = 0.05). Metric invariance was then calculated. There were several co-variances among subscales an in attempt to achieve metric invariance. See Appendix L for full syntax and output. The resulting scale had an acceptable fit (χ^2 = 1622.90, *df* = 1004, *p* < 0.001, CFI = 0.90, TLI = 0.89, RMSEA = 0.05). Finally, scalar invariance was computed. There were several covariances among subscales an in attempt to achieve scalar invariance. See Appendix M for full syntax and output. The resulting scale had an acceptable fit (χ^2 = 1664.67, *df* = 1036, $p <$ 0.001, CFI = 0.90, TLI = 0.89, RMSEA = 0.05). As there was no change beyond ≥ 0.01 in CFI and ≥ 0.015 in RMSEA, this indicated that there was invariance among time-points, and the assumption of stationarity was met. Overall, these tests outline that the constructs do not have different meaning or structure on different measurement occasions in the same group, and so the construct can be meaningfully tested or construed across time via CLPM (see Table 11).

Table 11.

Test of Invariance: 16-Item SCS Score Across Three Time-Points (n = 242)

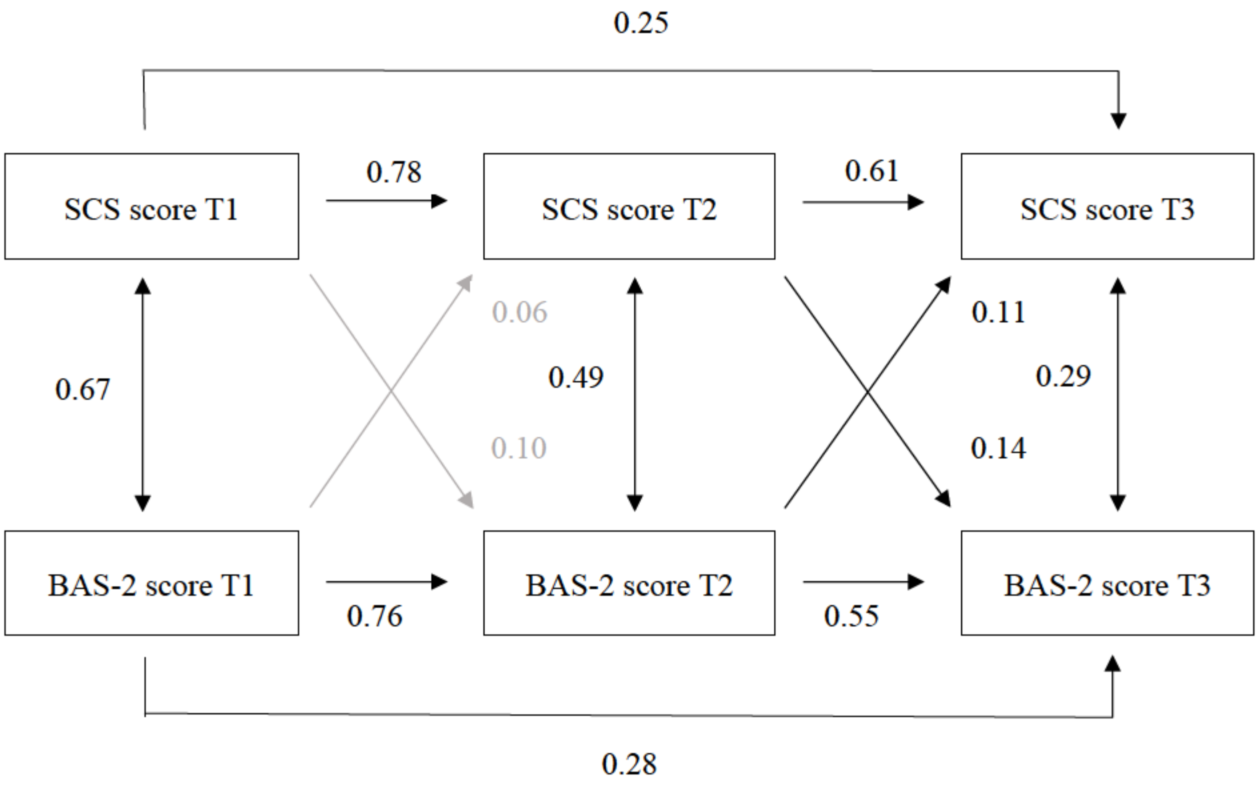
	χ^2	*df*	*p*	CFI	ΔCFI	TLI	RMSEA	Δ RMSEA
Configural: loadings + intercepts free	1574.32	974	< 0.001	0.90		0.89	0.05	
Metric: loadings fixed + intercepts free	1622.90	1004	< 0.001	0.90	0.003	0.89	0.05	0.000
Scalar: loadings + intercept fixed	1664.67	1036	< 0.001	0.90	0.000	0.89	0.05	0.000

Note: SCS = Self-Compassion Scale. Δ = Change.

4.6.5. Cross-Lagged Panel Modelling Using Structural Equation Modelling with the 26-Item SCS

Figure 4 and Table 12 summarise the longitudinal relationships between self-compassion (SCS-26) and body appreciation. Cross-lagged path coefficients demonstrated most pathways were statistically significant; however, the relationship between self-compassion at T1 and body appreciation at T2 and the relationship between body appreciation at T1 and self-compassion at T2 were not significant. From T2 to T3, greater self-compassion was associated with subsequent higher body appreciation and, likewise, higher body appreciation was associated with subsequent greater self-compassion. Associations between SCS-26 and BAS-2 from T1 to T2 ($\beta = 0.10$, $p = 0.053$), and T2 to T3 ($\beta = 0.14$, $p < 0.001$) tended to be slightly stronger than associations between BAS-2 and SCS-26 from T1 to T2 ($\beta = 0.06$, $p = 0.206$), and T2 to T3 ($\beta = 0.11$, $p = 0.020$) (see Figure 4 and Table 12).

Figure 4. Three time-point CLPM examining BAS-2 and the 26-item SCS scores.



Note: n = 242. T1 = Time 1; T2 = Time 2; T3 = Time 3; BAS-2 = Body Appreciation Scale-2; SCS = Self-Compassion Scale. Values reflect standardised path coefficients. Positive path coefficients reflect associations between greater self-compassion and greater body appreciation. All paths are statistically significant except for those that are coloured grey.

Table 12.

Path Coefficients Between BAS-2 and the 26-item SCS Scores Across Three Time-Points (n = 242)

Outcome	Predictors	R^2	B	β	95% CI
SCS score T2		0.67			
	BAS-2 score T1		0.04	0.06	-0.02-0.11
	SCS score T1		0.78	0.78	0.70-0.87
SCS score T3		0.81			
	BAS-2 score T2		0.08	0.11	0.02-0.15
	SCS score T2		0.62	0.61	0.50-0.75
	SCS score T1		0.25	0.25	0.14-0.36
BAS-2 score T2		0.69			
	BAS-2 score T1		0.77	0.76	0.64-.090
	SCS score T1		0.14	0.10	-0.00-0.27
BAS-2 score T3		0.82			
	BAS-2 score T2		0.56	0.55	0.45-.068
	SCS score T2		0.18	0.14	0.09-.028
	BAS-2 score T1		0.29	0.28	0.19-0.40

Note: T1 = Time 1; T2 = Time 2; T3 = Time 3; BAS-2 = Body Appreciation Scale-2; SCS = Self-Compassion Scale.

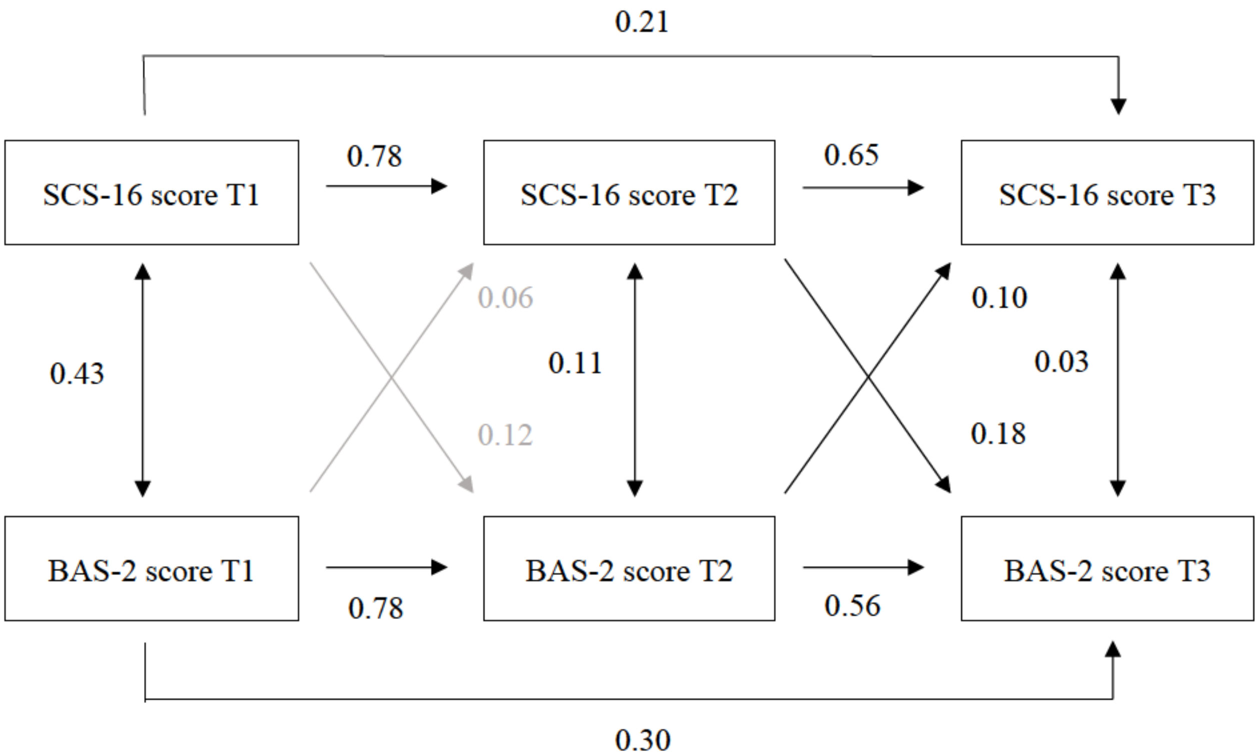
4.6.6. Fit Indices

Examination of the CFI (1.00) and TLI (0.96) suggested that the data fit the model well, with all recorded indices being on or above the benchmark of 0.90 (Hu & Bentler, 1999; Shadfar & Malekmohammadi, 2013). Moreover, examination of the SRMR (0.01) further suggested a good fit for the model, with scores < 0.11 being indicative of good model fit (Hu & Bentler, 1999; Themessl-Huber, 2014). Additionally, the RMSEA (0.10) fell on the suggested cut-off of 0.10 (MacCallum et al., 1996). However, as shown in the LMI testing, the SCS remained invariant across time-points. The overall goodness-of-fit indices for the 26-item SCS presented a model that poorly represents the relationships that were observed in the sample matrix. Given the goodness-of-fit of a hypothesised model can be improved by removing certain items (Brown, 2006), 10 items were removed from the SCS as they failed to meet a minimum criterion of having a primary factor loading of 0.4 or above, and no cross-loading of 0.3 or above (see Appendix D). Consequently, the CLPM was re-analysed with the SCS consisting of 16 items to examine whether this model had an appreciable difference in fit to the 26-item SCS.

4.6.7. Structural Equation Modelling: CLPM with the 16-item SCS

Figure 5 and Table 13 summarises the longitudinal relationship between the self-compassion (SCS-16) and body appreciation. Cross-lagged path coefficients demonstrated that greater self-compassion was associated with subsequent greater body appreciation, and that greater body appreciation was associated with greater subsequent self-compassion. Most paths were statistically significant; however, the relationship between self-compassion at T1 and body appreciation at T2 and the relationship between body appreciation at T1 and self-compassion at T2 were not significant. Associations between SCS-16 and BAS-2 from T1 to T2 ($\beta = 0.12$, $p = 0.106$), and T2 to T3 ($\beta = 0.18$, $p < 0.001$) tended to be stronger than associations between BAS-2 and SCS-16 from T1 to T2 ($\beta = 0.06$, $p = 0.144$), and T2 to T3 ($\beta = 0.10$, $p < 0.001$) (see Figure 5 and Table 13).

Figure 5. Three time-point CLPM examining BAS-2 and the 16-item SCS scores.



Note: n = 242. T1 = Time 1; T2 = Time 2; T3 = Time 3; BAS-2 = Body Appreciation Scale-2; SCS = Self-Compassion Scale. Values reflect standardised path coefficients. Positive path coefficients reflect associations between greater self-compassion and greater body appreciation. All paths are statistically significant except for those that are coloured grey.

Table 13.

Path Coefficients Between BAS-2 and the 16-Item SCS Scores Across Three Time-Points (n = 242)

Outcome	Predictors	R^2	B	β	95% CI
SCS-16 score T2		0.65			
	BAS-2 score T1		0.06	0.06	-0.02-0.14
	SCS-16 score T1		0.75	0.77	0.66-0.84
SCS-16 score T3		0.80			
	BAS-2 score T2		0.10	0.10	0.04-0.17
	SCS-16 score T2		0.65	0.65	0.53-0.77
	SCS-16 score T1		0.21	0.21	0.10-0.31
BAS-2 score T2		0.69			
	BAS-2 score T1		0.78	0.78	0.64-0.92
	SCS-16 score T1		0.12	0.12	-0.03-0.26
BAS-2 score T3		0.82			
	BAS-2 score T2		0.60	0.60	0.44-0.68
	SCS-16 score T2		0.18	0.18	0.09-0.27
	BAS-2 score T1		0.30	0.30	0.19-0.40

Note: T1 = Time 1; T2 = Time 2; T3 = Time 3; BAS-2 = Body Appreciation Scale-2; SCS = Self-Compassion Scale.

4.6.8. Fit Indices

Examination of the CFI (1.00) and TLI (0.96) suggested that the data fit the model well, with all recorded indices being on or above the benchmark of 0.90 (Hu & Bentler, 1999; Shadfar & Malekmohammadi, 2013). Moreover, examination of the SRMR (0.01) further suggested a good fit for the model. Additionally, the RMSEA (0.10) fell on the suggested cut-off of 0.10 (MacCallum et al., 1996). Overall, LMI testing of the 26-item SCS presented a model that poorly represented the relationships that were observed in the sample matrix. However, the fit indices as identified above illustrate that there was not an appreciable difference between the two models (SCS-26 and SCS-16) as identified via CLPM. Overall, self-compassion and body appreciation remained invariant over the three time-points (supporting the assumption of stationarity), and self-compassion (irrespective of whether tested by SCS-26 and SCS-16) body appreciation showed partial support for a reciprocal model. However, the effects over time were slightly stronger for self-compassion predicting body appreciation.

4.7. Discussion

The present study investigated whether self-compassion or body appreciation is a more stable predictor than the other, and whether one variable was more sensitive to change over a three and six-month period via CLPM. It was expected that greater self-compassion would be predictive of higher body appreciation over three time-points, but the possibility of the inverse of this as well as reciprocal relationships was also explored.

The CLPM examining self-compassion and body appreciation showed partial support for a reciprocal model, though the effects over time were slightly stronger for self-compassion (measured by either the 26-SCS or 16-SCS) predicting body appreciation. This is to say that there was some evidence of a bidirectional influence between self-compassion and body appreciation where, over time, greater self-compassion was associated with higher body appreciation, and higher body appreciation was associated with greater self-compassion. However, these reciprocal effects were not entirely consistent. There was no significant cross-lagged effect between self-compassion at T1 and body appreciation at T2, and likewise, no significant cross-lagged effect between body appreciation at T1 and self-compassion at T2.

Whilst there was no significant cross-lagged effect between self-compassion and body appreciation from T1 to T2, several possible mechanisms may explain why greater self-compassion at T2 was associated with higher body appreciation at T3. Self-kindness specifically promotes understanding and care, which is directed inward (Neff, 2003a). It is likely that this played a role in the way participants perceived and felt about their bodies.

Furthermore, those who directed kindness inward could have developed a greater appreciation of their bodies over time, as self-kindness allows one to remain positive about their body. In short, an existing higher level of self-compassion may serve as a precursor for incremental improvements in body appreciation over time.

Additionally, the common humanity component of self-compassion specifically could be argued to foster two facets of body appreciation: (a) the capacity to safeguard body image by rejecting unrealistic representations of idealised body shapes, and (b) promoting body acceptance. Common humanity also supports the promotion of body appreciation. Perhaps shared experiences on social network forums (e.g., “body positive” Facebook groups) contribute to the enhancement of interconnectedness with others by collectively rejecting impractical exemplifications of unrealistic body standards. This in turn, may have generated a positive attitude and appreciation toward one’s body that entails respect and gratitude (Albertson et al., 2014; Avalos et al., 2005).

The mindfulness element of self-compassion could have also contributed to the participants’ elevation in body appreciation levels through awareness. Mindfulness could have prompted the participants to savour the here and now and to stop conforming to societal pressures, and to tune into themselves instead. Moreover, mindfulness could have encouraged the participants to observe their bodies, thoughts, and feelings without judgment. Like common humanity, through mindfulness participants could have been aware of and reject salient messages and images of the idealised body, potentially helping participants to become appreciative of their bodies. Results from the present study has shown that greater body appreciation could be a natural consequence or by-product of broader self-compassion, where people with greater self-compassion are kind toward themselves, are involved in common humanity, and are mindfully aware of their experiences and more appreciative of their bodies (Albertson et al., 2014; Avalos et al., 2005).

Given the CLPM showed that there was a bidirectional relationship between body appreciation (T2) and self-compassion (T3), one explanation could be that participants decided to adopt greater body appreciation, which in turn may have engendered greater overall self-compassion. This may involve participants realising that it may be more important to appreciate what the body offers rather than what it looks like; for instance, feeling more grateful for and appreciative of their body's functionality and body's ability to execute tasks. It may be this realisation, or epiphany even, which then could allow participants to extend that degree of appreciation and self-kindness across other domains and other areas of life. Additionally, greater body appreciation may foster greater overall self-compassion, which then feeds back into a high level of body appreciation.

This study is not without limitations. First, there were relatively small cross-lagged effects across the three time points. Therefore, caution should be taken when interpreting the direction and strength of the relationship between self-compassion and body appreciation. Second, the association between self-compassion and body appreciation was only measured over a six-month period. To the author's knowledge, the present study is the first to demonstrate a reciprocal, cross-lagged relationship between self-compassion and body appreciation; however, future research should aim for a longer-term multi-wave study that can follow a developmental sequence of events to further consolidate the nature of causality between self-compassion and body appreciation. Additional time-points are central to learning specific time patterns of clinical impairments that could be missed otherwise in short-term multi-wave studies.

Last, whilst this study provided partial support of the stability over time among self-compassion and body appreciation levels, the present study did not establish cause and effect between the two variables. Therefore, the third and final study of this research program is an experimental study designed to establish cause and effect; specifically, to explore whether improving self-compassion via meditation training would enhance body appreciation. Additionally, Study 3 is designed to extend on findings from Study 2 and a similar previous study conducted by Albertson et al. (2014) by including positive well-being as an outcome variable. This is to investigate whether self-compassion meditation training can enhance self-compassion, positive well-being, and body appreciation, and reduce body dissatisfaction. This will help to provide further empirical support for the positive effect that greater self-compassion is proposed to have on improving body appreciation and well-being along with reducing body dissatisfaction.

Chapter 5: Study 3

5.1. Introduction

This study was designed to investigate whether increasing self-compassion has a positive influence on enhancing body appreciation and positive well-being, as well as mitigating body dissatisfaction. Cross-sectional associations between self-compassion and body appreciation were identified in Study 1 and have been previously reported in the literature (e.g., Homan & Tylka, 2015; Kelly & Stephen, 2016; Pisitsungkagarn et al., 2013; Schmidt et al., 2019; Wasylkiw et al., 2012).

Additionally, several experimental studies have established a link between self-compassion and body appreciation. In a randomised controlled trial, a sample of women undertook a three-week self-compassion meditation intervention (Albertson et al., 2014). Those who were assigned to the experimental group experienced significantly greater increases in body appreciation, which were maintained three months later (Albertson et al., 2014). Moreover, Slater et al. (2017) experimentally examined the impact of exposure to self-compassion quotes and fitspiration images on Instagram on young women's body appreciation, negative mood, self-compassion, and body satisfaction. Findings revealed that brief exposure to such self-compassion quotes were beneficial to women's body image, levels of self-compassion, and mood. In contrast to women who viewed neutral images, those who viewed self-compassion quotes on Instagram reported greater self-compassion, body appreciation, and body satisfaction, and lower negative mood (Slater et al., 2017). Even though quotes that appear to capture self-compassion are ever-present on Instagram, it is notable that viewing self-compassion quotes for a brief period led to an increase in positive feelings towards participants' bodies and self-compassion, and a reduction in mood (Slater et al., 2017). One of the shortcomings of the study by Slater et al. (2017) was that they examined very short-term exposure to two different types of Instagram images for a period of five minutes. As participants stated that they spent up to 60 minutes per day on Instagram, the limited exposure to the experimental images was not representative of the actual exposure that women have on Instagram (Slater et al., 2017). Thus, the present study explored whether body appreciation and positive well-being are influenced by self-compassion via a twenty-minute mindfulness meditation, given previous reports of its effectiveness (Neff & Germer, 2013; Albertson et al., 2014).

Longitudinal associations between self-compassion and body appreciation have also been established (Cox & McMahon, 2019). In support of this, the CLPM in Study 2 (Chapter 4) examining self-compassion and body appreciation showed support for a reciprocal model, though the effects over time were more consistent for self-compassion (measured by the 16 and 26-item SCS) predicting body appreciation. This is to say that there was evidence of a bidirectional influence between self-compassion and body appreciation, but enhanced self-compassion was associated with stronger elevation of body appreciation rather than the inverse. Whilst evidence of bidirectionality was present, these reciprocal effects were not consistently observed over time. There was no significant cross-lagged effect between T1 self-compassion and T2 body appreciation, and likewise, no significant cross-lagged effect between T1 body appreciation and T2 self-compassion. Given the cross-lagged model provided mixed evidence of causal inferences, this guided the choice to test an intervention that targeted mechanisms of change, based on the methods of Albertson et al. (2014).

Whilst Study 2 provided partial support of the stability over time of self-compassion and body appreciation levels, it could not firmly establish cause and effect. Therefore, Study 3 was designed to examine a possible causal relationship; specifically, to extend on the study conducted by Albertson et al. (2014) and to explore if improving self-compassion via meditation training would enhance body appreciation, self-compassion, and mitigate body dissatisfaction, albeit in a non-clinical sample. Additionally, given Study 1 showed that relatively strong relationship between self-compassion and positive well-being ($\beta = 0.43$), it was decided to further extend Albertson and colleagues' (2014) study by including positive well-being as an outcome variable into the analysis to examine a possible causal relationship. What's more, this study investigated whether the frequency of meditation training influences the effects of meditation training on body appreciation self-compassion, positive well-being, and body dissatisfaction. It must be noted that measuring self-compassion levels across the different time points in this study was a treatment fidelity/integrity check; that is, to examine if the self-compassion meditation podcasts were conducted consistently and reliably.

Based on arguments presented in the literature review in sections 2.5.3., the results from Chapter 4 (see 4.6. and 4.7.), and evidence reported by Albertson et al. (2014) and Slater et al. (2017), it was expected that (a) self-compassion meditation training would enhance body appreciation, self-compassion, and positive well-being, and mitigate body dissatisfaction in the experimental group relative to the control group; (b) there would be a dosage effect (i.e., improvement in study outcomes due to repeated exposure to test materials), such that the total number of times per week participants practiced self-compassion meditation would predict the magnitude of change in all study outcomes from T1 to T2; and (c) all gains associated with the experiment would be maintained at six-week follow-up.

5.2. Method

5.2.1. Participants

A total of 356 individuals from the general population expressed interest in participating in the study. Of this total, 84 were excluded from the test survey at T1 because they: (a) had a current (or recently diagnosed) anxiety disorder, (b) had a current (or recently diagnosed) eating disorder, (c) experienced panic attacks, (d) did not reside in Australia, or

(e) were not between 18 and 39 years of age (the focal age group of this project given contemporary literature has illustrated the population's investment in their body image (Gattario & Frisén, 2019; Tylka & Wood-Barcalow, 2015; Wood-Barcalow et al., 2010). The exclusion criteria is explored in more depth in section 5.4. Additionally, 55 participants did not complete the initial test survey at T1 (25 from the experimental group and 30 from the control group), and 67 (41 from the experimental group and 29 from the control group) did not complete the test survey at T2, due to technical difficulties, because they indicated they did not have time, or for unknown reasons. In addition, six participants (three from the experimental group and three from the control group) were eliminated from the study because of univariate and multivariate outliers (for details see section 5.6.3.).

A final pool of 147 individuals participated in the experimental study: 75 in the experimental group and 72 in the control group. The sample identified as 18.4% men and 78.9% women, with the remaining 2.7% identifying as non-binary. Participant age ranged from 18-39, with a mean age of 31.75 years (SD = 4.88). Of the participants in the experimental group (M_{age} = 31.09, SD = 5.00), 38.7% reported having no prior meditation experience, 46.7% had meditated occasionally, and 14.7% were regular meditators. Of the participants in the control group (M_{age} = 32.43, SD = 4.69), 23.6% reported never having meditated, 66.7% had mediated occasionally, and 9.7% were regular meditators. All participants resided in Australia. Most participants were from the state of Victoria (67.3%), and reported being Caucasian (44.2%), heterosexual (80.3%), from the capital city/inner suburban area (61.2%), having an undergraduate university degree (42.2%), and having full-time employment (56.5%). See Table 14 for full participant information.

Table 14.
Sociodemographic Characteristics of Participants (n = 147)

Baseline Characteristics	Total Sample	
	n	%
Gender		
Male	27	18.4%
Female	116	78.9%
Non-binary	4	2.7%
Ethnicity		
Caucasian	65	44.2%
Asian	25	17.0%
Arabic	2	1.4%
European	30	20.4%
Hispanic or Latino	4	2.7%
African	0	0.0%
Mixed	17	11.6%
Indigenous or Native	1	0.7%
Other	3	2.0%
State		
Australian Capital Territory	5	3.4%
New South Wales	15	10.2%
Northern Territory	1	0.7%
Queensland	14	9.5%
South Australia	6	4.1%
Tasmania	2	1.4%
Victoria	99	67.3%
Western Australia	5	3.4%
Region		
Outer suburbs	37	25.2%
Capital city/Inner suburbs	90	61.2%
Rural areas	6	4.1%
Regional centres	14	9.5%
Highest educational level		
Completed secondary school	11	7.5%
Completed tertiary diploma or trade certificate	16	10.9%
Undergraduate university degree	62	42.2%
Postgraduate university degree	58	39.5%
Some secondary school education	0	0.0%
Primary school education	0	0.0%
Employment		
Working full-time	83	56.5%
Working part-time	26	17.7%
Casual worker	10	6.8%
Student	18	12.2%
Household duties	1	0.7%
Receiving a pension	0	0.0%
Unemployed	4	2.7%
Other	5	3.4%
Sexual orientation		
Heterosexual	118	80.3%
Bisexual	13	8.8%
Homosexual	8	5.4%
Other	8	5.4%
BMI (Average)		25.93

5.3. Materials

An online survey was designed to measure whether improving self-compassion via meditation training could enhance body appreciation, positive well-being, and reduce body dissatisfaction. Participants who participated in the pre, post, and six-week follow-up survey completed the same questionnaires: the Body Appreciation-2 Questionnaire (BAS-2; α = 0.94), the Warwick Edinburgh Mental Well-Being Scale (WEMWBS; α = 0.94), and the Self-Compassion Scale (SCS; α = 0.95), as described in Study 1 (refer to Chapter 3.3.). Additionally, the Body Shape Questionnaire [BSQ]; Cooper et al., 1987) was used to measure body dissatisfaction, and two additional pre-screening questionnaires were used to measure levels of anxiety (Anxiety subscale of the 21-item Depression Anxiety Stress Scale [DASS-21], Lovibond & Lovibond, 1995) and eating disorder symptomatology (Eating Disorder Examination Questionnaire Short [EDE-QS]; Gideon et al., 2016; see Appendix N).

Questionnaires at T1 and T2 were completed online up to five days prior to and after the three-week program. To clarify, both surveys at T1 and T2 contained exactly the same measures. Those in the experimental group were required to complete the same battery of questionnaires again six weeks after completion of the experiment to establish if any improvements in body appreciation and positive well-being and a reduction in body dissatisfaction would be maintained over time. Fifty of these participants completed the six-week follow-up evaluation. Participants in the waitlist-control group had access to the self-compassion audio podcasts for three weeks after the experimental group completed their T2 survey. They were not required to complete the six-week follow-up survey.

5.3.1. Body Dissatisfaction

The BSQ (Cooper et al., 1987) is a widely used instrument that measures body dissatisfaction. The present study utilised a shortened 16-item version of the questionnaire, which was modified by Evans and Dolan (1993). To gauge body dissatisfaction, items are worded negatively (e.g., *"Have you avoided wearing clothes which make you particularly aware of the shape of your body?", "Have you felt happiest about your shape when your stomach has been empty (e.g., in the morning)?"*, and *"Have you been worried about your flesh being dimply?"*). Participants indicate their responses on a 6-point scale ranging from 1 ("*never*") to 6 (*"always"*). The overall score is calculated by averaging item responses. Higher scores indicate higher levels of body dissatisfaction. Internal consistency reliability was excellent (α = 0.93) and consistent with previous literature (α = 0.93; Albertson et al., 2014).

5.3.2. Anxiety

The Anxiety subscale of the 21-item DASS-21 (Lovibond & Lovibond, 1995) was employed in this study. This questionnaire serves as a screener for the possible presence of anxiety symptomatology, but it is not a diagnostic tool. It is a self-report questionnaire with seven items which are worded negatively (e.g., *"Over the past week I was worried about situations in which I might panic and make a fool of myself"*). Participants indicate their responses on a 4-point scale ranging from 0 (*"did not apply to me at all – never"*) to 3 (*"applied to me very much, or most of the time – almost always"*) The higher the score, the more severe the anxiety symptoms. In the present study, internal consistency for the anxiety subscale was good (α = 0.76) and is reliable as indicated by previous findings (α = 0.88; Nieuwenhuijsen et al., 2003).

5.3.3. Eating Disorder Symptoms

The EDE-QS (Gideon et al., 2016) was employed to measure symptoms of eating disorders, including anorexia nervosa, bulimia nervosa, and binge eating disorder, experienced over the past seven days. This questionnaire may serve as a screener for the possible presence of eating disorders, but it is not a diagnostic tool. The 12-item questionnaire includes two subscales related to symptoms of eating disorders, along with two body dissatisfaction questions. Participants select the response item that best describes their experience of each question, using a 4-point Likert-type scale. These options range from 0 (*"0 days"*) to 3 (*"6-7 days"*). Questions within the eating disorder subscale include, *"Have you tried to control your weight or shape by making yourself sick (vomit) or takin laxatives?"*; and questions within the body dissatisfaction subscale include, *"of the past seven days has your weight or shape influenced how you think about (judge) yourself as a person?"* Participants select the response item that best describes their experience of the two questions, using a 4-point Likert-type scale. These options range from 0 (*"not at all"*) to 3 (*"markedly"*). Items ratings are summed to compute overall scores ranging from 0 to 36, with higher scores indicating more severe symptoms of eating disorders and dietary restraint. In the present study, Cronbach's alpha for the EDE-QS was good (α = 0.79) and is reliable as indicted by previous findings (α = 0.91; Prnjak et al., 2020).

5.3.4. Meditation Podcasts

Contemporary research on self-compassion training has shown that brief periods of meditation can be effective in mitigating body dissatisfaction, body shame, and contingent self-worth based on appearance, as well as enhancing gains in self-compassion and body appreciation (Albertson et al., 2014). Participants received the link for each 20-minute self-compassion meditation training via email or text with the instructions: *"Please try to listen to it every day for the next week"*. These links took participants to the podcasts on Kristin Neff's website (www.self-compassion.org). At the start of each week, participants received a link to a different podcast: (1) compassionate body scan; (2) affectionate breathing; and (3) loving-kindness meditation taken from the Mindful Self-Compassion program (www.self-compassion.org: "practices" > "guided practices" tab; Albertson et al., 2014; Neff & Germer, 2013; see Appendix N).

The week 1 podcast – the body compassionate scan – was designed for the listener to be in touch with their body's sensations and bring a sense of gratitude, compassion, and peace to their body. The listener is required to be in a comfortable position, where they are told to put their hand over their heart as a reminder to be compassionate to themselves. The listener is then instructed to notice the sensations of numerous body parts, starting with the feet, and moving towards the head. Participants are instructed to be kind to themselves, and if any intrusive thoughts or judgements arise, they are to place their hand on their heart, breathe deeply, and continue to be in touch with the sensations.

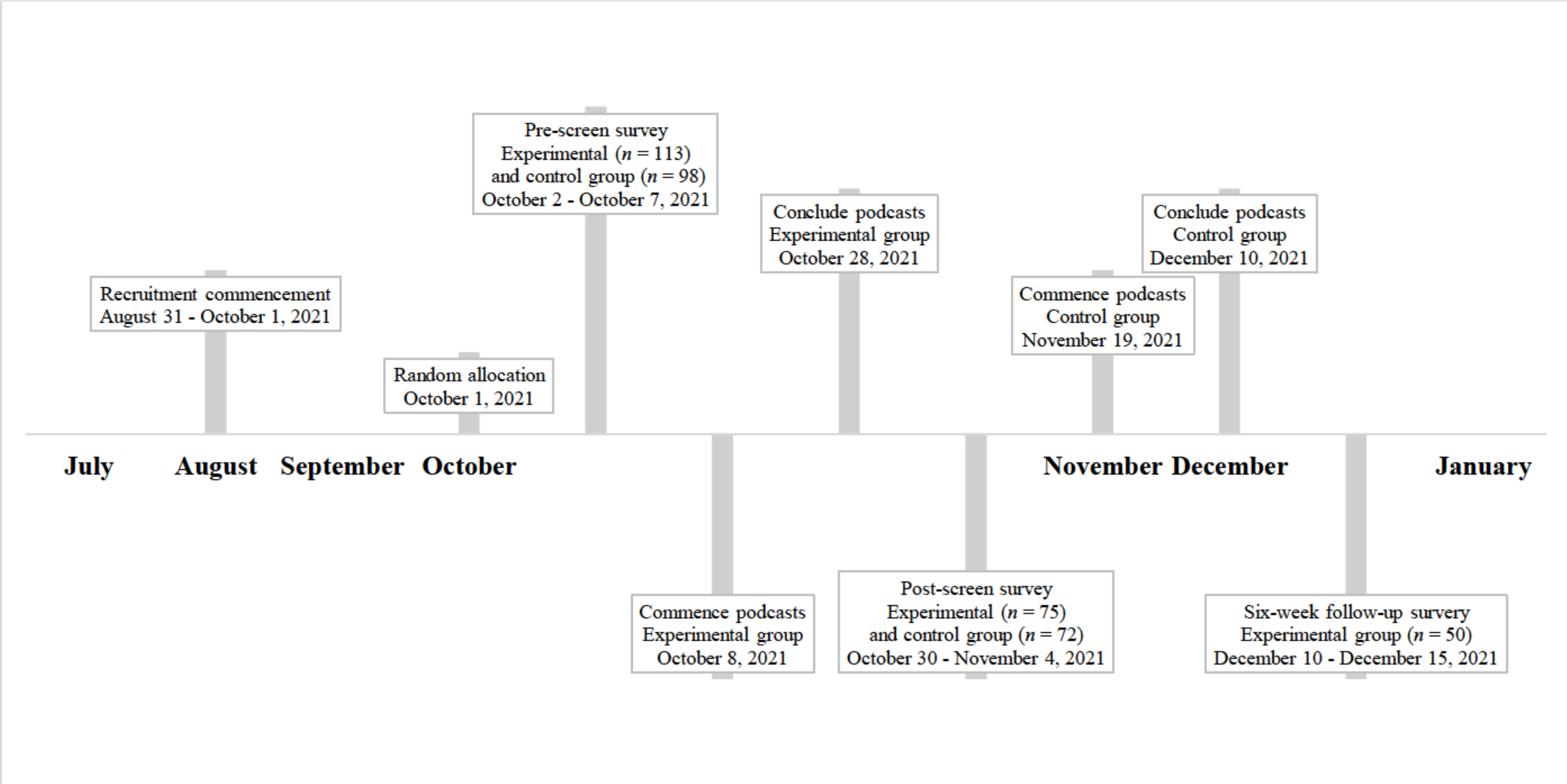
The week 2 podcast – the affectionate breathing podcast – instructed the listener to get in touch with their body by doing a short scan of the body and paying attention to any sensations and whether they are pleasant, unpleasant, or neutral. The listener is then instructed to take three deep breaths to release any lingering tensions and then to allow breathing to return to normal. The listener is then encouraged to see if they can notice where they feel their breath most strongly. The listener is then asked to adopt a little half-smile with their mouth closed and is asked to observe how they feel when their body adapts feelings of contentment, peace, and happiness with the present moment. The listener is encouraged to let their breath be infused with affection and kindness for themselves and others. If the listener's mind wonders, they are encouraged to judge, to appreciate each breath, and rest in the feelings of kindness they are generating.

The week 3 podcast – the loving-kindness meditation – is focused on generating goodwill and kindness both for others and for oneself. Firstly, the listener is encouraged to let out three deep breaths to alleviate any tension from their day. They are then instructed to call to mind an image of someone who has been unconditionally kind to them, who has supported them over the years – someone who has very uncomplicated feelings. They are encouraged to imagine this person in front of them and to send them goodwill and kindness and the wish for their well-being by repeating the following phrases silently: *"May you be safe. May you be peaceful. May you be healthy, and may you live with ease and well-being"*. The listener is then instructed place their gently hand on their heart if they are having trouble getting in touch with their feelings by silently repeating the following phrase to themselves: *"May I be safe. May I be peaceful. May I be healthy—mind and body, and may I live with ease"*.

5.4. Design and Procedure

The Victoria University Human Ethics Committee (VUHEC) provided approval for the student investigator to collect data (Application ID: HRE21-028). The ethics approval document is shown in Appendix O. The experiment was registered as a trial with the Australian New Zealand Clinical Trials Registry (#ACTRN12621001028897p) and approved by the VUHEC prior to commencement. The Clinical Trials Registry document is shown in Appendix P. The experimental study design and timeline of the study is illustrated in Figure 6.

Figure 6. Study Design and Timeline.



Data collection commenced on August 31 2021 and concluded on October 1 2021. Participants were recruited through convenience and snowball sampling via social media platforms (e.g., Facebook, Instagram, Twitter, LinkedIn, etc.). Participants were required to indicate by checking a box at the bottom of the first page of the consent form that they had read and understood all the information provided about the nature and potential risks of the study, and that they consented to participate. Participants were also informed that completing the survey and intervention was voluntary and that all responses were anonymous. The participant information form is presented in its entirety in Appendix Q.

A preliminary screening survey to determine eligibility asked if participants were Australian, were between 18 and 39 years of age, had been diagnosed with an anxiety or eating disorder, or if they experienced panic attacks. Participants who did not reside in Australia, were not between 18 and 39 years of age, had a current (or recently diagnosed) anxiety disorder, had a current (or recently diagnosed) eating disorder, or experienced panic attacks were excluded from participating further in the study.

Specifically pertaining to eating disorders and anxiety, the preliminary screening survey contained two *"yes"* or *"no"* questions. The questions asked whether participants have been diagnosed with an anxiety or eating disorder. Participants who selected *"yes"* on either question were informed that they were ineligible to partake in the experiment. Participants who selected *"no"* were then asked to complete two additional questionnaires EDE-QS (Gideon et al., 2016), and the anxiety subscale of the 21-item DASS-21; Lovibond & Lovibond, 1995). Participants who scored ≥ 15 on the EDE-QS (Gideon et al., 2016) and ≥ 20 on the anxiety subscale of the 21-item DASS-21 (Lovibond & Lovibond, 1995) were excluded from the study given both scores deemed participants high-risk of an eating or anxiety disorder (Gideon et al., 2016; Lovibond & Lovibond, 1995).

A total of 15 participants were ineligible based on exceeding the cut-off scores for either screener, given they were deemed high-risk. Participants who experience panic attacks, and those with a recent or current diagnosis of an anxiety disorder were also excluded as meditations focusing on bodily sensations can contribute to increases in anxiety symptomatology and panic attacks among those who are already vulnerable (Farias et al., 2020). Moreover, participants with a recent or current diagnosis of an eating disorder were excluded from the analysis as their scores on measures of body appreciation may have been impacted by the extreme body image concerns that characterise many eating disorders (Hosseini & Padhy, 2019).

Those eligible to participate in the study were asked to provide their email address and mobile number and were assigned a participant ID. Participants were then randomly allocated (via simple randomisation number generator in Microsoft Excel) to either the experimental or waitlist control group based on their ID. To ensure participants remained blind to condition assignment, those in the experimental group were informed that they would be participating in the experiment in October, and those in the control group were informed that they would be participating at a later time-period. Participants then completed the T1 test survey containing a battery of questionnaires (see section 5.3.). Those in the experimental group were given a link via email and/or text messages to the podcasts with the request of listening to the self-compassion meditation audio training every day. Email and text reminders with the audio link were given to the participants once per week. After three weeks, all participants completed the T2 survey. Participants in the experimental group were also required to indicate if they listened to meditation podcasts (*"yes"* or *"no"*), and how frequently they meditated per week (1-7 days). Three weeks after the T2 test survey, those in the control group were given access to the podcasts. Email and text reminders with the link to the audio were also given to these participants once per week. Participants in the control group were not surveyed again. Six weeks after the T2 survey, participants in the experimental group were administered all the study measures again to determine if any improvements were maintained over time. The chance to win one of five $125AUD GiftPay gift cards was offered as an incentive for starting and completing all phases of the study. Participants who indicated they did not listen to the meditation podcasts were omitted from the analysis.

5.5. Analysis

Data were analysed using SPSS 27. Prior to the data analysis, all variables were screened for missing data and deviations from accepted statistical standards. There were no missing data present in the sample. The data were also screened for univariate outliers via standardised scores, with a cut-off of ± 3.29 indicating the presence of an outlier (Field, 2013). Three scores across the BAS-2 and two scores across the WEMWBS scales were identified as univariate outliers. These participants were removed from subsequent analysis via listwise deletion (Tabachnick & Fidell, 2014), leaving 148 participants. Multivariate outliers were examined utilising the Mahalanobis distance and Cook's distance statistics. Examination of the Mahalanobis distance discovered one score that exceeded the critical χ^2 cut-off of 26.13 ($\alpha = 0.01$; Mahalanobis distance = 32.65). Whilst this participant's score did not exceed the Cook's distance of 1 (Cook's D = 0.14), it was decided to remove this participant from the subsequent analysis as their score may have influenced the parameter estimates of the regression models (Tabachnick & Fidell, 2014). Overall, 147 participants were included in the final analyses.

Examinations of the skewness and kurtosis across the variables were used to evaluate the assumption of univariate normality. The distributions of all variables yielded skewness statistics of less than absolute 3 (skewness = 0.75), and kurtosis statistics of less than absolute

8 (kurtosis = -0.97; Field, 2013; Kline, 2005). Therefore, the assumption of univariate normality was met for this study. Calculating bivariate correlations examining relationships between the variables among the experimental and control group at T1 and T2 followed this. Then, two sets of independent samples t-tests were conducted to compare the means of the experimental and control groups to determine whether there was statistical evidence that the associated group means were significantly different at T1 and T2, respectively. All assumptions pertaining to independence, normality, linearity, and homoscedasticity were examined and met.

A repeated measures mixed design ANOVA (SPANOVA) was then conducted to investigate the impact of self-compassion meditation training on body appreciation, positive well-being, self-compassion, and body dissatisfaction (at T1 and T2) among participants in the experimental and control group. It was initially planned to use age and participants' prior experience with meditation as covariates in this analysis, given their relationship with several outcome variables in previous research (e.g., body appreciation, self-compassion, and body dissatisfaction; Albertson et al., 2014). However, given they were not significantly related to any outcome variables in the present research, the analysis was conducted with no covariates.

For each level of the between-subjects variable (group) the pattern of intercorrelations between repeated measures (T1 and T2) should be identical. The assumption of homogeneity of covariance matrices via Box's M was examined to test this assumption. Using Box's M statistic, all scores presented an alpha level of > 0.001; therefore, this assumption was not violated (Tabachnick & Fidell, 2001). Additionally, the assumption of homogeneity of variance was examined via Levene's test. Body appreciation, positive well-being, and self-compassion presented an alpha level of > 0.05, however, the value for body dissatisfaction was < 0.05. This assumption was violated; however, as identified by Ramachandran and Tsokos (2015), if sample sizes of each sample are equal, ANOVA is mostly robust for violation of homogeneity of variance. Given the two groups were almost identical (75 and 72, respectably) the analysis was performed. An analysis of simple effects as part of the SPANOVA was then employed given the significant interaction effects among the between-subjects and within-subjects variables.

Next, a Pearson's correlation analysis was conducted to examine whether frequency of practice (i.e., how often participants listened to the self-compassion meditation podcasts) was associated with changes in the study outcomes within the experimental group at T1 and T2. All assumptions pertaining to independence, normality, linearity, and homoscedasticity were examined and met. Finally, a paired samples t-test was employed for the experimental group to test whether there were significant differences between each outcome variable at T2 and T3 (six-week follow-up). Relevant assumptions pertaining to normality were assessed and met.

5.6. Results

Table 15 presents the descriptive statistics for body appreciation, positive well-being, self-compassion, and body dissatisfaction among participants in the experimental and control groups at T1 and T2. On average, participants reported moderate body appreciation and positive well-being, self-compassion, and body dissatisfaction.

Table 15.

Test Descriptive Statistics T1 and T2 (n = 147)

Outcome	Experimental Group						Control Group					
	T1			T2			T1			T2		
	Min	Max	M *(SD)*	Min	Max	M *(SD)*	Min	Max	M *(SD)*	Min	Max	M *(SD)*
BAS-2	1.50	5.00	**3.65** *(0.66)*	1.80	5.00	**3.87** *(0.75)*	2.40	5.00	**3.40** *(0.56)*	1.50	5.00	**3.32** *(0.66)*
WEMWBS	31.00	65.00	**47.76** *(7.42)*	25.00	69.00	**51.21** *(9.37)*	36.00	67.00	**46.90** *(7.55)*	23.00	68.00	**46.29** *(8.58)*
SCS	1.59	4.78	**3.10** *(0.67)*	2.08	4.78	**3.38** *(0.67)*	1.32	4.80	**2.92** *(0.67)*	1.69	4.67	**2.89** *(0.67)*
BSQ	1.00	4.94	**2.28** *(0.75)*	0.94	3.69	**1.92** *(0.68)*	1.00	5.13	**2.53** *(0.98)*	0.94	4.50	**2.46** *(1.00)*

Note: T1 = Time 1; T2 = Time 2. BAS-2 = Body Appreciation Scale-2; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale; SCS = Self-Compassion Scale; BSQ = Body Shape Questionnaire. Mean values are presented in bold text for emphasis.

5.6.1. Correlations

Bivariate correlations were computed to identify associations between variables, before examining the associations further in multivariate analyses. Table 16 presents the correlations between the body appreciation, positive well-being, self-compassion, and body dissatisfaction among the experimental and control group, respectively.

Table 16.

Bivariate Correlations between BAS-2, WEMWBS, SCS, and BSQ Scores at T1 and T2

Experimental Group (n = 75)

	1	2	3	4	5	6	7	8
1. BAS-2 T1	-	0.70^{**}	0.65^{**}	0.47^{**}	0.47^{**}	0.46^{**}	-0.41^{**}	-0.46^{**}
2. BAS-2 T2		-	0.45^{**}	0.81^{**}	0.28^{*}	0.58^{**}	-0.28^{*}	-0.64^{**}
3. WEMWBS T1			-	0.55^{**}	0.57^{**}	0.51^{**}	-0.15	-0.14^{*}
4. WEMWBS T2				-	0.31^{**}	0.62^{**}	-0.15	-0.51^{**}
5. SCS T1					-	0.70^{**}	-0.23^{*}	-0.11
6. SCS T2						-	-0.22	-0.39^{**}
7. BSQ T1							-	0.70^{**}
8. BSQ T2								-

Note: $^{*}p < 0.05$, $^{**}p < 0.01$; T1 = Time 1; T2 = Time 2; BAS-2 = Body Appreciation Scale-2; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale; SCS = Self-Compassion Scale; BSQ = Body Shape Questionnaire.

As illustrated in Table 16, the correlation between body appreciation at T1 and T2 was positive, significant, and moderate in magnitude among participants in the experimental group. Moreover, the correlation between positive well-being at T1 and positive well-being at

T2 was also positive, significant, and moderate in magnitude. Likewise, the correlation between self-compassion at T1 and self-compassion T2 was also positive, significant, and moderate in magnitude. The correlation between body dissatisfaction at T1 and T2 was positive, significant, and strong in magnitude.

Body appreciation at T1 had a positive, significant, and moderate relationship with positive well-being and self-compassion at T1 and T2; however, had a negative, significant, and moderate relationship with body dissatisfaction at T1 and T2. Likewise, positive well-being T1 had a positive, significant, relationship with self-compassion at T1 and T2, a negative, significant, and weak relationship with body dissatisfaction at T2, but a negative, non-significant relationship with body dissatisfaction at T1. Last, self-compassion had a negative, significant, and small relationship with body dissatisfaction at T2, but a negative, non-significant relationship with body dissatisfaction at T1.

Table 17.

Bivariate Correlations between BAS-2, WEMWBS, SCS, and BSQ Scores at T1 and T2 (Control Group) (n = 72)

	1	2	3	4	5	6	7	8
1. BAS-2 T1	-	0.83^{**}	0.51^{**}	0.47^{**}	0.48^{**}	0.53^{**}	-0.61^{**}	-0.65^{**}
2. BAS-2 T2		-	0.46^{**}	0.61^{**}	0.37^{**}	0.50^{**}	-0.54^{**}	-0.65^{**}
3. WEMWBS T1			-	0.77^{**}	0.40^{**}	0.39^{**}	-0.13	-0.18
4. WEMWBS T2				-	0.34^{**}	0.47^{**}	-0.06	-0.15
5. SCS T1					-	0.85^{**}	-0.37^{**}	-0.31^{**}
6. SCS T2						-	-0.30^{**}	-0.36^{**}
7. BSQ T1							-	0.88^{**}
8. BSQ T2								-

Note: $^{**}p < 0.01$; T1 = Time 1; T2 = Time 2; BAS-2 = Body Appreciation Scale-2; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale; SCS = Self-Compassion Scale; BSQ = Body Shape Questionnaire.

As illustrated in Table 17, the correlation between body appreciation at T1 and T2 was positive, significant, and strong in magnitude among participants in the control group. Moreover, the correlation between positive well-being at T1 and positive well-being at T2 was also positive, significant, but moderate in magnitude. Likewise, the correlation between self-compassion at T1 and self-compassion T2 was also positive, significant, but strong in magnitude. The correlation between body dissatisfaction at T1 and T2 was positive, significant, and strong in magnitude.

Body appreciation at T1 had a positive, significant, and moderate relationship with positive well-being and self-compassion at T1 and T2; however, had a negative, significant, and moderate relationship with body dissatisfaction at T1 and T2. Likewise, positive well-being T1 had a positive, significant, relationship with self-compassion at T1 and T2, but negative, non-significant, and weak relationship with body dissatisfaction at T1 and T2. Lastly, self-compassion had a negative, significant, and small relationship with body dissatisfaction at T1 and T2.

It is also worth noting that a t-test was conducted to illustrate the mean difference in all variables among men and women at T1 (n = 207 (4 participants identified as "other" and were not included in the analysis)) and T2 (n = 143 (4 participants identified as "other" and were not included in the analysis)). At T1, there was a significant difference in self-compassion and body dissatisfaction scores where men scores significantly greater self-compassion (men: M = 3.17, SD = 0.57; women: M = 2.92, SD = 0.68, t(205) = 2.06, p = 0.04, d = 0.37) and significantly lower body dissatisfaction (men: M = 2.05, SD = 0.73; women: M = 2.63, SD = 0.94, t(205) = -3.54, p = 0.001, d = - 0.64) than women. At T2, there was a significant difference in mean scores among all variables, where men scored significantly greater levels of body appreciation (men: M = 4.07, SD = 0.70; women: M = 3.48, SD = 0.72, t(141) = 3.88, $p < 0.001$, d = 0.83), self-compassion (men: M = 3.62, SD = 0.66; women: M = 3.03, SD = 0.67, t(141) = 4.10, $p < 0.001$, d = 0.88), and positive well-being (men: M = 55.04, SD = 10.00; women: M = 47.40, SD = 8.47, t(141) = 4.08, $p < 0.001$, d = 0.87), and significantly lower levels of body dissatisfaction (men: M = 1.53, SD = 0.53; women: M = 2.36, SD = 0.88, t(141) = -4.70, $p < 0.001$, d = -1.00) than women.

5.6.2. Randomisation Examination

An independent sample t-test was employed to examine whether randomisation was successful; that is, whether there were no significant differences between the experimental and control group relating to each outcome variable at T1. Results are shown in Table 18.

Table 18.

Independent Samples T-Test at T1 (n = 147)

Outcome	t	*df*	*p*	*d*
BAS-2	2.53	145	0.01	0.42
WEMWBS	0.69	145	0.49	0.12
SCS	1.60	145	0.11	0.26
BSQ	-1.78	132.89	0.78	-0.26

Note: T1 = Time 1; BAS-2 = Body Appreciation Scale-2; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale; SCS = Self-Compassion Scale; BSQ = Body Shape Questionnaire.

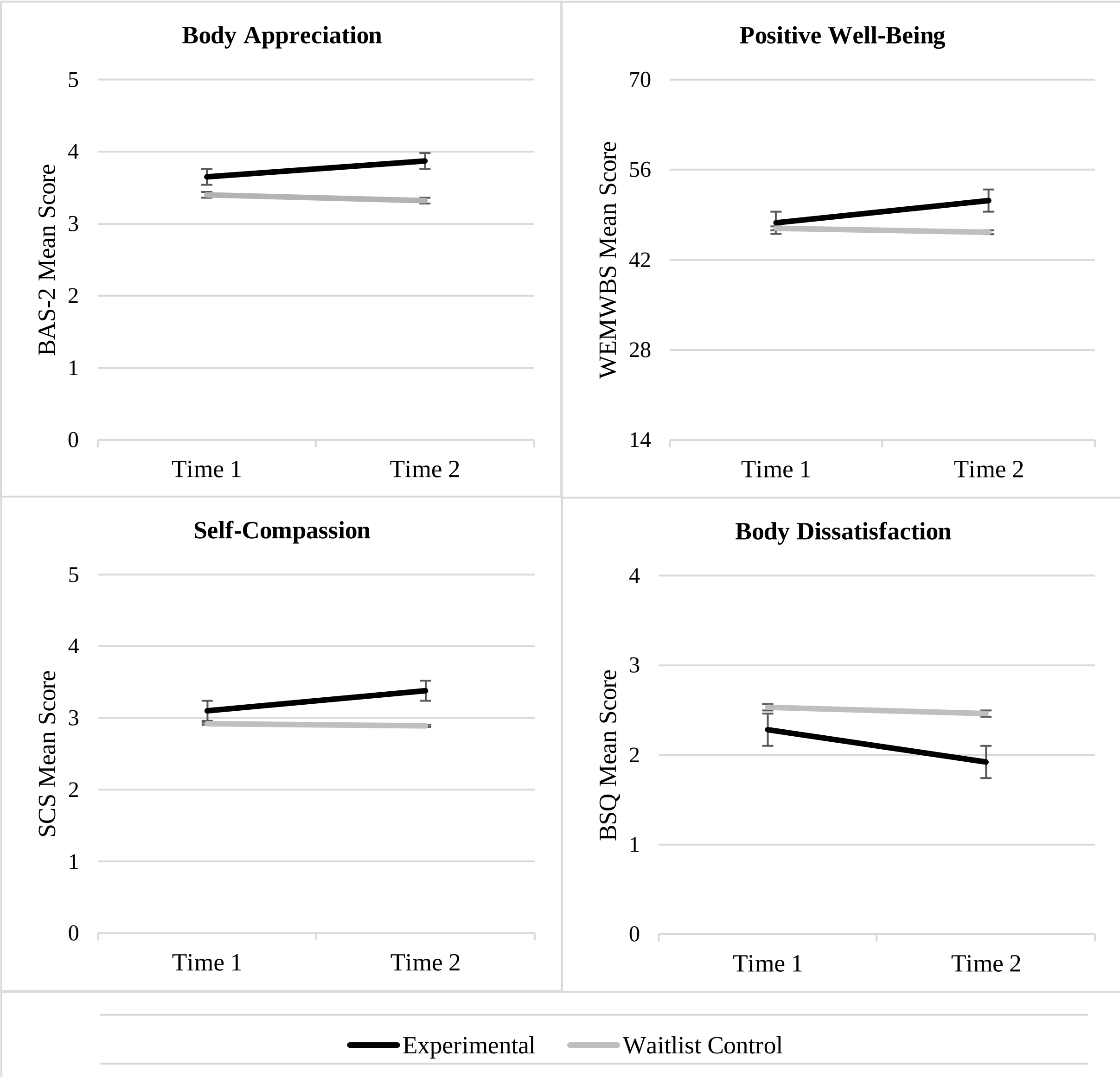
Table 18 shows that there was a significant difference in mean body appreciation scores among those in the experimental group and control group at T1. This illustrates that randomisation failed on the primary dependent variable in body appreciation, whereby those in the experimental group already demonstrated significantly greater body appreciation than participants in the control group prior to listening to the self-compassion meditation podcasts. No significant differences in mean positive well-being, self-compassion, and body dissatisfaction scores were found between the experimental group and control group at T1. It must be noted that as body appreciation was the primary dependent variable, a conservative approach of deciding that *any* statistical difference (no matter how small) at baseline was a threat to randomisation, was taken.

Given the significant result of the BAS-2 at T1, a completer analysis was examined at baseline to explore if there were any systematic differences in body appreciation between participants who completed the survey at both time points and participants who completed the survey at baseline only (completers (October: n = 75; November: n = 72) vs. non-completers (October: n = 38; November: n = 26)). Results indicated that participants who completed surveys at both time points (experimental group: $M = 3.67$, $SD = 0.68$; control group: $M = 3.40$, $SD = 0.56$) had a significantly higher baseline BAS-2 score (F (1, 209) = 4.45, $p = 0.03$, $\eta^2 = 0.02$) than those who did not complete surveys at both time points (experimental group: $M = 3.29$, $SD = 0.70$; control group: $M = 3.23$, $SD = 0.75$), although only mildly so. This suggests that the participants who remained in the study were slightly more appreciative of their body initially, and therefore may not have benefited from the intervention as much as people who started with lower body appreciation.

Prior to conducting the t-tests, a 2(group) × 2(time) SPANOVA, with group as the between-subjects factor and time as the repeated measures factor was conducted. Results are shown in Figure 7.

5.6.3. Effects of Meditation Training on Study Outcomes

Figure 7. Self-Compassion Meditation Training Effects on Body Appreciation, Positive Well-Being, Self-Compassion, and Body Dissatisfaction at T1 and T2 (with error bars).



Note: n = 147. The WEMWBS comprises 14 items with a response scale from 1 to 5, giving a minimum score of 14 and maximum score of 70.

Based on studies conducted by Albertson et al. (2014) and Verger et al. (2021), it was expected that a medium effect size (η_p^2 = 0.06; using a significance level of α = 0.05) for body appreciation, self-compassion, and body dissatisfaction, and a large effect size (η_p^2 = 0.14; using a significance level of $\alpha = 0.05$) for positive well-being would be suitable for the practical significance of the results (as clarified by the G*Power program; Faul et al., 2007). Additionally, the SPANOVA procedures would require a sample size of 98 or more to detect a medium effect and 120 or more to detect a large effect at $\alpha = 0.05$. The analyses presented below are indicative of the planned analyses for the full study.

The SPANOVA revealed that there was a no significant main effect of time on body appreciation (F (1, 145) = 2.84, $p = 0.09$, $\eta_p^2 = 0.01$), but a significant time-by-group interaction effect for body appreciation (F (1, 145) = 14.07, $p < 0.001$, $\eta_p^2 = 0.08$). This suggests that, on average, the sample did not report an increase in body appreciation. Next, there was a significant main effect of time (F (1, 145) = 6.00, $p = 0.01$, $\eta_p^2 = 0.04$), and a time-by-group interaction effect for positive well-being (F (1, 145) = 12.27, $p < 0.001$, η_p^2 = 0.08). On average, the sample reported an increase in positive well-being, and this increase was greater in the experimental group compared to the control group. Yet, whilst there was statistical significance, self-compassion meditation training accounted for only 4% of change over the two time points. Therefore, the meditation program did not appear to effect meaningful improvements positive well-being in this sample.

Furthermore, there was a significant main effect of time (F (1, 145) = 10.76, $p = 0.00$, $\eta_p^2 = 0.06$), and a time-by-group interaction effect for self-compassion (F (1, 145) = 18.65, $p < 0.001$, $\eta_p^2 = 0.11$). On average, the sample did report an increase in self-compassion, and this increase was stronger in the experimental group compared to the control group. Though, whilst there was statistical significance, the data demonstrated the self-compassion meditation training accounted only 6% of change over the two time points. Finally, there was a significant main effect of time (F (1, 145) = 25.34, $p < 0.001$, $\eta_p^2 = 0.15$), and a time-by-group interaction effect for body dissatisfaction (F (1, 145) = 10.58, $p < 0.001$, $\eta_p^2 = 0.07$).

On average, the sample did report a reduction in body dissatisfaction, but this reduction was stronger in the experimental group compared to the control group. However, whilst there was statistical significance, the data demonstrated the self-compassion meditation training accounted for 15% of change over the two time points. Therefore, the meditation program may not have meaningfully changed body dissatisfaction in this sample.

5.6.4. Correlations

Bivariate correlations were then conducted to examine whether frequency of practice (i.e., how often participants listened to the self-compassion meditation podcasts) was associated with changes in the study outcomes within the experimental group at T1 and T2. Results are shown in Table 19.

Table 19.

Bivariate Correlations on Meditation Frequency and Study Outcomes at T2 (Experimental Group) (n = 75)

	1	2	3	4	5
1. MF	-	0.00	-0.07	-0.09	-0.08
2. BAS-2		-	0.75^{**}	0.60^{**}	-0.66^{**}
3. WEMWBS			-	0.58^{**}	-0.36^{**}
4. SCS				-	-0.43^{**}
5. BSQ					-

Note: $^{**}p < 0.01$; T2 = Time 2; MF = Meditation Frequency; BAS-2 = Body Appreciation Scale-2; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale; SCS = Self-Compassion Scale; BSQ = Body Shape Questionnaire.

As illustrated in Table 19, results indicated that frequency of meditation (M = 4.16, SD = 1.82) was not significantly correlated with any study outcomes. This indicates that there were significant changes from T1 to T2 in all study outcomes irrespective of whether participants mediated one or seven days per week.

5.6.5. Paired Samples T-Test

Six weeks after completion of the meditation period, participants in the experimental group participated in the survey questionnaire again. Initially, it was intended to run a one-way repeated ANOVA with post-hoc pairwise comparisons, to compare changes from all three time-points for the experimental group. Due to the lack of statistical power, however, the sample size of 50 participants did not provide enough power to detect the predicted effect the meditation program had on body appreciation, self-compassion, and body dissatisfaction (η_p^2 = 0.06; using a significance level of α = 0.05), and positive well-being (η_p^2 = 0.15; using a significance level of $\alpha = 0.05$) across all time points (T1 vs. T2, T2 vs. T3, and T1 vs. T3). Ultimately, it was decided to run a paired samples t-test from T2 to T3 to examine if changes in all outcomes were maintained at the six-week follow-up. Results are shown in Table 20.

Table 20.

Paired Samples T-Test at T2 and T3 (Experimental Group) (n = 50)

Outcome	M (*SD*)	t	*df*	*p*
BAS-2	-0.07 (*0.37*)	-1.29	49	0.20
WEMWBS	-0.20 (*6.63*)	-0.21	49	0.83
SCS	-0.00 (*0.40*)	-0.06	49	0.95
BSQ	-0.04 (*0.38*)	-0.67	49	0.51

Note: T2 = Time 2; T3 = Time 3; BAS-2 = Body Appreciation Scale-2; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale; SCS = Self-Compassion Scale; BSQ = Body Shape Questionnaire.

As illustrated in Table 20, mean scores of body appreciation, positive well-being, self-compassion, and body dissatisfaction at T3 were not significantly different from T2. This indicates that whilst the significant effects of the self-compassion meditation podcasts were likely not meaningful, they were nonetheless maintained at follow-up.

5.7. Discussion

Study 3 was designed to extend on the study conducted by Albertson et al. (2014) and explore if improving self-compassion via meditation training would enhance body appreciation, self-compassion, and positive well-being, and mitigate body dissatisfaction. Additionally, this study investigated whether the frequency of meditation training influenced the magnitude of effects on the outcome variables. This was to clarify the effect of the frequency of meditation training on body appreciation self-compassion, positive well-being, and body dissatisfaction. It was predicted that (a) self-compassion meditation training would enhance body appreciation, self-compassion, and positive well-being, and mitigate body dissatisfaction in the experimental group as opposed to the control group; (b) there would be a dosage effect, so that the total number of times per week participants practiced self-compassion meditation would predict the presence of change in all study outcomes T1 and T2; (c) all gains associated with the experiment would be maintained at six-week follow-up.

The findings of this experiment demonstrated that engagement in the three-week self-compassion meditation program had limited influence on body appreciation, self-compassion, positive well-being, and body dissatisfaction, which was inconsistent with hypotheses. Where results indicated significant improvements and/or larger improvements in the experimental group, effect sizes were generally too small to represent meaningful change.

These findings are inconsistent with Study 1 and Study 2 along with previous research that indicates that self-compassion is linked to an increase in body appreciation (Albertson et al., 2014; Homan & Tylka, 2015; Kelly & Stephen, 2016; Pisitsungkagarn et al., 2013; Schmidt et al., 2019; Wasylkiw et al., 2012), and positive well-being (Albertson et al., 2014; Baer et al., 2012; Neff, Kirkpatrick, et al., 2007; Neff, Rude, et al., 2007). Additionally, findings from the present study differed from Albertson and colleagues' (2014) study, where engaging in self-compassion meditation mitigated body dissatisfaction. Even though gains were maintained six weeks after the program, the effect of the self-compassion meditation podcasts was likely not to have much real-world significance. Also, there was no dosage effect, where the frequency of meditation was not significantly correlated with any study outcomes. This partly contrasts with Albertson and colleagues' (2014) study, where only body appreciation (the primary dependent variable) was significantly and positively related to the number of days a week that participants meditated. Potential reasons as to why participating in the self-compassion meditation program did not influence change on the study outcomes are now discussed.

Failure of randomisation may have contributed to the lack of a meaningful effect of the self-compassion meditation podcasts on all outcome variables. Results illustrated that at baseline, those who were randomly allocated into the experimental group had significantly greater body appreciation that those in the control group. A completer analysis (addressed in section 5.6.2.) showed that participants from the experimental and control group who remained in the study (completers) were slightly more appreciative of their body initially than those who did not (non-completers), and therefore may not have benefited from the intervention as much as people who started with a lower body appreciation. Additionally, those allocated to the experimental group had marginally lower body dissatisfaction than those of the control group. Therefore, if the experimental group had favourable outcomes, it may not have been attributable to the intervention being tested, but rather due to small pre-existing differences between the groups. Given the groups were randomised through simple randomisation, this cannot guarantee equal distribution of factors; however, given the random allocation of treatments was followed, the subsequent imbalance of mean scores on any given questionnaire can be explained as the play of chance (Burt, 2000).

Small effect sizes identified by the SPANOVA further consolidated the lack of meaningful effects the podcasts had on the study outcomes. The effect sizes of this study were very small compared to the study by Albertson et al. (2014) which indicated a greater magnitude of the experimental effect (body appreciation *d* = 0.62, η_p^2 = 0.28; self-compassion *d* = 0.82, η_p^2 = 0.40; body dissatisfaction *d* = 0.73, η_p^2 = 0.35). Several reasons may explain the why the effects of the self-compassion meditation program were not large enough for it to be meaningful in someone's day-to-day lives. First, the present participants were a non-clinical sample – individuals were recruited who had an interest in their body image. Those who were deemed high-risk on pre-screening measures for anxiety and eating disorders were excluded from the study. Contrarily, Albertson and colleagues' (2014) study targeted women with pre-existing body image concerns, disordered eating and eating disorders, and some level of body dissatisfaction-related distress. Given this difference, perhaps self-compassion meditation is a useful intervention for a sub-clinical sample, but for a general population, it is not clear if these types of interventions meaningfully change thoughts and feelings about one's body.

Second, given that over one-third of participants in the experimental and control group were lost at T2, (*n* = 64), this contributed to an attrition bias (confirmed by a completer analysis; see section 5.6.2.) which affected the strength of the trial's findings. According to Eysenbach (2005), attrition rates for studies conducted over the internet tend to be much higher than for studies conducted through more traditional means, particularly with self-help applications. This was problematic, as Dumville et al. (2006) argued that loss to follow-up of 5% or lower is usually of little concern, whereas a loss of 20% or greater means that there is a possibility of attrition bias, resulting in threats to the validity of the findings. Given reduced retention rate, this adjusted the nature of the present sample, where participants who remained in the study were likely highly motivated (identified by the significant difference in BAS-2 scores from completers to non-completers; see section 5.6.2.) to complete all phases the experiment. Therefore, the present study was no longer randomised due to the failure of randomisation; rather, it was an investigation of whether self-compassion meditation influenced change in the study outcomes in a group of people who were highly motivated to engage in the study. Consequently, results cannot be generalised to a wider population. Whilst the National Statement on Ethical Conduct in Human Research (2014) states that patients are not obliged to give a reason for pre-mature withdrawal (section 2.2.20) reasonable efforts should be made to ascertain the reason to assess potential bias. Future research should seek to collect withdrawal reasons and communicate this with potential patients. Moreover, educating participants about the importance of retention could impact both patient withdrawal and loss to follow up rates, and should be implemented – a truly informed decision can only be made if communication of the right to withdraw is balanced with information that explains the importance of completing follow-up (Kearney et al., 2018). It must be noted that multiple imputation of missing measurements (a general approach to the problem of missing data that “aims to allow for the uncertainty about the missing data by creating several different plausible imputed data sets and appropriately combining results obtained from each of them”, Sterne et al., 2009, p. 3) was considered to remedy the issue of attrition bias. However, given a large portion of the data were missing at T2 (n = 64), and one-third of participants were lost from the experimental group at T3 (n = 25), it was recommended by Jakobsen et al. (2017) to report just the results of the complete case analysis and then discuss the subsequent interpretive limitations of the trial results.

Simple randomisation was one of few limitations of the present study. A disadvantage of simple randomisation is that it can lead to an imbalance among the treatment groups with respect to prognostic variables that affect the outcome variables (Roberts & Torgerson, 1999). At baseline, those in the experimental group had significantly greater body appreciation and marginally lower body dissatisfaction than those in the control group. Whilst it may require more administrative effort than a simple randomisation, future research should consider stratified randomisation as it gives researchers a systematic way of gaining a population sample that considers the demographic make-up of the population, which leads to stronger research results. Moreover, stratified randomisation is fair for participants as the sample from each stratum can be randomly selected, meaning there is no bias in the process (Qualtrics, 2022). Future research should ensure that attrition bias is mitigated, and stratified random sampling is employed as this may enhance confidence in the clinical implications of impending evidence-based treatment on self-compassion meditation programs among young adults in a non-clinical population.

As practice time is the key predictor of experiencing benefit from a meditation program, particularly after years of continued practice (Rusch et al., 2019; Smith et al., 2019), it was hypothesised that there would be a dosage effect. That is, the more frequently participants meditated, the greater the change in the study outcomes. Findings from the present study, however, illustrated that there was no dosage effect – change in the study outcomes was independent of how many days per week participants meditated. One explanation could be attributed to the null effect that the frequency of meditation had on the change in study outcomes. Participants may not have accurately recalled how often and how long they listened to the podcasts. To address these limitations, future research could include a manipulation check where respondents are required to briefly summarise the content of the podcasts; and researchers could include a system that monitors how long participants listen to the podcasts for, rather than how many times they open the podcasts.

Having participants in the control group wait to receive the meditation podcasts after the active treatment group had completed the program was another limitation. This may have artificially inflated estimates of the experimental effect (Cunningham et al., 2013). That is, those in the experimental group may have reported beneficial outcomes as they were assigned the podcasts one day after the T1 test survey rather waiting three weeks after the T2 test survey like the control group did. This could have contributed to spurious results. Future research may extend on the present study's findings by providing alternative podcasts with neutral content to the control group, which could control for time spent in the experimental activity.

There was a lack of gender balance in the sample as 78.9% of participants identified as female. This was another limitation as generalising the present findings to men or those who identify as another gender should be done with caution. Future research could attempt to explore the impact of self-compassion meditation training in a non-clinical sample on body image, positive well-being, self-compassion, and body dissatisfaction with a sample of greater gender diversity.

Overall, evidence that self-compassion meditation was beneficial to body appreciation was very limited in this study, at least in a non-clinical sample comprising largely females. In comparison to the clearer beneficial effects of self-compassion meditation in the study by Albertson et al. (2014), where participants already experienced high body dissatisfaction and eating disorder symptomatology at the time of recruitment, the findings of this study with a non-clinical sample do not clearly indicate that these types of interventions meaningfully change thoughts and feelings about one's body for the better.

Chapter 6: General Discussion

6.1. Overview

Research examining factors that promote body appreciation and mental health through the positive psychology lens is in its infancy. Several factors which have been shown to be inversely related to body dissatisfaction, including self-compassion and physical activity (Albertson et al., 2014; Carraça et al., 2012), have been proposed as facilitating factors for positive body image. However, research is required to confirm this, as well as to provide a broader and better-integrated model of multiple factors influencing positive body image and well-being than research to date has offered. The program of research reported in this dissertation was designed to address this need.

As identified in Chapters 1 and 2, a notable gap in current research is consideration of body image issues in young adults who are not students, and particularly in men. Current research indicates that there is an increasing number of men who experience negative body image (Barnes et al., 2020; McCabe & Ricciardelli, 2004; Murray & McLean, 2018; Olivardia et al., 2004; Rodrigues & Rodrigues 2022). Consequences that surface from this range from slight unhappiness (e.g., body dissatisfaction) to unhealthy and extreme thoughts and behaviours (e.g., steroid use, excessive exercise, and muscle dysmorphic disorder; Leone et al., 2005). The factors that facilitate body appreciation and mental health in men, as well as how they may differ for women, needed to be further investigated. Doing so would provide an understanding of the interrelationships between a range of factors that not only buffer against body dissatisfaction, but collectively promote body appreciation and positive well-being.

To recap, a shortcoming of much of the body image literature is that the primary focus has been on people's struggles with negative body image rather than on the benefits of having positive body image. Consequently, body dissatisfaction has been a focal point in the literature across many decades (Clifford, 1971; Lawler & Nixon, 2011; Mable et al., 1986; Stice & Whitenton, 2002; Tiggemann & Pickering, 1996). As stated in Chapter 1, body dissatisfaction is indeed problematic as it is associated with poor mental health outcomes, which in turn can be linked to adverse consequences, including long term work absence, reduced employability, alcohol consumption, harm, abuse, and eating disorder symptomatology (Blank et al., 2008; Tylka, 2004; Weitzman, 2004). However, the prevailing focus on negative body image has limited our understanding of body image more broadly. Research that has investigated alleviating the symptoms of negative body image without considering how to promote positive body image, and the benefits of doing so, has therefore restricted our understanding of body image in all its forms (Smolak & Cash, 2011; Tylka & Wood-Barcalow, 2015b). This may have resulted in some clinicians being less than ideally equipped to promote health and well-being to prevent or lessen body image disturbances (Tylka & Wood-Barcalow, 2015b). If clinicians are not empowered to enhance more positive and accepting perceptions of their bodies, there is a risk of clients reaching only a neutral perception of their body by merely tolerating it (Tylka & Wood-Barcalow, 2015b).

For these reasons, understanding the factors that influence body image in a more balanced way can improve both theory and treatment. The present program of research, therefore, was designed to achieve this understanding by examining variables that have been independently linked to positive body image in past research but had not yet been tested in a simultaneous model. From this, researchers may further understand how these factors work together to enhance positive well-being. Understanding how feeling good about one’s body – as opposed to not feeling bad about one’s body – has beneficial implications for one’s general well-being. If researchers can understand the role body appreciation plays in positive well-being, they can guide further research and practice into more holistic treatments for body image concerns and related well-being.

The primary aim of the present research was to examine factors that contribute to positive body image (operationalised as body appreciation) and mental health in adults using a positive psychology framework; that is, adopting the perspective that optimal mental health is not simply the absence of symptoms but also the cultivation of positive factors, and that this can be achieved through promoting beneficial psychological processes rather than only eliminating unhelpful ones.

Secondary aims of this dissertation included demonstrating the interrelationship between self-compassion, planned physical activity, intrinsic motivations to exercise, body appreciation, and positive well-being simultaneously. Secondly, using a prospective design with an initial baseline survey and a three-month and six-month follow-up survey, this research would provide clarity as to which variable (self-compassion or body appreciation) has a greater longitudinal influence over the other. This would confirm the strength and direction of relationships between self-compassion and body appreciation and provide insight into whether one variable is more sensitive to change over time. Additionally, this would help to inform the design of future intervention programs aimed at promoting positive body image and positive well-being. The final aim of the research program was to employ an experimental technique to establish cause and effect; specifically, to explore whether improving self-compassion via meditation training would enhance body appreciation, self-compassion, and positive well-being, and mitigate body dissatisfaction.

6.2. Summary of Findings

Study 1 investigated the predictors of body appreciation and positive well-being in a sample of young adults aged 18-39 years. The resulting structural equation model demonstrated that there were significant relationships between self-compassion, body appreciation and positive well-being; there were significant relationships between planned physical activity, body appreciation and positive well-being; and body appreciation significantly predicted increased positive well-being. Mediation pathways were also explored to explain the relationships between self-compassion and planned physical activity, and between body appreciation and positive well-being. Intrinsic motivations to exercise partially mediated the relationship between self-compassion and planned physical activity; body appreciation partially mediated the relationship between planned physical activity and positive well-being; and body appreciation mediated the relationship between self-compassion and positive well-being. A recap of the interpretations of the findings in Study 1 is in section 6.3.

Using the same sample, Study 2 investigated whether self-compassion or body appreciation is a more stable predictor than the other, and whether one variable was more sensitive to change over a three-month and six-month period. Results from this study showed partial support for a reciprocal model, though the effects over time were slightly stronger for self-compassion predicting body appreciation. Taken together, there was some evidence of a bidirectional influence between self-compassion and body appreciation whereby, over time, greater self-compassion was associated with higher body appreciation, and higher body appreciation was associated with greater self-compassion. However, these reciprocal effects were not entirely consistent. There was no significant cross-lagged effect between self-compassion at T1 and body appreciation at T2, and likewise, no significant cross-lagged effect between body appreciation at T1 and self-compassion at T2. A recap of the interpretations of the findings in Study 2 is explored in section 6.3.

Although Study 2 provided partial support of the stability over time among self-compassion and body appreciation levels, it did not establish cause and effect; therefore, Study 3 was designed to address this and test the potential real-world benefits for body appreciation by cultivating self-compassion via a mediation program. Specifically, Study 3 extended on the study conducted by Albertson et al. (2014) in a new, non-clinical sample of young adults aged 18-39 years. Additionally, Study 3 investigated if the frequency of meditation training influenced changes in body appreciation, positive well-being, and body dissatisfaction. Results from this study provided little evidence to suggest any real-world benefits that self-compassion meditation podcasts have on improving body appreciation and positive well-being, and mitigating body dissatisfaction. A recap of the interpretations of the findings of Study 3 is in section 6.3., and future recommendations in section 6.5. are explored.

6.3. Implications for the Major Study Aims

As previously discussed, the major aim of the dissertation was to investigate factors that promote body appreciation and mental health through the positive psychology lens. Together, two of the three studies confirmed several predictors. Particularly, enhanced self-compassion emerged as the most consistent predictor of body appreciation and positive well-being cross-sectionally and prospectively in the sample of young adults. This finding lends support to previous results related to self-compassion and body appreciation, and self-compassion and positive well-being (Albertson et al., 2014; Baer et al., 2012; Breines & Chen, 2012; Heffernan et al., 2010; Hollis-Walker & Colosimo, 2011; Homan & Tylka, 2015; Kelly & Stephen, 2016; Leary et al., 2007; Neff, 2003a; Neff, et al., 2005; Neff, Kirkpatrick, et al., 2007; Neff, Rude, et al., 2007; Neff & Vonk, 2009; Pisitsungkagarn et al., 2013; Schmidt et al., 2019; Wasylkiw et al., 2012). Planned physical activity (Study 1) also predicted greater body appreciation, and greater positive well-being as it had been shown to in previous studies (Kavussanu & McAuley, 1995; Kim et al., 2016; Maher et al., 2015; Cox & McMahon, 2019; Halliwell et al., 2019; Morgan et al., 2013; Pasco et al., 2011; Mahlo & Tiggemann, 2016; Schmalz et al., 2007).

Additionally, several mediation analyses in Study 1 confirmed the factors that contributed to positive well-being via intrinsic motivations to exercise and body appreciation. Specifically, the relationships found between self-compassion, planned physical activity, and intrinsic regulation are consistent with existing literature where self-compassion was theorised to promote a physically active lifestyle (Thall, 2014). Higher self-compassion promotes more intrinsic reasons for exercising, which in turn encourage more engagement in planned physical activity. Enhanced self-compassion is well suited to encouraging people to partake in healthy patterns and promoting intrinsic reasons for partaking in planned physical activity. People who are kind to themselves are more likely to participate in activities for reasons pertaining to the exercise of one's skills, excitement, feelings of enjoyment, and personal accomplishment, as well as health reasons.

Moreover, enhanced self-compassion was shown to promote more positive well-being through the greater appreciation of one's body. This supports a theoretical perspective as identified by Gilbert (1989) who posited that self-compassion deactivates the threat system and activates the self-soothing system. As addressed in Chapter 2, self-soothing qualities of self-compassion are thought to produce capacities for exploration and successful coping with the environment, effective affect regulation, and intimacy (Gilbert, 1989; Gilbert, 2005; Neff, Kirkpatrick, et al., 2007). This allows those with higher levels of self-compassion to foster more positive well-being, in part because self-compassion encourages individuals to appreciate their body for what it already looks like and what it can do, rather than critiquing or criticising it. Furthermore, rather than punitively judging one's body, which could stem from body-related comparisons, self-compassion conceivably assists with a type of accepting and kind response that promotes body appreciation (Andrew, 2015; Homan & Tylka, 2015). Greater positive well-being, therefore, is fostered by appreciating one's body for what it is, rather than engaging in self-judgement and denigration. These more positive perceptions, in turn, emerge through greater self-compassion.

Likewise, enhanced planned physical activity was related to an experience of greater positive well-being via body appreciation. This supports a theoretical perspective identified by Ryff (1989) pertaining to sense of mastery and accomplishment. This theory supports the notion that undertaking regular planned physical activity enhances positive well-being through appreciating the body's capabilities in executing particular tasks (e.g., running, stretching, throwing, kicking, bicep curling, etc.). This reinforces appreciation for one's body as it can perform and execute specific tasks related to the activity, and the physical capacity that one's body possesses.

Prospectively, there was partial support for a reciprocal relationship between self-compassion and body appreciation, though the effects over time were slightly stronger for self-compassion predicting body appreciation. Several possible mechanisms may explain why greater self-compassion at baseline was associated with higher body appreciation at a later time. Self-kindness – a component of self-compassion – specifically promotes understanding and care, which is directed inward (Neff, 2003a). It is likely that this played a role in the way participants perceived and felt about their bodies. An existing higher level of self-compassion may serve as a precursor for incremental improvements in body appreciation over time. Additionally, the common humanity component of self-compassion specifically could be argued to foster body appreciation through the recognition that body shape and size vary substantially between people. Perhaps shared experiences on social network forums (e.g., "body positive" Facebook groups) contribute to the enhancement of interconnectedness with others by collectively rejecting impractical exemplifications of unrealistic body standards. This in turn, may have generated a positive attitude and appreciation toward one's body that entails respect and gratitude (Albertson et al., 2014; Avalos et al., 2005). Finally, the mindfulness element of self-compassion could have prompted the participants to savour the here and now and to stop conforming to societal pressures, and to tune into themselves instead. Results from the present study has shown that greater body appreciation could be a natural consequence or by-product of broader self-compassion, where people with greater self-compassion are kind toward themselves, are involved in common humanity, and are mindfully aware of their experiences and more appreciative of their bodies (Albertson et al., 2014; Avalos et al., 2005). Given the bidirectional relationship, participants may also have decided to adopt greater body appreciation, which in turn may have engendered greater overall self-compassion. This may have involved participants realising that it may be more important to appreciate what the body offers rather than what it looks like; for instance, feeling more grateful for and appreciative of their body's functionality and body's ability to execute tasks. It may be this realisation, or epiphany even, which then could have allowed participants to extend that degree of appreciation and self-kindness across other domains and other areas of life. Additionally, greater body appreciation may have fostered greater overall self-compassion, which then could have fed back into a high level of body appreciation. Although Study 2 provided partial support of the stability over time among self-compassion and body appreciation levels, it did not establish cause and effect; therefore, Study 3 was designed to address this and test the real-world application of changing self-compassion via a mediation program. Findings of this experiment demonstrated engagement in the three-week self-compassion meditation program did not substantially influence change in all study outcomes. Failure of randomisation contributed to why the effects of the program were not large enough to have real-world significance. Results illustrated that at baseline, those who were randomly allocated into the experimental group had significantly greater body appreciation that those in the control group, albeit a small difference. Additionally, those allocated to the experimental group had marginally lower body dissatisfaction than those of the control group. Further, a non-clinical sample - compared to Albertson and colleagues' study (2014) - and attrition bias were attributed to the small effect sizes of the intervention. A lack of dosage effect was also present, where there was no relationship between how often people meditated and the changes in the body appreciation, positive well-being, and body dissatisfaction. This indicates that these types of interventions in young adults, irrespective of how long one meditates, do not clearly or meaningfully change thoughts and feelings about one's body and well-being for the better. It is worth noting that whilst the effects of the program, overall, were so small, the dosage effect was unlikely to emerge.

Given the abovementioned shortcomings, cause and effect was not established, and caution should be exercised regarding the notion of self-compassion contributing to enhanced body appreciation, self-compassion, positive well-being, and mitigating body dissatisfaction. Ultimately, the analyses showed no evidence that any effect of the program was significantly different from null effect, suggesting this type of intervention may not be particularly valuable for a general population. Compared to Albertson and colleagues' (2014) study, where participants baseline experienced heightened body dissatisfaction and eating disorder symptomatology, conceivably the intervention may be valuable for a sub-clinical sample; however, it is not clear if these types of interventions change thoughts and feelings about one's body among the general population. Recommendations for future research pertaining to experimental study designs are explored in section 6.5.

Overall, the results of this dissertation not only lend support to some previous findings, but also extend the literature in at least three important ways. First, the studies have broadened the scope of possible predictors of positive body image, operationalised as body appreciation, and positive well-being. Particularly, self-compassion, planned physical activity, and intrinsic motivations to exercise were identified as predictors, adding to those psychological predictors previously confirmed in the literature. Second, the investigation of predictors was extended to young adults, including a sample of men. This is important as research indicates that there is an increasing number of men who experience negative body image (Barnes et al., 2020; McCabe & Ricciardelli, 2004; Murray & McLean, 2018; Olivardia et al., 2004; Rodrigues & Rodrigues 2022). Consequences that arise from this range from unhappiness (e.g., body dissatisfaction) to unhealthy and extreme thoughts and behaviours (e.g., steroid use, excessive exercise, and muscle dysmorphic disorder; Leone et al., 2005). Findings from the present research apply to people regardless of gender. However, as gender was not directly compared, factors that facilitate body appreciation and positive well-being – or more broadly positive body image and enhanced mental health – in men, as and how they may differ for women, require further investigation.

Third, self-compassion was identified in the longitudinal follow-up as a predictor of body appreciation. Given longitudinal associations between self-compassion and body appreciation have not been adequately explored, this study provides more clarity onto the relationship among the two variables. Whilst there was partial support for a reciprocal relationship between self-compassion and body appreciation, the effects over time were slightly stronger for self-compassion predicting body appreciation. These findings contribute to the growing literature on the relationship between self-compassion and body appreciation through a prospective analysis.

6.4. Practical Implications

As identified in the present studies, there are several benefits to possessing body appreciation and positive well-being, and thus increasing positive body image may be a worthwhile aim for interventions (Tylka & Wood-Barcalow, 2015b). Indeed, it is possible that interventions that specifically seek to enhance positive body image will be welcomed additions to established interventions that focus more on reducing body dissatisfaction, and body image disturbance more broadly (Tylka & Wood-Barcalow, 2015b). Moreover, clinicians should encourage clients to have a more positive and accepting perceptions of their bodies, so that merely tolerating it is mitigated (Tylka & Wood-Barcalow, 2015b).

Additionally, helping young adults gauge and reflect on functional aspects of the body and its significance to partaking in meaningful activities could assist in highlighting areas of personal strength and growth and an appreciation for the body. Utilising a therapeutic approach that incorporates acceptance as a skill that can be learned and is values-guided may provide young adults with a more universal conceptualisation of self and mental health that is not contingent on appearance (Chung, 2014). More specifically, Acceptance and Commitment Therapy (ACT), defined as "... a psychological intervention based on modern behavioural psychology, including relational frame theory, that applies mindfulness and acceptance processes, and commitment and behaviour change processes, to the creation of psychological flexibility" (Hayes et al., 2006, p. 9), is a therapeutic approach that can facilitate appreciation of the body for what it is. ACT could assist people in accepting the flaws and limitations of their bodies, especially aspects that they cannot change. However, for aspects that a person *could* change, establishing healthy/adaptive values around body functionality could promote committed action to living in ways which align with these healthier values. In other words, helping to boost body appreciation could encourage people to develop body-related values that are more around what it can do than what it looks like, and the emergence of these new values could motivate a person to live in ways on a day-to-day basis that foster this greater sense of appreciation. Committed action could include engaging in more physical activity for the enjoyment of it and how it helps with strength, stamina, flexibility, etc., rather than focusing on weight loss or muscle mass for the sake of it. This idea is supported by the findings of Study 1 regarding intrinsic motivation.

A broader practical implication of the findings is that increasing positive body image should have a wide range of beneficial outcomes for young adults. Fostering body appreciation should encourage behaviours that benefit health, which in turn contribute to greater positive well-being. Businesses utilising advertisements for products and services (e.g., weight loss industry) through media outlets could reframe messages that are promoted in these campaigns. Specifically, the emphasis could shift from messages fostering appearance-based improvements to promoting functionality, and health and fitness. Given that appearance-based messages may appeal to someone concerned about losing weight, advertisements of this nature can often be misleading and promote unrealistic results (Ethan et al., 2016). This can perpetuate one's negative self-concept when comparing perceived personal weight loss "failures" with advertised themes of appearance-based achievement and success (Ethan et al., 2016). Therefore, it is important that businesses employing weight loss messages through media outlets (along with other community and government-led health programs) consider enhancing body appreciation – through fostering functionality, and health and fitness – in young adults to influence a range of health outcomes pertaining to overall well-being.

6.5. Limitations and Future Directions

Whilst studies presented in this dissertation extend past research by considering a range of factors that contribute to enhanced body appreciation and positive well-being, there are several limitations that must be noted. First, as previously discussed in this chapter, results from Study 3 indicated that randomisation had failed, and while there was did see some significant interactions, the amount of change that was accounted for by the grouping variables, were so small as to suggest they do not likely represent meaningful benefits. Specific limitations of this study were addressed in that discussion (Chapter 5); more broadly, future research could attempt to use meditation interventions more specific to body appreciation to improve this construct in people with only mild to moderate levels of body image concerns.

Second, given this project utilised a quantitative methodology, there was a lack of depth regarding the reasons behind why self-compassion, planned physical activity, and intrinsic motivations contributed to enhanced body appreciation and positive well-being. Qualitative studies are needed to explore in-depth insights on why such associations exist among the predictors of body appreciation and positive well-being. Thematic analyses would be appropriate by exploring key themes and patterns including how responding to their body's needs through acts of self-care and compassion contributes to enhanced body appreciation and overall positive well-being (Thornton & Lewis-Smith, 2021). Such investigations – which are layered, context-dependent, and in flux – would provide valuable insight to the approaches employed by people to enhance body appreciation and positive well-being. Fundamentally, this would be beneficial for psychologists and other healthcare professionals alike who would perhaps better comprehend the presentation and symptomologies when encountering those seeking to enhance their body appreciation and positive well-being.

Third, young adults who participated in this study were between 18-39 years of age. This limits generalisability of the findings to populations in middle and older adulthood and constrains the understanding of how predictors of body appreciation are related to positive well-being during later stages of adulthood. Future studies should examine if these predictors of body appreciation and, by extension, positive well-being, are valid among middle and older adults given recent investigations on body dissatisfaction levels in these populations (Fallon et al., 2014; Gough et al., 2016; Mangweth-Matzek et al., 2006). Given body image concerns differ from young adults to middle-aged (a shift from appearance-related aspects to being physically active) and older adults (a shift from appearance-related aspects to health issues and physical functioning aspects of the body; Lee & Damhorst, 2021), it is important for researchers, program intervention developers, and clinicians to understand and promote the factors that enhance body appreciation, to foster the overall well-being of adults in this population. Additionally, the current sample was relatively homogenous in terms of ethnicity and level of education (i.e., mostly Caucasian and well-educated individuals); therefore, caution should be taken when generalising the current findings to more diverse populations. Future research should explore the factors that promote body appreciation and mental health through the positive psychology lens in a more culturally and demographically diverse population.

Fourth, the research relied exclusively on self-report measures for all three studies. Self-report measures may have caused participants to provide answers that they felt were desired by the researchers (Holtgraves, 2004). Additionally, response bias may have been an issue in all three studies. Participants may have responded in a certain way irrespective of what question was asked. For example, some participants may have been more likely to respond, *"strongly agree"* (acquiescent response bias), or *"strongly disagree"* (non-acquiescent response bias) regardless of the content of the question (Demetriou et al., 2015). These limitations may compromise the validity and reliability of the questionnaires. Future research should consider implicit measures of relevant variables of interest (e.g., body-related attitudes) via an Implicit Association Test. These measures intend to reduce the need for participants to reveal personal insecurities, which can facilitate assembling important information; for example, providing valuable insights into cognitions underlying the field of eating disturbances (Chequer, 2014).

Last, payments/incentives were offered to research participants in all studies to enhance recruitment and retention of participants, which could have been perceived as coercive or serve as undue inducement to participants (Grady, 2005). Consequently, participants who were motivated by cash payments or other financial incentives could have had less interest in evaluating or understanding study details, reading the consent form, or attempting to understand the goals, purposes, and risks associated with a study (Grady, 2005). It must be noted, however, that the financial incentives were only a token amount that was unlikely to attract participants simply because of the financial benefit (Study 1 and Study 2); and that the higher amount for Study 3 was a lottery and was offered because of the greater commitment required to take part in the study.

Despite the limitations, the current dissertation makes important inroads in investigating the factors that contribute to body image and improved mental health. Taken together, the results suggest that self-compassion, planned physical activity, and intrinsic motivations to exercise are all either directly or indirectly associated with promoting body appreciation and positive well-being in young adults. Furthermore, prospectively, self-compassion is a stronger predictor of body appreciation than the inverse, although there is some evidence of bidirectionality. Overall, the results contribute to our understanding of factors that influence body appreciation and positive well-being in young adults, and in so doing, identify several potential points for intervention.

6.6. Concluding Statement

The present dissertation investigated factors that promote body appreciation and mental health through the positive psychology lens in young adults across three studies using different methodologies. Most studies identified several predictors and positive outcomes of body appreciation and positive well-being. The findings suggest several mechanisms by which we might enhance body appreciation, with several potential benefits. This dissertation outlined that self-compassion, planned physical activity, and intrinsic motivations to exercise appear to be important contributors to body appreciation, and positive well-being in young adults. It is to be hoped that this dissertation influences clinicians, researchers, and program intervention developers alike to collaborate and engage in efforts to enhance body appreciation and positive well-being.

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Appendices

Appendix A

Survey Items: Studies 1 and 2

SECTION A: Your Background

A1	Are you:	1: Male 2: Female 3: Other (Please specify)
A2	In which month were you born?	[drop down list: January thru December]
A3	What is your age (in years)	[drop down list: 18 thru 39]
A4	In which country do you currently live?	[drop down list] Australia Canada Ireland New Zealand United Kingdom United States of America
A5	In which country were you born?	[drop down list] Afghanistan Albania Algeria Andorra Angola Antigua and Barbuda Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Barbados Belarus Belgium Belize Benin Bhutan Bolivia Bosnia and Herzegovina Botswana Brazil Brunei Darussalam Bulgaria Burkina Faso Burundi Cambodia Cameroon

		Canada Cape Verde Central African Republic Chad Chile China Colombia Comoros Democratic Republic of the Congo Republic of the Congo Costa Rica Cote d'Ivoire Croatia Cuba Cyprus Czech Republic Denmark Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea Estonia Ethiopia Fiji Finland France Gabon Gambia Georgia Germany Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Honduras Hong Kong Hungary Iceland India Indonesia Iran Iraq Ireland Israel Italy Jamaica Japan

		Jordan Kazakhstan Kenya Kiribati North Korea South Korea Kuwait Kyrgyzstan Laos Latvia Lebanon Lesotho Liberia Libya Liechtenstein Lithuania Luxembourg Republic of Macedonia Madagascar Malawi Malaysia Maldives Mali Malta Marshall Islands Mauritania Mauritius Mexico Micronesia, Federated States of Moldova Monaco Mongolia Montenegro Morocco Mozambique Myanmar Namibia Nauru Nepal Netherlands New Zealand Nicaragua Niger Nigeria Norway Oman Pakistan Palau Panama Papua New Guinea Paraguay Peru Philippines Poland Portugal

		Qatar Romania Russian Federation Rwanda Saint Kitts and Nevis Saint Lucia Saint Vincent and the Grenadines Samoa San Marino Sao Tome and Principe Saudi Arabia Senegal Serbia Seychelles Sierra Leone Singapore Slovakia Slovenia Solomon Islands Somalia South Africa Spain Sri Lanka Sudan Suriname Swaziland Sweden Switzerland Syria Tajikistan Tanzania Thailand Timor-Leste Togo Tonga Trinidad and Tobago Tunisia Turkey Turkmenistan Tuvalu Uganda Ukraine United Arab Emirates United Kingdom United States of America Uruguay Uzbekistan Vanuatu Venezuela Viet Nam Yemen Zambia Zimbabwe
A6	How would you describe your racial or ethnic background?	1: African 2: Arabic

		3: Asian 4: Caucasian 5: European 6: Hispanic or Latino 7: Mixed/Multiple ethnic groups 8: Native or Indigenous 9: Other (Please specify)
A7	What is the highest level of education you have completed?	1: Primary school only 2: Some secondary school 3: All of secondary school (up to Year 12) 4: Tertiary diploma/trade certificate 5: University degree (undergraduate) 6: University degree (postgraduate)
A8	Which of the following best describes the area in which you live?	1: Capital city/Inner suburban 2: Outer suburban 3: Regional centre (pop. 5,000 or more) 4: Rural
A9	What is the postcode or suburb/town where you live?	[Entre manually]
A10	What is your employment status?	1: Working full-time 2: Working part-time 3: Working casually, sessionally, or temping 4: Unemployed 5: Retired 6: Household duties 7: Receiving a pension/benefit 8: Student 9: Volunteer 10: Other (please specify)
A11	What is your height? What is your weight?	[Entre manually in cm.] [Entre manually in kg.]

SECTION B: Sexual Orientation

S1	How would you describe your sexual orientation?	1: Straight or heterosexual 2: Gay or homosexual 3: Bisexual 4: Other (please specify): ___________

SECTION C: Well-Being

	Below are some statements about feelings and thoughts. Please tick the box that best describes your experience of each over the last 2 weeks.	
WB-a	I’ve been feeling optimistic about the future	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time

WB-b	I've been feeling useful	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-c	I've been feeling relaxed	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-d	I've been feeling interested in other people	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-e	I've had energy to spare	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-f	I've been dealing with problems well	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-g	I've been thinking clearly	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-h	I've been feeling good about myself	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-i	I've been feeling close to other people	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-j	I've been feeling confident	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-k	I've been able to make up my own mind about things	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-l	I've been feeling loved	1: None of the time 2: Rarely 3: Some of the time 4: Often

		5: All the time
WB-m	I've been interested in new things	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-n	I've been feeling cheerful	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time

SECTION D: Your Body

BAS-2	Below is a list of attributes relating to the appreciation of your body. Please indicate whether the question is true about you never, seldom, sometimes, often, or always.	
BAS-2-a	I respect my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-b	I feel good about my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-c	I feel that my body has at least some good qualities.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-d	I take a positive attitude towards my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-e	I am attentive to my body's needs.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-f	I feel love for my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-g	I appreciate the different and unique characteristics of my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always

BAS-2-h	My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-i	I am comfortable in my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-j	I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors).	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always

SECTION E: Self-Compassion

	Now we would like to ask you some questions about how you would typically act towards yourself in difficult times.	
SC-a	I'm disapproving and judgmental about my own flaws and inadequacies.	1: Almost never 2: 3: 4: 5: Almost always
SC-b	When I'm feeling down I tend to obsess and fixate on everything that's wrong.	1: Almost never 2: 3: 4: 5: Almost always
SC-c	When things are going badly for me, I see the difficulties as part of life that everyone goes through.	1: Almost never 2: 3: 4: 5: Almost always
SC-d	When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.	1: Almost never 2: 3: 4: 5: Almost always
SC-e	I try to be loving towards myself when I'm feeling emotional pain.	1: Almost never 2: 3: 4: 5: Almost always
SC-f	When I fail at something important to me I become consumed by feelings of inadequacy.	1: Almost never 2: 3: 4:

		5: Almost always
SC-g	When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.	1: Almost never 2: 3: 4: 5: Almost always
SC-h	When times are really difficult, I tend to be tough on myself.	1: Almost never 2: 3: 4: 5: Almost always
SC-i	When something upsets me I try to keep my emotions in balance.	1: Almost never 2: 3: 4: 5: Almost always
SC-j	When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.	1: Almost never 2: 3: 4: 5: Almost always
SC-k	I’m intolerant and impatient towards those aspects of my personality I don't like.	1: Almost never 2: 3: 4: 5: Almost always
SC-l	When I’m going through a very hard time, I give myself the caring and tenderness I need.	1: Almost never 2: 3: 4: 5: Almost always
SC-m	When I’m feeling down, I tend to feel like most other people are probably happier than I am.	1: Almost never 2: 3: 4: 5: Almost always
SC-n	When something painful happens I try to take a balanced view of the situation.	1: Almost never 2: 3: 4: 5: Almost always
SC-o	I try to see my failings as part of the human condition.	1: Almost never 2: 3: 4: 5: Almost always
SC-p	When I see aspects of myself that I don’t like, I get down on myself.	1: Almost never 2: 3: 4: 5: Almost always

SC-q	When I fail at something important to me I try to keep things in perspective.	1: Almost never 2: 3: 4: 5: Almost always
SC-r	When I'm really struggling, I tend to feel like other people must be having an easier time of it.	1: Almost never 2: 3: 4: 5: Almost always
SC-s	I'm kind to myself when I'm experiencing suffering.	1: Almost never 2: 3: 4: 5: Almost always
SC-t	When something upsets me I get carried away with my feelings.	1: Almost never 2: 3: 4: 5: Almost always
SC-u	I can be a bit cold-hearted towards myself when I'm experiencing suffering.	1: Almost never 2: 3: 4: 5: Almost always
SC-v	When I'm feeling down I try to approach my feelings with curiosity and openness.	1: Almost never 2: 3: 4: 5: Almost always
SC-w	I'm tolerant of my own flaws and inadequacies.	1: Almost never 2: 3: 4: 5: Almost always
SC-x	When something painful happens I tend to blow the incident out of proportion.	1: Almost never 2: 3: 4: 5: Almost always
SC-y	When I fail at something that's important to me, I tend to feel alone in my failure.	1: Almost never 2: 3: 4: 5: Almost always
SC-z	I try to be understanding and patient towards those aspects of my personality I don't like.	1: Almost never 2: 3: 4: 5: Almost always

SECTION F: Physical Activity

	This part of the survey explores some of the experiences you may have had with regard to physical activity.	
PA	For each pre-planned lifestyle physical activity below that you have participated in, please indicated the type of physical activity. Pre-planned lifestyle physical activity is any activity that is scheduled into your daily routine, which may enhance your health, fitness or well-being	[drop down list: Team sports (indoor and outdoor)] [drop down list: Individual sports (indoor and outdoor)] [drop down list: Gym] [drop down list: Incidental activities] [drop down list: Other activities]
PA-1a	1. How many times in a normal week do you engage in pre-planned physical activity?	1: Never 2: 1-2 times 3: 3-4 times 4: 5-6 times 5: 7 or more times
PA-1b	2. How long have you been engaging in pre-planned physical activity at this weekly rate?	1: Not relevant to me 2: Less than 1 month 3: 1-3 months 4: 4-6 months 5: More than 7 months
PA-1c	3. In general, what is the duration of each session of pre-planned physical activity that you engage in?	1: Not relevant to me 2: Less than 10 minutes 3: 10-20 minutes 4: 21-30 minutes 5: More than 30 minutes
PA-1d	4. If you add together each session of pre-planned physical activity that you engage in during a normal week, how much time would you estimate that you spend in total?	1: Not relevant to me 2: Less than 1 hour 3: 1-2 hours 4: 3-5 hours 5: More than 5 hours
PA-1e	5. In the past, how long have you generally persisted with a pre-planned physical activity program before giving up?	1: Not relevant to me as I have never persisted 2: Up to 1 month 3: Up to 3 months 4: Up to 6 months 5: More than 6 months, or, I have never given up
PA-1f	6. How vigorously do you engage in these forms of physical activity? ("Very light" means that you hardly get out of breath. "Very hard" means that you exercise to the extent that you are breathing deeply)	1: Not relevant to me 2: Very light 3: Moderately hard 4: Hard 5: Very hard
PA-2a	7. Excluding your pre-planned physical activity sessions, how many hours do you estimate that you spend doing other forms of physical activity each week? (These may include heavy housework, climbing	1: Fewer than 2 hours 2: 2-4 hours 3: 5-7 hours 4: 8-9 hours 5: 10 hours or more

	stairs, cycling or walking to work, walking the dog, gardening, shopping, playing with children, etc.)	
PA-2b	8. How vigorously do you engage in pre-planned physical activity? ("Very light" means that you hardly get out of breath. "Very hard" means that you exercise to the extent that you are breathing deeply)	1: Not relevant to me 2: Very light 3: Moderately hard 4: Hard 5: Very hard
PA-2c	9. In general, how physically demanding are your job or day-to-day activities? ("Not at all" means that your activities are sedentary without requiring much movement. "Highly" means that you are engaged in heavy labour or constantly moving around)	1: Not at all 2: A little 3: Moderately 4: Quite 5: Highly
PA-2d	10. Which of these types of physical activity do you enjoy participating in? (Click as many as appropriate)	1. Walking/ Hiking 2. Swimming 3. Weight-training 4. Aerobics/ Steps 5. Jogging/ Running 6. Rowing 7. Cycling 8. Step machine 9. Dancing 10. Yoga 11. None 12. Other (please specify below) [drop down list]

SECTION G: Motivations to Exercise

	We are interested in the reasons underlying your decisions to engage, or not engage in physical exercise. Please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise.	
EXM-a	It’s important to me to exercise regularly	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-b	I don’t see why I should have to exercise	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me

EXM-c	I exercise because it's fun	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-d	I feel guilty when I don't exercise	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-e	I exercise because it is consistent with my life goals	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-f	I exercise because other people say I should	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-g	I value the benefits of exercise	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-h	I can't see why I should bother exercising	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-i	I enjoy my exercise sessions	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-j	I feel ashamed when I miss an exercise session	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-k	I consider exercise part of my identity	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-l	I take part in exercise because my friends/family/partner say I should	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-m	I think it is important to make the effort to exercise regularly	0: Not true for me 1: 2: Sometimes true for me 3:

		4: Very true for me
EXM-n	I don't see the point in exercising	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-o	I find exercise a pleasurable activity	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-p	I feel like a failure when I haven't exercised in a while	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-q	I consider exercise a fundamental part of who I am	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-r	I exercise because others will not be pleased with me if I don't	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-s	I get restless if I don't exercise regularly	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-t	I think exercising is a waste of time	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-u	I get pleasure and satisfaction from participating in exercise	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-v	I would feel bad about myself if I was not making time to exercise	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-w	I consider exercise consistent with my values	0: Not true for me 1: 2: Sometimes true for me 3: 4: Very true for me
EXM-x	I feel under pressure from my friends/family to exercise	0: Not true for me 1: 2: Sometimes true for me

		3: 4: Very true for me

Appendix B

Ethics Approval: Studies 1 and 2

Dear DR WARWICK HOSKING,

Your ethics application has been formally reviewed and finalised.

» Application ID: HRE19-092
» Chief Investigator: DR WARWICK HOSKING
» Other Investigators: DR SIAN MCLEAN, MR JOSHUA MARMARA
» Application Title: Examining predictors of body appreciation and positive well-being among young adults: Perspectives from positive psychology.
» Form Version: 13-07

The application has been accepted and deemed to meet the requirements of the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007)' by the Victoria University Human Research Ethics Committee. Approval has been granted for two (2) years from the approval date; 09/07/2019.

Continued approval of this research project by the Victoria University Human Research Ethics Committee (VUHREC) is conditional upon the provision of a report within 12 months of the above approval date or upon the completion of the project (if earlier). A report proforma may be downloaded from the Office for Research website at: http://research.vu.edu.au/hrec.php.

Please note that the Human Research Ethics Committee must be informed of the following: any changes to the approved research protocol, project timelines, any serious events or adverse and/or unforeseen events that may affect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes. Researchers are also reminded of the need to notify the approving HREC of changes to personnel in research projects via a request for a minor amendment. It should also be noted that it is the Chief Investigators' responsibility to ensure the research project is conducted in line with the recommendations outlined in the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007).'

On behalf of the Committee, I wish you all the best for the conduct of the project.

Secretary, Human Research Ethics Committee
Phone: 9919 4781 or 9919 4461
Email: researchethics@vu.edu.au

This is an automated email from an unattended email address. Do not reply to this address.

Appendix C

Participant Information Form: Studies 1 and 2

You are invited to participate

You are invited to participate in a research project entitled: Examining predictors of body appreciation and positive well-being among young adults: Perspectives from positive psychology.

This project is being conducted by a student researcher Joshua Marmara as part of a requirement of the degree of Doctor of Philosophy at Victoria University under the supervision of Dr Warwick Hosking and Dr Peter Baldwin from the Institute of Health and Sport.

Project explanation

This study is an online survey examining predictors of body appreciation and positive well-being among young adults from the perspectives of positive psychology. Self-compassion, physical activity, exercise motivations, and importance of appearance and importance of functionality will be explored as factors which may influence body appreciation and its association with positive well-being. Depression and anxiety levels along with prosocial behaviour intentions and pandemic stress will also be examined.

Findings from this study will give information about the risk factors, which could help with the designing of future interventions that are based on risk factor models. Moreover, results may identify factors that could be used in future interventions tailored to men. These interventions will deliver the necessary steps required for men to become more appreciative of their bodies, thereby contributing to improved well-being.

What will I be asked to do?

Upon indicating your consent to participate by checking the box at the bottom of this page, you will be asked to answer questions about self-compassion, physical activity, exercise motivations, importance of appearance and importance of functionality, depression, anxiety, body appreciation and well-being. You will also be asked to provide some demographic information about yourself. Your participation in this survey is completely voluntary, and all responses you provide will be anonymous and confidential.

What will I gain from participating?

There are monetary incentives for completing the survey. As you will be required to complete the survey three times, you will receive approximately £1.66 for each survey completed plus an additional £0.82 for the second and third follow-up surveys. Although there are no psychological benefits for participating, results of this survey may identify factors that could be used in future interventions tailored to men. These interventions will deliver the necessary steps required for men to become more appreciative of their bodies, thereby contributing to improved well-being.

How will the information I give be used?

Responses will be collated and analysed at the group level. The findings will be reported in the student investigator’s thesis and may be written up in journal articles and presented at academic conferences.

What are the potential risks of participating in this project?

As some questions in the survey are of a personal nature, you may feel uncomfortable answering some of them. You are free to skip any questions that you do not want to answer, and as your participation is completely voluntary, you are free to withdraw at any time without submitting your responses. In the event you experience any discomfort or distress from participating in the survey, you are encouraged to contact the following services, which will provide a free, confidential, and anonymous telephone counselling service:
Participants from Australia (Lifeline on 13 11 14)
Participants from Canada (Crisis services Canada on 1833 456 4566)
Participants from Ireland (Samaritans on 116 123)
Participants from New Zealand (Lifeline on 0800 543 354 or 09 5222 999)
Participants from the United Kingdom (Samaritans on 116 123)
Participants from the United States of America (National suicide prevention lifeline on 1800 273 8255)

How will this project be conducted?

The project will be conducted using an online survey which includes questions about self-compassion, physical activity, exercise motivations, importance of appearance and importance of functionality, depression, anxiety, body appreciation and well-being. The survey should take no longer than 20 minutes to complete. All responses will be completely anonymous and confidential, and results will be collated and statistically analysed.

Who is conducting the study?

Joshua Marmara (Student researcher)
Joshua.marmara@live.vu.edu.au

Dr Warwick Hosking (Chief investigator)
warwick.hosking@vu.edu.au
(03) 9919 2620

Dr Siân McLean (Associate investigator)
sian.mclean@vu.edu.au
(03) 9919 5867

Any queries about your participation in this project may be directed to the Chief Investigator listed above.
If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

STATEMENT BY PERSON AGREEING TO PARTICIPATE IN THIS STUDY

I have read this informed consent document and the material contained in it has been explained to me. I understand each part of the document, all my questions have been answered, and I freely and voluntarily choose to participate in this study.

Appendix D

Table 21.

Factor Loadings and Commonalities Based on a Principal Component Analysis with Promax Rotation for the BAS-2, SCS, BLPAQ (PPA Subscale) BREQ-3 (IR and ER Subscale), and WEMWBS Items (n = 394)

	Factor loading						
	1	2	3	4	5	6	7
Factor 1: Body Appreciation-2							
4. I take a positive attitude towards my body.	0.91						
3. I feel that my body has at least some good qualities.	0.89						
10. I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors).	0.88						
7. I appreciate the different and unique characteristics of my body.	0.87						
2. I feel good about my body.	0.86						
6. I feel love for my body.	0.86						
9. I am comfortable in my body.	0.84						
8. My behaviour reveals my positive attitude toward my body; for example, I hold my head high and smile.	0.75						
5. I am attentive to my body's needs.	0.74						
1. I respect my body.	0.74						
Factor 2: Positive Well-being							
9. I've been feeling close to other people		0.87					
7. I've been thinking clearly		0.81					
12. I've been feeling loved		0.80					
14. I've been feeling cheerful		0.80					
11. I've been able to make up my own mind about things		0.73					
1. I've been feeling optimistic about the future		0.72					
2. I've been feeling useful		0.70					
4. I've been feeling interested in other people		0.70					
10. I've been feeling confident		0.65					
8. I've been feeling good about myself		0.64					
6. I've been dealing with problems well		0.62					
13. I've been interested in new things		0.60					
3. I've been feeling relaxed		0.58					

Factor 3: Self-Compassion (Reverse Items)			
6. When I fail at something important to me I become consumed by feelings of inadequacy.	0.81		
16. When I see aspects of myself that I don't like, I get down on myself.	0.81		
2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.	0.80		
8. When times are really difficult, I tend to be tough on myself.	0.80		
25. When I fail at something that's important to me, I tend to feel alone in my failure.	0.77		
1. I'm disapproving and judgmental about my own flaws and inadequacies.	0.69		
4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.	0.65		
11. I'm intolerant and impatient towards those aspects of my personality I don't like.	0.61		
13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.	0.49		
Factor 4: Brunel Lifestyle Physical Activity Questionnaire - Planned Physical Activity subscale			
2. How long have you been engaging in pre-planned physical activity at this weekly rate?		0.87	
1. How many times in a normal week do you engage in pre-planned physical activity?		0.86	
3. In general, what is the duration of each session of pre-planned physical activity that you engage in?		0.86	
4. If you add together each session of pre-planned physical activity that you engage in during a normal week, how much time would you estimate that you spend in total?		0.86	
5. In the past, how long have you generally persisted with a pre-planned physical activity program before giving up?		0.62	
6. How vigorously do you engage in these forms of physical activity? ("Very light" means that you hardly get out of breath. "Very hard" means that you exercise to the extent that you are breathing deeply)		0.60	
Factor 5: Self-Compassion			
22. When I'm feeling down I try to approach my feelings with curiosity and openness.			0.74
5. I try to be loving towards myself when I'm feeling emotional pain.			0.73
3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.			0.72
12. When I'm going through a very hard time, I give myself the caring and tenderness I need.			0.70
			0.66

26. I try to be understanding and patient towards those aspects of my personality I don't like.	0.65		
15. I try to see my failings as part of the human condition.	0.65		
19. I'm kind to myself when I'm experiencing suffering.			
Factor 6: Behavioural Regulation in Exercise Questionnaire-3 – Intrinsic Regulation subscale			
9. I enjoy my exercise sessions		0.85	
15. I find exercise a pleasurable activity		0.85	
21. I get pleasure and satisfaction from participating in exercise		0.84	
3. I exercise because it's fun		0.83	
Factor 7: Behavioural Regulation in Exercise Questionnaire-3 – External Regulation subscale			
18. I exercise because others will not be pleased with me if I don't			0.85
12. I take part in exercise because my friends/family/partner say I should			0.85
24. I feel under pressure from my friends/family to exercise			0.80
6. I exercise because other people say I should			0.76

Appendix E

Confirmatory Factor Analysis SCS T1

"SCST=~ SCS_1 + SCS_2 + SCS_3 + SCS_4 + SCS_5 + SCS_6 + SCS_7 + SCS_8 + SCS_9 + SCS_10 + SCS_11 + SCS_12 + SCS_13 + SCS_14 + SCS_15 + SCS_16 + SCS_17 + SCS_18 + SCS_19 + SCS_20 + SCS_21 + SCS_22 + SCS_23 + SCS_24 + SCS_25 + SCS_26

Note: ~~ = co-vary

SCS_7~~SCS_10
SCS_1~~SCS_2
SCS_5~~SCS_12
SCS_7~~SCS_15
SCS_9~~SCS_14
SCS_10~~SCS_15
SCS_13~~SCS_18
SCS_14~~SCS_17
SCS_15~~SCS_17
SCS_8~~SCS_21
SCS_9~~SCS_17
SCS_10~~SCS_17
SCS_12~~SCS_19
SCS_14~~SCS_15
SCS_20~~SCS_25
SCS_19~~SCS_26
SCS_23~~SCS_26
SCS_20~~SCS_24
SCS_5~~SCS_19
SCS_5~~SCS_22
SCS_3~~SCS_7
SCS_2~~SCS_4
SCS_5~~SCS_26
SCS_9~~SCS_15
SCS_10~~SCS_12
SCS_10~~SCS_22
SCS_12~~SCS_22
SCS_16~~SCS_20
SCS_22~~SCS_26
SCS_24~~SCS_25
SCS_3~~SCS_10
SCS_11~~SCS_16
SCS_12~~SCS_26
SCS_13~~SCS_25
SCS_3~~SCS_15
SCS_19~~SCS_22
SCS_22~~SCS_23
SCS_1~~SCS_25

```
SCS_2~~SCS_6
SCS_3~~SCS_14
SCS_3~~SCS_17
SCS_3~~SCS_9
SCS_4~~SCS_25
SCS_7~~SCS_14
SCS_7~~SCS_17
SCS_7~~SCS_23
SCS_8~~SCS_13
SCS_3~~SCS_23
SCS_10~~SCS_14
SCS_11~~SCS_25
SCS_14~~SCS_19
SCS_14~~SCS_23
SCS_16~~SCS_25
SCS_9~~SCS_10
SCS_18~~SCS_25
SCS_7~~SCS_9"

SCStest1 <- cfa(SCStest, data = JMDFULLDATASET_BL_3M_6M, estimator="MLR",
meanstructure=F)summary(SCStest1, standardised = T, fit.measures = T, rsq = T)

subset(modificationindices(SCStest1), mi > 3)
```

lavaan 0.6-6 ended normally after 53 iterations

Estimator	ML	
Optimization method	NLMINB	
Number of free parameters	108	
Number of observations	Used	Total
	394	394
Model Test User Model:		
	Standard	Robust
Test Statistic	558.309	473.056
Degrees of freedom	243	243
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.180
Yuan-Bentler correction (Mplus variant)		

Model Test Baseline Model:

Test statistic	5101.404	4183.828
Degrees of freedom	325	325
P-value	0.000	0.000
Scaling correction factor		1.219

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.934	0.940
Tucker-Lewis Index (TLI)	0.912	0.920

Robust Comparative Fit Index (CFI)		0.942
Robust Tucker-Lewis Index (TLI)		0.923

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-13165.017	-13165.017
Scaling correction factor for the MLR correction	1.177	
Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.179	
Akaike (AIC)	26546.033	26546.033
Bayesian (BIC)	26975.479	26975.479
Sample-size adjusted Bayesian (BIC)	26632.796	26632.796

Root Mean Square Error of Approximation:

RMSEA	0.057	0.049
90 Percent confidence interval – Lower	0.051	0.043
90 Percent confidence interval – Upper	0.064	0.055
P-value RMSEA <= 0.05	0.026	0.597
Robust RMSEA		0.053
90 Percent confidence interval – Lower		0.046
90 Percent confidence interval – Upper		0.060

Standardised Root Mean Square Residual:

SRMR	0.084	0.084

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCST=~						
SCS_1	1.000			0.866	0.748	
SCS_2	0.936	0.067	14.059	0.000	0.810	0.668
SCS_3	0.323	0.075	4.329	0.000	0.279	0.279
SCS_4	0.859	0.057	15.185	0.000	0.744	0.616
SCS_5	0.466	0.073	6.407	0.000	0.404	0.372
SCS_6	1.003	0.062	16.222	0.000	0.869	0.730

SCS_7	0.479	0.071	6.748	0.000	0.415	0.371
SCS_8	0.931	0.063	14.877	0.000	0.806	0.743
SCS_9	0.354	0.075	4.701	0.000	0.307	0.290
SCS_10	0.423	0.076	5.529	0.000	0.366	0.329
SCS_11	0.762	0.071	10.718	0.000	0.660	0.584
SCS_12	0.646	0.061	10.585	0.000	0.560	0.544
SCS_13	0.667	0.064	10.433	0.000	0.577	0.517
SCS_14	0.397	0.068	5.823	0.000	0.344	0.351
SCS_15	0.421	0.079	5.318	0.000	0.364	0.333
SCS_16	0.935	0.061	15.228	0.000	0.810	0.754
SCS_17	0.506	0.069	7.287	0.000	0.438	0.441
SCS_18	0.643	0.072	8.883	0.000	0.557	0.495
SCS_19	0.680	0.061	11.138	0.000	0.589	0.577
SCS_20	0.772	0.066	11.703	0.000	0.669	0.597
SCS_21	0.861	0.059	14.664	0.000	0.745	0.674
SCS_22	0.448	0.068	6.583	0.000	0.388	0.389
SCS_23	0.752	0.060	12.222	0.000	0.651	0.626
SCS_24	0.654	0.075	8.672	0.000	0.566	0.475
SCS_25	0.897	0.062	14.524	0.000	0.777	0.710
SCS_26	0.576	0.065	8.877	0.000	0.499	0.493

Covariances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_7~~SCS_10	0.655	0.062	10.589	0.000	0.655	0.601
SCS_1~~SCS_2	0.119	0.044	2.703	0.007	0.119	0.171
SCS_5~~SCS_12	0.390	0.059	6.568	0.000	0.390	0.448
SCS_7~~SCS_15	0.423	0.061	6.912	0.000	0.423	0.394
SCS_9~~SCS_14	0.513	0.053	9.614	0.000	0.513	0.553
SCS_10~~SCS_15	0.527	0.063	8.385	0.000	0.527	0.486
SCS_13~~SCS_18	0.428	0.067	6.413	0.000	0.428	0.457
SCS_14~~SCS_17	0.369	0.054	6.828	0.000	0.369	0.452
SCS_15~~SCS_17	0.384	0.060	6.365	0.000	0.384	0.417
SCS_8~~SCS_21	0.139	0.039	3.526	0.000	0.139	0.233
SCS_9~~SCS_17	0.323	0.058	5.546	0.000	0.323	0.358
SCS_10~~SCS_17	0.350	0.058	6.072	0.000	0.350	0.375
SCS_12~~SCS_19	0.333	0.054	6.215	0.000	0.333	0.463
SCS_14~~SCS_15	0.372	0.058	6.447	0.000	0.372	0.393
SCS_20~~SCS_25	0.004	0.041	0.092	0.927	0.004	0.005
SCS_19~~SCS_26	0.218	0.043	5.106	0.000	0.218	0.297
SCS_23~~SCS_26	0.170	0.041	4.138	0.000	0.170	0.239
SCS_20~~SCS_24	0.314	0.061	5.114	0.000	0.314	0.333
SCS_5~~SCS_19	0.329	0.057	5.724	0.000	0.329	0.390
SCS_22	0.314	0.052	6.017	0.000	0.314	0.339
SCS_3~~SCS_7	0.333	0.055	6.100	0.000	0.333	0.333
SCS_2~~SCS_4	0.169	0.053	3.198	0.001	0.169	0.197
SCS_5~~SCS_26	0.290	0.052	5.523	0.000	0.290	0.327
SCS_9~~SCS_15	0.295	0.066	4.485	0.000	0.295	0.282
SCS_10~~SCS_12	0.106	0.038	2.803	0.005	0.106	0.117
SCS_22	0.094	0.044	2.110	0.035	0.094	0.097
SCS_12~~SCS_22	0.243	0.048	5.038	0.000	0.243	0.306

SCS_16~~SCS_20	0.092	0.040	2.300	0.021	0.092	0.144
SCS_22~~CS_26	0.229	0.049	4.690	0.000	0.229	0.284
SCS_24~~SCS_25	0.175	0.045	3.886	0.000	0.175	0.216
SCS_3~~SCS_10	0.267	0.058	4.630	0.000	0.267	0.264
SCS_11~~SCS_16	0.094	0.051	1.855	0.064	0.094	0.146
SCS_12~~SCS_26	0.187	0.050	3.747	0.000	0.187	0.246
SCS_13~~SCS_25	0.132	0.045	2.927	0.003	0.132	0.179
SCS_3~~SCS_15	0.306	0.056	5.456	0.000	0.306	0.308
SCS_19~~SCS_22	0.134	0.047	2.832	0.005	0.134	0.175
SCS_22~~SCS_23	0.097	0.040	2.451	0.014	0.097	0.131
SCS_1~~SCS_25	-0.083	0.036	-2.302	0.021	-0.083	-0.140
SCS_2~~SCS_6	0.070	0.044	1.566	0.117	0.070	0.095
SCS_3~~SCS_14	0.313	0.051	6.089	0.000	0.313	0.355
SCS_17	0.265	0.055	4.829	0.000	0.265	0.309
SCS_9	0.271	0.054	5.003	0.000	0.271	0.278
SCS_4~~SCS_25	0.070	0.044	1.611	0.107	0.070	0.096
SCS_7~~SCS_14	0.307	0.053	5.737	0.000	0.307	0.322
SCS_17	0.248	0.054	4.575	0.000	0.248	0.267
SCS_23	0.100	0.038	2.665	0.008	0.100	0.119
SCS_8~~ CS_13	-0.076	0.030	-2.500	0.012	-0.076	-0.110
SCS_3~~SCS_23	0.103	0.036	2.833	0.005	0.103	0.132
SCS_10~~SCS_14	0.235	0.054	4.340	0.000	0.235	0.245
SCS_11~~SCS_25	-0.078	0.043	-1.808	0.071	-0.078	-0.111
SCS_14~~SCS_19	0.059	0.028	2.119	0.034	0.059	0.077
SCS_23	0.079	0.037	2.154	0.031	0.079	0.107
SCS_16~~SCS_25	0.058	0.039	1.514	0.130	0.058	0.107
SCS_9~~SCS_10	0.276	0.060	4.615	0.000	0.276	0.260
SCS_18~~SCS_25	0.093	0.041	2.291	0.022	0.093	0.123
SCS_7~~SCS_9	0.233	0.059	3.975	0.000	0.233	0.221

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	0.590	0.051	11.460	0.000	0.590	0.440
SCS_2	0.815	0.080	10.227	0.000	0.815	0.554
SCS_3	0.926	0.062	14.956	0.000	0.926	0.922
SCS_4	0.905	0.074	12.207	0.000	0.905	0.620
SCS_5	1.017	0.071	14.276	0.000	1.017	0.862
SCS_6	0.660	0.062	10.731	0.000	0.660	0.466
SCS_7	1.080	0.063	17.263	0.000	1.080	0.863
SCS_8	0.527	0.049	10.769	0.000	0.527	0.448
SCS_9	1.023	0.069	14.760	0.000	1.023	0.916
SCS_10	1.101	0.072	15.396	0.000	1.101	0.892
SCS_11	0.838	0.073	11.559	0.000	0.838	0.658
SCS_12	0.745	0.061	12.228	0.000	0.745	0.704
SCS_13	0.916	0.076	12.071	0.000	0.916	0.733
SCS_14	0.841	0.057	14.716	0.000	0.841	0.877
SCS_15	1.066	0.075	14.260	0.000	1.066	0.889
SCS_16	0.497	0.058	8.507	0.000	0.497	0.432
SCS_17	0.794	0.061	13.006	0.000	0.794	0.805
SCS_18	0.957	0.077	12.398	0.000	0.957	0.755

SCS_19	0.697	0.058	12.020	0.000	0.697	0.668
SCS_20	0.809	0.066	12.211	0.000	0.809	0.644
SCS_21	0.668	0.055	12.196	0.000	0.668	0.546
SCS_22	0.844	0.057	14.859	0.000	0.844	0.849
SCS_23	0.658	0.060	11.021	0.000	0.658	0.608
SCS_24	1.101	0.082	13.475	0.000	1.101	0.774
SCS_25	0.594	0.051	11.681	0.000	0.594	0.496
SCS_26	0.773	0.055	13.928	0.000	0.773	0.757
SCST	0.750	0.079	9.457	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1	0.560
SCS_2	0.446
SCS_3	0.078
SCS_4	0.380
SCS_5	0.138
SCS_6	0.534
SCS_7	0.137
SCS_8	0.552
SCS_9	0.084
SCS_10	0.108
SCS_11	0.342
SCS_12	0.296
SCS_13	0.267
SCS_14	0.123
SCS_15	0.111
SCS_16	0.568
SCS_17	0.195
SCS_18	0.245
SCS_19	0.332
SCS_20	0.356
SCS_21	0.454
SCS_22	0.151
SCS_23	0.392
SCS_24	0.226
SCS_25	0.504
SCS_26	0.243

Appendix F

Confirmatory Factor Analysis CFA SCS T2

Note: ~~ = co-vary

SCS3Mtest <- "SCS3MT=~ SCS_1_3M + SCS_2_3M + SCS_3_3M + SCS_4_3M + SCS_5_3M + SCS_6_3M + SCS_7_3M + SCS_8_3M + SCS_9_3M + SCS_10_3M + SCS_11_3M + SCS_12_3M + SCS_13_3M + SCS_14_3M + SCS_15_3M + SCS_16_3M + SCS_17_3M + SCS_18_3M + SCS_19_3M + SCS_20_3M + SCS_21_3M + SCS_22_3M + SCS_23_3M + SCS_24_3M + SCS_25_3M + SCS_26_3M

SCS_7_3M~~SCS_10_3M
SCS_7_3M~~SCS_15_3M
SCS_9_3M~~SCS_14_3M
SCS_10_3M~~SCS_15_3M
SCS_12_3M~~SCS_19_3M
SCS_13_3M~~SCS_18_3M
SCS_14_3M~~SCS_15_3M
SCS_14_3M~~SCS_17_3M
SCS_20_3M~~SCS_24_3M
SCS_22_3M~~SCS_26_3M
SCS_23_3M~~SCS_26_3M
SCS_15_3M~~SCS_17_3M
SCS_9_3M~~SCS_17_3M
SCS_5_3M~~SCS_12_3M
SCS_23_3M~~SCS_26_3M
SCS_5_3M~~SCS_19_3M
SCS_2_3M~~SCS_6_3M
SCS_22_3M~~SCS_23_3M
SCS_6_3M~~SCS_21_3M
SCS_8_3M~~SCS_21_3M
SCS_9_3M~~SCS_15_3M
SCS_10_3M~~SCS_22_3M
SCS_17_3M~~SCS_22_3M
SCS_3_3M~~SCS_7_3M
SCS_3_3M~~SCS_17_3M
SCS_4_3M~~SCS_18_3M
SCS_11_3M~~SCS_21_3M
SCS_12_3M~~SCS_26_3M
SCS_3_3M~~SCS_10_3M
SCS_6_3M~~SCS_14_3M
SCS_6_3M~~SCS_25_3M
SCS_8_3M~~SCS_11_3M
SCS_11_3M~~SCS_16_3M
SCS_3_3M~~SCS_15_3M
SCS_1_3M~~SCS_24_3M
SCS_5_3M~~SCS_17_3M
SCS_7_3M~~SCS_12_3M
SCS_8_3M~~SCS_18_3M

SCS_12_3M~~SCS_22_3M
SCS_13_3M~~SCS_20_3M
SCS_18_3M~~SCS_24_3M
SCS_18_3M~~SCS_25_3M
SCS_24_3M~~SCS_25_3M
SCS_1_3M~~SCS_20_3M
SCS_1_3M~~SCS_2_3M
SCS_1_3M~~SCS_8_3M
SCS_2_3M~~SCS_4_3M
SCS_2_3M~~SCS_8_3M
SCS_2_3M~~SCS_21_3M
SCS_2_3M~~SCS_24_3M
SCS_3_3M~~SCS_5_3M
SCS_3_3M~~SCS_9_3M
SCS_3_3M~~SCS_14_3M
SCS_1_3M~~SCS_6_3M
SCS_1_3M~~SCS_21_3M
SCS_6_3M~~SCS_24_3M
SCS_2_3M~~SCS_20_3M
SCS_4_3M~~SCS_21_3M
SCS_5_3M~~SCS_22_3M"

SCS3Mtest1 <- cfa(SCS3Mtest, data = JMDFULLDATASET_BL_3M_6M, estimator="MLR", meanstructure=F) summary(SCS3Mtest1, standardised = T, fit.measures = T, rsq = T) subset(modificationindices(SCS3Mtest1), mi > 3) summary(SCS3Mtest1, standardised = T, fit.measures = T, rsq = T)

lavaan 0.6-6 ended normally after 51 iterations

Estimator	ML	
Optimization method	NLMINB	
Number of free parameters	110	
Number of observations	Used	Total
	305	394
Model Test User Model:		
	Standard	Robust
Test Statistic	538.607	458.875
Degrees of freedom	241	241
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.174
Yuan-Bentler correction (Mplus variant)		

Model Test Baseline Model:

Test statistic	4626.789	3780.865
Degrees of freedom	325	325
P-value	0.000	0.000
Scaling correction factor		1.224

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.931	0.937
Tucker-Lewis Index (TLI)	0.907	0.915
Robust Comparative Fit Index (CFI)		0.940
Robust Tucker-Lewis Index (TLI)		0.918

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-9907.651	-9907.651
Scaling correction factor for the MLR correction	1.204	

Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.183	

Akaike (AIC)	20035.301	20035.301
Bayesian (BIC)	20444.535	20444.535
Sample-size adjusted Bayesian (BIC)	20095.668	20095.668

Root Mean Square Error of Approximation:

RMSEA	0.064	0.054
90 Percent confidence interval – Lower	0.056	0.047
90 Percent confidence interval – Upper	0.071	0.061
P-value RMSEA <= 0.05	0.001	0.145
Robust RMSEA		0.059
90 Percent confidence interval – Lower		0.051
90 Percent confidence interval – Upper		0.067

Standardised Root Mean Square Residual:

SRMR	0.082	0.082

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS3MT=~						
SCS_1_3M	1.000			0.896	0.792	

SCS_2_3M	0.893	0.058	15.402	0.000	0.800	0.705
SCS_3_3M	0.220	0.089	2.467	0.014	0.197	0.201
SCS_4_3M	0.982	0.055	18.021	0.000	0.880	0.723
SCS_5_3M	0.602	0.075	8.013	0.000	0.539	0.494
SCS_6_3M	0.843	0.067	12.521	0.000	0.756	0.629
SCS_7_3M	0.510	0.075	6.820	0.000	0.457	0.411
SCS_8_3M	0.879	0.053	16.533	0.000	0.788	0.714
SCS_9_3M	0.434	0.068	6.375	0.000	0.389	0.402
SCS_10_3M	0.440	0.077	5.698	0.000	0.394	0.375
SCS_11_3M	0.799	0.059	13.548	0.000	0.716	0.659
SCS_12_3M	0.717	0.071	10.147	0.000	0.643	0.618
SCS_13_3M	0.730	0.075	9.750	0.000	0.654	0.581
SCS_14_3M	0.557	0.063	8.897	0.000	0.499	0.493
SCS_15_3M	0.600	0.076	7.885	0.000	0.537	0.506
SCS_16_3M	0.981	0.052	8.891	0.000	0.879	0.791
SCS_17_3M	0.576	0.078	7.402	0.000	0.516	0.503
SCS_18_3M	0.723	0.063	11.458	0.000	0.648	0.588
SCS_19_3M	0.717	0.074	9.724	0.000	0.643	0.643
SCS_20_3M	0.734	0.078	9.400	0.000	0.658	0.597
SCS_21_3M	0.941	0.056	16.864	0.000	0.843	0.721
SCS_22_3M	0.488	0.080	6.125	0.000	0.437	0.429
SCS_23_3M	0.770	0.061	12.602	0.000	0.690	0.664
SCS_24_3M	0.755	0.077	9.750	0.000	0.676	0.563
SCS_25_3M	0.858	0.065	13.284	0.000	0.769	0.675
SCS_26_3M	0.677	0.071	9.527	0.000	0.607	0.595

Covariances:

	Est.	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_7_3M~~SCS_10_3M	0.569	0.062	9.126	0.000	0.569	0.575
SCS_15_3M	0.281	0.056	5.034	0.000	0.281	0.302
SCS_9_3M~~SCS_14_3M	0.290	0.060	4.868	0.000	0.290	0.372
SCS_10_3M~~SCS_15_3M	0.320	0.053	5.987	0.000	0.320	0.358
SCS_12_3M~~SCS_19_3M	0.289	0.052	5.604	0.000	0.289	0.462
SCS_13_3M~~SCS_18_3M	0.331	0.060	5.529	0.000	0.331	0.405
SCS_14_3M~~SCS_15_3M	0.274	0.049	5.541	0.000	0.274	0.339
SCS_17_3M	0.344	0.060	5.736	0.000	0.344	0.440
SCS_20_3M~~SCS_24_3M	0.296	0.057	5.220	0.000	0.296	0.337
SCS_22_3M~~SCS_26_3M	0.247	0.055	4.510	0.000	0.247	0.326
SCS_23_3M~~SCS_26_3M	0.239	0.058	4.088	0.000	0.239	0.374
SCS_15_3M~~SCS_17_3M	0.260	0.057	4.529	0.000	0.260	0.319
SCS_9_3M~~SCS_17_3M	0.272	0.056	4.876	0.000	0.272	0.346
SCS_5_3M~~SCS_12_3M	0.328	0.062	5.336	0.000	0.328	0.424
SCS_19_3M	0.281	0.054	5.181	0.000	0.281	0.387
SCS_2_3M~~SCS_6_3M	0.217	0.053	4.081	0.000	0.217	0.289
SCS_22_3M~~SCS_23_3M	0.150	0.050	2.971	0.003	0.150	0.209
SCS_6_3M ~~SCS_21_3M	-0.118	0.045	-2.626	0.009	-0.118	-0.155
SCS_8_3M~~SCS_21_3M	0.175	0.049	3.598	0.000	0.175	0.280
SCS_9_3M~~SCS_15_3M	0.143	0.049	2.882	0.004	0.143	0.175
SCS_10_3M~~SCS_22_3M	0.110	0.041	2.719	0.007	0.110	0.123

SCS_17_3M~~SCS_22_3M	0.114	0.046	2.458	0.014	0.114	0.139
SCS_3_3M~~SCS_7_3M	0.248	0.060	4.164	0.000	0.248	0.254
SCS_17_3M	0.212	0.059	3.584	0.000	0.212	0.248
SCS_4_3M~~SCS_18_3M	0.118	0.049	2.413	0.016	0.118	0.157
SCS_11_3M~~SCS_21_3M	0.170	0.045	3.746	0.000	0.170	0.256
SCS_12_3M~~SCS_26_3M	0.115	0.036	3.209	0.001	0.115	0.171
SCS_3_3M~~SCS_10_3M	0.205	0.054	3.784	0.000	0.205	0.218
SCS_6_3M~~SCS_14_3M	-0.115	0.045	-2.543	0.011	-0.115	-0.139
SCS_25_3M	0.151	0.051	2.975	0.003	0.151	0.193
SCS_8_3M~~SCS_11_3M	0.149	0.041	3.650	0.000	0.149	0.237
SCS_11_3M~~SCS_16_3M	0.117	0.036	3.277	0.001	0.117	0.210
SCS_3_3M~~SCS_15_3M	0.267	0.053	5.022	0.000	0.267	0.302
SCS_1_3M~~SCS_24_3M	-0.090	0.043	-2.089	0.037	0.090	-0.130
SCS_5_3M~~SCS_17_3M	0.120	0.046	2.628	0.009	0.120	0.142
SCS_7_3M~~SCS_12_3M	0.078	0.033	2.390	0.017	0.078	0.094
SCS_8_3M~~SCS_18_3M	0.077	0.035	2.184	0.029	0.077	0.111
SCS_12_3M~~SCS_22_3M	0.105	0.044	2.379	0.017	0.105	0.140
SCS_13_3M~~SCS_20_3M	0.089	0.067	1.330	0.184	0.089	0.110
SCS_18_3M~~SCS_24_3M	0.099	0.050	1.987	0.047	0.099	0.112
SCS_25_3M	0.092	0.053	1.725	0.084	0.092	0.123
SCS_24_3M~~SCS_25_3M	0.140	0.054	2.604	0.009	0.140	0.167
SCS_1_3M~~SCS_20_3M	-0.107	0.036	-3.004	0.003	-0.107	-0.176
SCS_2_3M	0.120	0.045	2.669	0.008	0.120	0.215
SCS_8_3M	0.092	0.040	2.304	0.021	0.092	0.172
SCS_2_3M~~ SCS_4_3M	0.085	0.043	1.950	0.051	0.085	0.125
SCS_8_3M	0.086	0.041	2.135	0.033	0.086	0.139
SCS_21_3M	-0.034	0.041	-0.818	0.413	-0.034	-0.052
SCS_24_3M	0.145	0.051	2.862	0.004	0.145	0.181
SCS_3_3M~~ SCS_5_3M	0.079	0.052	1.507	0.132	0.079	0.086
SCS_9_3M	0.159	0.055	2.899	0.004	0.159	0.186
SCS_14_3M	0.181	0.055	3.295	0.001	0.181	0.213
SCS_1_3M~~SCS_6_3M	0.102	0.047	2.172	0.030	0.102	0.158
SCS_21_3M	0.055	0.045	1.212	0.225	0.055	0.098
SCS_6_3M~~SCS_24_3M	0.154	0.066	2.341	0.019	0.154	0.166
SCS_2_3M~~SCS_20_3M	0.095	0.051	1.857	0.063	0.095	0.133
SCS_4_3M~~SCS_21_3M	-0.075	0.045	-1.663	0.096	-0.075	-0.111
SCS_5_3M~~SCS_22_3M	0.104	0.055	1.887	0.059	0.104	0.119

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1_3M	0.479	0.054	8.894	0.000	0.479	0.373
SCS_2_3M	0.648	0.067	9.648	0.000	0.648	0.503
SCS_3_3M	0.929	0.071	13.031	0.000	0.929	0.960
SCS_4_3M	0.708	0.073	9.727	0.000	0.708	0.477
SCS_5_3M	0.900	0.079	11.330	0.000	0.900	0.756
SCS_6_3M	0.873	0.102	8.570	0.000	0.873	0.604
SCS_7_3M	1.029	0.073	14.129	0.000	1.029	0.831
SCS_8_3M	0.596	0.055	10.786	0.000	0.596	0.490
SCS_9_3M	0.784	0.063	12.528	0.000	0.784	0.838

SCS_10_3M	0.951	0.062	15.371	0.000	0.951	0.860
SCS_11_3M	0.668	0.057	11.748	0.000	0.668	0.566
SCS_12_3M	0.667	0.064	0.432	0.000	0.667	0.618
SCS_13_3M	0.839	0.092	9.162	0.000	0.839	0.662
SCS_14_3M	0.778	0.062	12.614	0.000	0.778	0.757
SCS_15_3M	0.841	0.068	2.438	0.000	0.841	0.744
SCS_16_3M	0.463	0.053	8.686	0.000	0.463	0.375
SCS_17_3M	0.789	0.073	10.872	0.000	0.789	0.747
SCS_18_3M	0.795	0.072	10.983	0.000	0.795	0.655
SCS_19_3M	0.586	0.069	8.507	0.000	0.586	0.586
SCS_20_3M	0.782	0.081	9.692	0.000	0.782	0.644
SCS_21_3M	0.658	0.058	1.265	0.000	0.658	0.481
SCS_22_3M	0.849	0.068	12.446	0.000	0.849	0.816
SCS_23_3M	0.603	0.068	8.889	0.000	0.603	0.559
SCS_24_3M	0.988	0.087	11.349	0.000	0.988	0.683
SCS_25_3M	0.707	0.072	9.767	0.000	0.707	0.545
SCS_26_3M	0.672	0.060	11.165	0.000	0.672	0.646
SCS3MT	0.803	0.088	9.128	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1_3M	0.627
SCS_2_3M	0.497
SCS_3_3M	0.040
SCS_4_3M	0.523
SCS_5_3M	0.244
SCS_6_3M	0.396
SCS_7_3M	0.169
SCS_8_3M	0.510
SCS_9_3M	0.162
SCS_10_3M	0.140
SCS_11_3M	0.434
SCS_12_3M	0.382
SCS_13_3M	0.338
SCS_14_3M	0.243
SCS_15_3M	0.256
SCS_16_3M	0.625
SCS_17_3M	0.253
SCS_18_3M	0.345
SCS_19_3M	0.414
SCS_20_3M	0.356
SCS_21_3M	0.519
SCS_22_3M	0.184
SCS_23_3M	0.441
SCS_24_3M	0.317
SCS_25_3M	0.455
SCS_26_3M	0.354

Appendix G

Confirmatory Factor Analysis SCS T3

Note: ~~ = co-vary

```
SCS6Mtest <- "SCS_6M=~ SCS_1R_6M + SCS_2R_6M + SCS_3_6M + SCS_4R_6M +
SCS_5_6M + SCS_6R_6M + SCS_7_6M + SCS_8R_6M + SCS_9_6M + SCS_10_6M +
SCS_11R_6M + SCS_12_6M + SCS_13R_6M + SCS_14_6M + SCS_15_6M +
SCS_16R_6M + SCS_17_6M + SCS_18R_6M + SCS_19_6M + SCS_20R_6M +
SCS_21R_6M + SCS_22_6M + SCS_23_6M + SCS_24R_6M + SCS_25R_6M
+SCS_26_6M

SCS_6R_6M~~SCS_25R_6M
SCS_7_6M~~SCS_10_6M
SCS_13R_6M~~SCS_18R_6M
SCS_14_6M~~SCS_17_6M
SCS_12_6M~~SCS_22_6M
SCS_20R_6M~~SCS_24R_6M
SCS_23_6M~~SCS_26_6M
SCS_5_6M~~SCS_19_6M
SCS_8R_6M~~SCS_18R_6M
SCS_11R_6M~~SCS_21R_6M
SCS_15_6M~~SCS_17_6M
SCS_15_6M~~SCS_22_6M
SCS_15_6M~~SCS_26_6M
SCS_19_6M~~SCS_26_6M
SCS_22_6M~~SCS_26_6M
SCS_14_6M~~SCS_15_6M
SCS_12_6M~~SCS_19_6M
SCS_9_6M~~SCS_26_6M
SCS_9_6M~~SCS_22_6M
SCS_9_6M~~SCS_14_6M
SCS_9_6M~~SCS_10_6M
SCS_5_6M~~SCS_22_6M
SCS_5_6M~~SCS_17_6M
SCS_3_6M~~SCS_10_6M
SCS_2R_6M~~SCS_20R_6M
SCS_5_6M~~SCS_12_6M
SCS_3_6M~~SCS_7_6M
SCS_19_6M~~SCS_22_6M
SCS_1R_6M~~SCS_18R_6M
SCS_5_6M~~SCS_26_6M
SCS_7_6M~~SCS_14_6M
SCS_9_6M~~SCS_23_6M
SCS_9_6M~~SCS_23_6M
SCS_10_6M~~SCS_23_6M
SCS_9_6M~~SCS_17_6M
SCS_10_6M~~SCS_14_6M
SCS_10_6M~~SCS_26_6M
```

```
SCS_12_6M~~SCS_26_6M
SCS_14_6M~~SCS_22_6M
SCS_15_6M~~SCS_19_6M
SCS_17_6M~~SCS_22_6M
SCS_17_6M~~SCS_23_6M
SCS_17_6M~~SCS_26_6M
SCS_2R_6M~~SCS_24R_6M
SCS_3_6M~~SCS_14_6M
SCS_4R_6M~~SCS_16R_6M
SCS_4R_6M~~SCS_25R_6M
SCS_5_6M~~SCS_15_6M
SCS_9_6M~~SCS_15_6M
SCS_10_6M~~SCS_17_6M
SCS_14_6M~~SCS_26_6M
SCS_3_6M~~SCS_17_6M
SCS_4R_6M~~SCS_6R_6M
SCS_4R_6M~~SCS_24R_6M
SCS_5_6M~~SCS_9_6M
SCS_5_6M~~SCS_23_6M
SCS_6R_6M~~SCS_21R_6M
SCS_8R_6M~~SCS_11R_6M
SCS_10_6M~~SCS_15_6M
SCS_12_6M~~SCS_15_6M
SCS_19_6M~~SCS_23_6M
SCS_20R_6M~~SCS_21R_6M
SCS_22_6M~~SCS_23_6M
SCS_1R_6M~~SCS_6R_6M
SCS_1R_6M~~SCS_13R_6M
SCS_1R_6M~~SCS_16R_6M
SCS_1R_6M~~SCS_25R_6M
SCS_2R_6M~~SCS_8R_6M
SCS_2R_6M~~SCS_11R_6M
SCS_2R_6M~~SCS_21R_6M
SCS_3_6M~~SCS_9_6M
SCS_7_6M~~SCS_17_6M
SCS_10_6M~~SCS_22_6M
SCS_5_6M~~SCS_10_6M
SCS_3_6M~~SCS_15_6M
SCS_4R_6M~~SCS_18R_6M
SCS_7_6M~~SCS_15_6M
SCS_6R_6M~~SCS_11R_6M
SCS_7_6M~~SCS_9_6M
SCS_9_6M~~SCS_19_6M"
```

```
SCS6Mtest1 <- cfa(SCS6Mtest, data = JMDFULLDATASET_BL_3M_6M,
estimator="MLR", meanstructure=F) summary(SCS6Mtest1, standardised = T, fit.measures =
T, rsq = T) subset(modificationindices(SCS6Mtest1), mi > 2)
```

```
summary(SCS6Mtest1, standardised = T, fit.measures = T, rsq = T)
```

lavaan 0.6-6 ended normally after 56 iterations

Estimator	ML	
Optimization method	NLMINB	
Number of free parameters	131	
Number of observations	Used	Total
	242	394
Model Test User Model:		
	Standard	Robust
Test Statistic	390.663	328.414
Degrees of freedom	220	220
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.190
Yuan-Bentler correction (Mplus variant)		
Model Test Baseline Model:		
Test statistic	3888.548	3122.879
Degrees of freedom	325	325
P-value	0.000	0.000
Scaling correction factor		1.245
User Model versus Baseline Model:		
Comparative Fit Index (CFI)	0.952	0.961
Tucker-Lewis Index (TLI)	0.929	0.943
Robust Comparative Fit Index (CFI)		0.963
Robust Tucker-Lewis Index (TLI)		0.945
Loglikelihood and Information Criteria:		
Loglikelihood user model (H0)	-7828.586	-7828.586
Scaling correction factor for the MLR correction	1.225	
Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.203	
Akaike (AIC)	15919.172	15919.172
Bayesian (BIC)	16376.222	16376.222
Sample-size adjusted Bayesian (BIC)	15960.976	15960.976
Root Mean Square Error of Approximation:		
RMSEA	0.057	0.045
90 Percent confidence interval – Lower	0.047	0.036
90 Percent confidence interval – Upper	0.066	0.054

P-value RMSEA <= 0.05	0.166	0.804
Robust RMSEA		0.049
90 Percent confidence interval – Lower		0.038
90 Percent confidence interval – Upper		0.060

Standardised Root Mean Square Residual:

SRMR	0.084	0.084

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_6M=~						
SCS_1R_6M	1.000			0.853	0.767	
SCS_2R_6M	1.033	0.071	14.475	0.000	0.882	0.768
SCS_3_6M	0.446	0.104	4.294	0.000	0.381	0.358
SCS_4R_6M	0.920	0.067	13.770	0.000	0.785	0.691
SCS_5_6M	0.611	0.079	7.722	0.000	0.522	0.495
SCS_6R_6M	1.077	0.070	15.462	0.000	0.919	0.746
SCS_7_6M	0.522	0.096	5.447	0.000	0.445	0.398
SCS_8R_6M	0.907	0.065	13.969	0.000	0.774	0.719
SCS_9_6M	0.296	0.087	3.397	0.001	0.253	0.264
SCS_10_6M	0.544	0.094	5.770	0.000	0.464	0.431
SCS_11R_6M	0.844	0.077	10.891	0.000	0.720	0.635
SCS_12_6M	0.662	0.081	8.192	0.000	0.565	0.549
SCS_13R_6M	0.909	0.072	12.644	0.000	0.775	0.690
SCS_14_6M	0.521	0.089	5.835	0.000	0.444	0.434
SCS_15_6M	0.617	0.096	6.450	0.000	0.526	0.468
SCS_16R_6M	1.140	0.067	16.972	0.000	0.972	0.874
SCS_17_6M	0.607	0.089	6.808	0.000	0.518	0.516
SCS_18R_6M	0.801	0.080	9.997	0.000	0.683	0.633
SCS_19_6M	0.745	0.077	9.698	0.000	0.636	0.583
SCS_20R_6M	0.766	0.085	9.054	0.000	0.654	0.574
SCS_21R_6M	0.960	0.068	14.026	0.000	0.819	0.696
SCS_22_6M	0.455	0.096	4.749	0.000	0.388	0.383
SCS_23_6M	0.732	0.085	8.655	0.000	0.624	0.576
SCS_24R_6M	0.745	0.098	7.614	0.000	0.636	0.508
SCS_25R_6M	0.861	0.086	10.047	0.000	0.735	0.665
SCS_26_6M	0.596	0.089	6.723	0.000	0.509	0.490

Covariances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all

SCS_6R_6M~~SCS_25R_6M	0.241	0.074	3.259	0.001	0.241	0.356
SCS_7_6M~~SCS_10_6M	0.524	0.088	5.921	0.000	0.524	0.526
SCS_13R_6M~~SCS_18R_6M	0.259	0.056	4.614	0.000	0.259	0.381
SCS_14_6M~~SCS_17_6M	0.424	0.072	5.889	0.000	0.424	0.536
SCS_12_6M~~SCS_22_6M	0.327	0.069	4.733	0.000	0.327	0.407
SCS_20R_6M~~SCS_24R_6M	0.347	0.076	4.572	0.000	0.347	0.345
SCS_23_6M~~SCS_26_6M	0.337	0.061	5.511	0.000	0.337	0.420
SCS_5_6M~~SCS_19_6M	0.310	0.065	4.757	0.000	0.310	0.383
SCS_8R_6M~~SCS_18R_6M	0.149	0.049	3.009	0.003	0.149	0.238
SCS_11R_6M~~SCS_21R_6M	0.159	0.068	2.356	0.018	0.159	0.215
SCS_15_6M~~SCS_17_6M	0.362	0.079	4.608	0.000	0.362	0.425
SCS_22_6M	0.237	0.076	3.118	0.002	0.237	0.255
SCS_26_6M	0.244	0.051	4.794	0.000	0.244	0.272
SCS_19_6M~~SCS_26_6M	0.295	0.068	4.359	0.000	0.295	0.368
SCS_22_6M~~SCS_26_6M	0.289	0.055	5.297	0.000	0.289	0.342
SCS_14_6M~~SCS_15_6M	0.340	0.082	4.135	0.000	0.340	0.372
SCS_12_6M~~SCS_19_6M	0.310	0.062	5.026	0.000	0.310	0.408
SCS_9_6M~~SCS_26_6M	0.243	0.061	3.995	0.000	0.243	0.292
SCS_22_6M	0.191	0.058	3.302	0.001	0.191	0.221
SCS_14_6M	0.335	0.063	5.320	0.000	0.335	0.395
SCS_10_6M	0.231	0.063	3.671	0.000	0.231	0.259
SCS_5_6M~~SCS_22_6M	0.347	0.054	6.375	0.000	0.347	0.406
SCS_17_6M	0.126	0.039	3.207	0.001	0.126	0.161
SCS_3_6M~~SCS_10_6M	0.363	0.077	4.721	0.000	0.363	0.377
SCS_2R_6M~~SCS_20R_6M	0.158	0.065	2.446	0.014	0.158	0.231
SCS_5_6M~~SCS_12_6M	0.277	0.058	4.782	0.000	0.277	0.351
SCS_3_6M~~SCS_7_6M	0.322	0.078	4.098	0.000	0.322	0.315
SCS_19_6M~~SCS_22_6M	0.298	0.061	4.907	0.000	0.298	0.359
SCS_1R_6M~~SCS_18R_6M	-0.125	0.048	-2.615	0.009	-0.125	-0.210
SCS_5_6M~~SCS_26_6M	0.271	0.061	4.411	0.000	0.271	0.328
SCS_7_6M~~SCS_14_6M	0.372	0.084	4.441	0.000	0.372	0.393
SCS_9_6M~~SCS_23_6M	0.158	0.058	2.725	0.006	0.158	0.194
SCS_10_6M~~SCS_23_6M	0.181	0.053	3.440	0.001	0.181	0.211
SCS_9_6M~~SCS_17_6M	0.283	0.055	5.149	0.000	0.283	0.358
SCS_10_6M~~SCS_14_6M	0.357	0.075	4.744	0.000	0.357	0.399
SCS_26_6M	0.144	0.052	2.745	0.006	0.144	0.164
SCS_12_6M~~SCS_26_6M	0.119	0.056	2.133	0.033	0.119	0.153
SCS_14_6M~~SCS_22_6M	0.147	0.052	2.820	0.005	0.147	0.171
SCS_15_6M~~SCS_19_6M	0.132	0.057	2.312	0.021	0.132	0.150
SCS_17_6M~~SCS_22_6M	0.139	0.055	2.499	0.012	0.139	0.173
SCS_23_6M	0.174	0.047	3.717	0.000	0.174	0.229
SCS_26_6M	0.203	0.047	4.278	0.000	0.203	0.262
SCS_2R_6M~~SCS_24R_6M	0.163	0.063	2.575	0.010	0.163	0.206
SCS_3_6M~~SCS_14_6M	0.300	0.071	4.232	0.000	0.300	0.328
SCS_4R_6M~~SCS_16R_6M	-0.081	0.037	-2.156	0.031	-0.081	-0.182
SCS_25R_6M	0.134	0.062	2.150	0.032	0.134	0.198
SCS_5_6M~~SCS_15_6M	0.095	0.060	1.582	0.114	0.095	0.104
SCS_9_6M~~SCS_15_6M	0.193	0.066	2.908	0.004	0.193	0.211
SCS_10_6M~~SCS_17_6M	0.339	0.071	4.774	0.000	0.339	0.408
SCS_14_6M~~SCS_26_6M	0.123	0.044	2.830	0.005	0.123	0.148

SCS_3_6M~~SCS_17_6M	0.246	0.076	3.257	0.001	0.246	0.288
SCS_4R_6M~~SCS_6R_6M	0.127	0.061	2.084	0.037	0.127	0.189
SCS_24R_6M	0.107	0.058	1.842	0.065	0.107	0.121
SCS_5_6M~~SCS_9_6M	0.136	0.058	2.359	0.018	0.136	0.161
SCS_23_6M	0.209	0.059	3.526	0.000	0.209	0.258
SCS_6R_6M~~SCS_21R_6M	-0.129	0.047	-2.721	0.007	-0.129	-0.187
SCS_8R_6M~~SCS_11R_6M	0.070	0.048	1.475	0.140	0.070	0.107
SCS_10_6M~~SCS_15_6M	0.350	0.084	4.182	0.000	0.350	0.364
SCS_12_6M~~SCS_15_6M	0.129	0.063	2.063	0.039	0.129	0.151
SCS_19_6M~~SCS_23_6M	0.150	0.056	2.683	0.007	0.150	0.191
SCS_20R_6M~~SCS_21R_6M	0.088	0.063	1.395	0.163	0.088	0.112
SCS_22_6M~~SCS_23_6M	0.189	0.056	3.381	0.001	0.189	0.228
SCS_1R_6M~~SCS_6R_6M	0.038	0.061	0.623	0.533	0.038	0.065
SCS_13R_6M	-0.095	0.051	-1.841	0.066	-0.095	-0.163
SCS_16R_6M	-0.070	0.041	-1.696	0.090	-0.070	-0.181
SCS_25R_6M	-0.041	0.056	-0.723	0.470	-0.041	-0.069
SCS_2R_6M~~SCS_8R_6M	0.063	0.035	1.789	0.074	0.063	0.115
SCS_11R_6M	-0.096	0.054	-1.772	0.076	-0.096	-0.149
SCS_21R_6M	0.095	0.047	-2.007	0.045	-0.095	-0.153
SCS_3_6M~~SCS_9_6M	0.133	0.066	2.019	0.043	0.133	0.145
SCS_7_6M~~SCS_17_6M	0.258	0.077	3.325	0.001	0.258	0.293
SCS_10_6M~~SCS_22_6M	0.147	0.055	2.673	0.008	0.147	0.162
SCS_5_6M~~ SCS_10_6M	0.110	0.053	2.092	0.036	0.110	0.124
SCS_3_6M~~ SCS_15_6M	0.244	0.081	2.998	0.003	0.244	0.247
SCS_4R_6M~~ SCS_18R_6M	0.061	0.050	1.207	0.227	0.061	0.089
SCS_7_6M~~ SCS_15_6M	0.314	0.089	3.540	0.000	0.314	0.309
SCS_6R_6M~~SCS_11R_6M	-0.064	0.047	-1.354	0.176	-0.064	-0.089
SCS_7_6M~~SCS_9_6M	0.112	0.072	1.561	0.118	0.112	0.119
SCS_9_6M~~SCS_19_6M	0.106	0.062	1.701	0.089	0.106	0.129

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1R_6M	0.510	0.072	7.078	0.000	0.510	0.412
SCS_2R_6M	0.541	0.062	8.694	0.000	0.541	0.411
SCS_3_6M	0.990	0.098	10.145	0.000	0.990	0.872
SCS_4R_6M	0.674	0.068	9.974	0.000	0.674	0.522
SCS_5_6M	0.838	0.063	13.219	0.000	0.838	0.755
SCS_6R_6M	0.671	0.090	7.486	0.000	0.671	0.443
SCS_7_6M	1.052	0.097	10.820	0.000	1.052	0.841
SCS_8R_6M	0.561	0.065	8.677	0.000	0.561	0.484
SCS_9_6M	0.851	0.074	11.541	0.000	0.851	0.930
SCS_10_6M	0.941	0.076	12.327	0.000	0.941	0.814
SCS_11R_6M	0.769	0.084	9.135	0.000	0.769	0.597
SCS_12_6M	0.739	0.079	9.387	0.000	0.739	0.699
SCS_13R_6M	0.660	0.066	10.029	0.000	0.660	0.524
SCS_14_6M	0.848	0.083	10.188	0.000	0.848	0.811
SCS_15_6M	0.987	0.084	11.821	0.000	0.987	0.781
SCS_16R_6M	0.292	0.040	7.283	0.000	0.292	0.236
SCS_17_6M	0.736	0.077	9.575	0.000	0.736	0.733
SCS_18R_6M	0.699	0.070	9.947	0.000	0.699	0.599

SCS_19_6M	0.784	0.085	9.203	0.000	0.784	0.660
SCS_20R_6M	0.872	0.089	9.809	0.000	0.872	0.671
SCS_21R_6M	0.711	0.077	9.215	0.000	0.711	0.515
SCS_22_6M	0.875	0.072	12.152	0.000	0.875	0.853
SCS_23_6M	0.786	0.090	8.722	0.000	0.786	0.669
SCS_24R_6M	1.162	0.103	11.273	0.000	1.162	0.742
SCS_25R_6M	0.679	0.083	8.191	0.000	0.679	0.557
SCS_26_6M	0.818	0.069	11.826	0.000	0.818	0.760
SCS_6M	0.728	0.098	7.404	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1R_6M	0.588
SCS_2R_6M	0.589
SCS_3_6M	0.128
SCS_4R_6M	0.478
SCS_5_6M	0.245
SCS_6R_6M	0.557
SCS_7_6M	0.159
SCS_8R_6M	0.516
SCS_9_6M	0.070
SCS_10_6M	0.186
SCS_11R_6M	0.403
SCS_12_6M	0.301
SCS_13R_6M	0.476
SCS_14_6M	0.189
SCS_15_6M	0.219
SCS_16R_6M	0.764
SCS_17_6M	0.267
SCS_18R_6M	0.401
SCS_19_6M	0.340
SCS_20R_6M	0.329
SCS_21R_6M	0.485
SCS_22_6M	0.147
SCS_23_6M	0.331
SCS_24R_6M	0.258
SCS_25R_6M	0.443
SCS_26_6M	0.240

Appendix H

SCS Longitudinal Configural Invariance

Note: ~~ = co-vary

long.SCS.1.2.3 <- "SCS=~ SCS_1 + SCS_2 + SCS_3 + SCS_4 + SCS_5 + SCS_6 + SCS_7
+ SCS_8 + SCS_9 + SCS_10 + SCS_11 + SCS_12 + SCS_13 + SCS_14 + SCS_15 +
SCS_16 + SCS_17 + SCS_18 + SCS_19 + SCS_20 + SCS_21 + SCS_22 + SCS_23 +
SCS_24 + SCS_25 + SCS_26

SCS_3M=~ SCS_1_3M + SCS_2_3M + SCS_3_3M + SCS_4_3M + SCS_5_3M +
SCS_6_3M + SCS_7_3M + SCS_8_3M + SCS_9_3M + SCS_10_3M +SCS_11_3M +
SCS_12_3M + SCS_13_3M + SCS_14_3M + SCS_15_3M + SCS_16_3M + SCS_17_3M +
SCS_18_3M + SCS_19_3M + SCS_20_3M +SCS_21_3M + SCS_22_3M + SCS_23_3M +
SCS_24_3M + SCS_25_3M + SCS_26_3M

SCS_6M=~ SCS_1R_6M + SCS_2R_6M + SCS_3_6M + SCS_4R_6M + SCS_5_6M +
SCS_6R_6M + SCS_7_6M + SCS_8R_6M + SCS_9_6M + SCS_10_6M +SCS_11R_6M +
SCS_12_6M + SCS_13R_6M + SCS_14_6M + SCS_15_6M + SCS_16R_6M +
SCS_17_6M + SCS_18R_6M + SCS_19_6M + SCS_20R_6M +SCS_21R_6M +
SCS_22_6M + SCS_23_6M + SCS_24R_6M + SCS_25R_6M + SCS_26_6M

SCS_1~~SCS_1_3M
SCS_2~~SCS_2_3M
SCS_3~~SCS_3_3M
SCS_4~~SCS_4_3M
SCS_5~~SCS_5_3M
SCS_6~~SCS_6_3M
SCS_7~~SCS_7_3M
SCS_8~~SCS_8_3M
SCS_9~~SCS_9_3M
SCS_10~~SCS_10_3M
SCS_11~~SCS_11_3M
SCS_12~~SCS_12_3M
SCS_13~~SCS_13_3M
SCS_14~~SCS_14_3M
SCS_15~~SCS_15_3M
SCS_16~~SCS_16_3M
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SCS_22~~SCS_22_3M
SCS_23~~SCS_23_3M
SCS_24~~SCS_24_3M
SCS_25~~SCS_25_3M
SCS_26~~SCS_26_3M

SCS_1~~SCS_1R_6M
SCS_2~~SCS_2R_6M
SCS_3~~SCS_3_6M
SCS_4~~SCS_4R_6M
SCS_5~~SCS_5_6M
SCS_6~~SCS_6R_6M
SCS_7~~SCS_7_6M
SCS_8~~SCS_8R_6M
SCS_9~~SCS_9_6M
SCS_10~~SCS_10_6M
SCS_11~~SCS_11R_6M
SCS_12~~SCS_12_6M
SCS_13~~SCS_13R_6M
SCS_14~~SCS_14_6M
SCS_15~~SCS_15_6M
SCS_16~~SCS_16R_6M
SCS_17~~SCS_17_6M
SCS_18~~SCS_18R_6M
SCS_19~~SCS_19_6M
SCS_20~~SCS_20R_6M
SCS_21~~SCS_21R_6M
SCS_22~~SCS_22_6M
SCS_23~~SCS_23_6M
SCS_24~~SCS_24R_6M
SCS_25~~SCS_25R_6M
SCS_26~~SCS_26_6M

SCS_1_3M~~SCS_1R_6M
SCS_2_3M~~SCS_2R_6M
SCS_3_3M~~SCS_3_6M
SCS_4_3M~~SCS_4R_6M
SCS_5_3M~~SCS_5_6M
SCS_6_3M~~SCS_6R_6M
SCS_7_3M~~SCS_7_6M
SCS_8_3M~~SCS_8R_6M
SCS_9_3M~~SCS_9_6M
SCS_10_3M~~SCS_10_6M
SCS_11_3M~~SCS_11R_6M
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SCS_16_3M~~SCS_16R_6M
SCS_17_3M~~SCS_17_6M
SCS_18_3M~~SCS_18R_6M
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SCS_20_3M~~SCS_20R_6M
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SCS_22_3M~~SCS_22_6M
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SCS_25_3M~~SCS_25R_6M
SCS_26_3M~~SCS_26_6M

SCS_7~~SCS_10
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SCS_2R_6M~~SCS_20R_6M
SCS_5_6M~~SCS_12_6M
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SCS_19_6M~~SCS_22_6M

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SCS_5_6M~~SCS_26_6M
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SCS_4R_6M~~SCS_25R_6M
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SCS_9_6M~~SCS_15_6M
SCS_10_6M~~SCS_17_6M
SCS_14_6M~~SCS_26_6M

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SCS_4R_6M~~SCS_6R_6M
SCS_4R_6M~~SCS_24R_6M
SCS_5_6M~~SCS_9_6M
SCS_5_6M~~SCS_23_6M
SCS_6R_6M~~SCS_21R_6M
SCS_8R_6M~~SCS_11R_6M
SCS_10_6M~~SCS_15_6M
SCS_12_6M~~SCS_15_6M
SCS_19_6M~~SCS_23_6M
SCS_20R_6M~~SCS_21R_6M
SCS_22_6M~~SCS_23_6M
SCS_1R_6M~~SCS_6R_6M
SCS_1R_6M~~SCS_13R_6M
SCS_1R_6M~~SCS_16R_6M
SCS_1R_6M~~SCS_25R_6M
SCS_2R_6M~~SCS_8R_6M
SCS_2R_6M~~SCS_11R_6M
SCS_2R_6M~~SCS_21R_6M
SCS_3_6M~~SCS_9_6M
SCS_7_6M~~SCS_17_6M
SCS_10_6M~~SCS_22_6M
SCS_5_6M~~SCS_10_6M
SCS_3_6M~~SCS_15_6M
SCS_4R_6M~~SCS_18R_6M
SCS_7_6M~~SCS_15_6M

SCS_6R_6M~~SCS_11R_6M
SCS_7_6M~~SCS_9_6M
SCS_9_6M~~SCS_19_6M

##for configural

SCS_1~~SCS_6
SCS_4~~SCS_11
SCS_4~~SCS_18
SCS_6~~SCS_21
SCS_8~~SCS_24
SCS_14~~SCS_26
SCS_6_3M~~SCS_20_3M
SCS_19_3M~~SCS_22_3M
SCS_4R_6M~~SCS_21R_6M
SCS_7_6M~~SCS_22_6M
SCS_2~~SCS_25
SCS_6~~SCS_8
SCS_1~~SCS_16
SCS_5~~SCS_15
SCS_12~~SCS_15"

LSCS.1.2.3 <- cfa(long.SCS.1.2.3, data = JMDFULLDATASET_BL_3M_6M, estimator="MLR", meanstructure=F)

summary(LSCS.1.2.3, standardised = T, fit.measures = T, rsq = T)

lavaan 0.6-6 ended normally after 89 iterations

Estimator	ML	
Optimization method	NLMINB	
Number of free parameters	445	
Number of observations	Used	Total
	242	394
Model Test User Model:		
	Standard	Robust
Test Statistic	4638.022	4357.302
Degrees of freedom	2636	2636
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.064
Yuan-Bentler correction (Mplus variant)		

Model Test Baseline Model:

Test statistic	16090.904	14699.227
Degrees of freedom	3003	3003
P-value	0.000	0.000
Scaling correction factor		1.095

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.847	0.853
Tucker-Lewis Index (TLI)	0.826	0.832
Robust Comparative Fit Index (CFI)		0.857
Robust Tucker-Lewis Index (TLI)		0.837

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-23037.979	-23037.979
Scaling correction factor for the MLR correction	1.199	

Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.084	

Akaike (AIC)	46965.957	46965.957
Bayesian (BIC)	48518.534	48518.534
Sample-size adjusted Bayesian (BIC)	47107.963	47107.963

Root Mean Square Error of Approximation:

RMSEA	0.056	0.052
90 Percent confidence interval – Lower	0.053	0.049
90 Percent confidence interval – Upper	0.059	0.055
P-value RMSEA <= 0.05	0.000	0.114
Robust RMSEA		0.054
90 Percent confidence interval – Lower		0.051
90 Percent confidence interval – Upper		0.056

Standardised Root Mean Square Residual:

SRMR	0.095	0.095

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS =~						
SCS_1	1.000				0.863	0.724
SCS_2	0.935	0.083	11.285	0.000	0.807	0.662

SCS_3	0.431	0.100	4.297	0.000	0.372	0.370
SCS_4	0.889	0.069	12.828	0.000	0.767	0.620
SCS_5	0.592	0.088	6.746	0.000	0.511	0.475
SCS_6	0.965	0.078	12.325	0.000	0.833	0.675
SCS_7	0.623	0.089	7.040	0.000	0.538	0.486
SCS_8	0.920	0.075	12.282	0.000	0.794	0.731
SCS_9	0.566	0.097	5.826	0.000	0.489	0.461
SCS_10	0.592	0.108	5.483	0.000	0.511	0.467
SCS_11	0.763	0.085	9.015	0.000	0.659	0.587
SCS_12	0.801	0.076	10.555	0.000	0.691	0.641
SCS_13	0.719	0.073	9.904	0.000	0.620	0.578
SCS_14	0.570	0.085	6.731	0.000	0.492	0.498
SCS_15	0.671	0.095	7.099	0.000	0.579	0.524
SCS_16	0.917	0.071	12.954	0.000	0.792	0.726
SCS_17	0.671	0.085	7.889	0.000	0.579	0.569
SCS_18	0.672	0.089	7.542	0.000	0.580	0.512
SCS_19	0.799	0.076	10.469	0.000	0.690	0.651
SCS_20	0.759	0.081	9.342	0.000	0.655	0.595
SCS_21	0.908	0.071	12.826	0.000	0.784	0.698
SCS_22	0.523	0.090	5.809	0.000	0.452	0.440
SCS_23	0.839	0.079	10.626	0.000	0.724	0.674
SCS_24	0.698	0.095	7.355	0.000	0.602	0.499
SCS_25	0.889	0.074	12.098	0.000	0.768	0.695
SCS_26	0.735	0.082	8.946	0.000	0.634	0.604
SCS_3M=~						
SCS_1_3M	1.000			0.913	0.797	
SCS_2_3M	0.859	0.063	13.554	0.000	0.785	0.691
SCS_3_3M	0.272	0.097	2.818	0.005	0.248	0.255
SCS_4_3M	0.924	0.060	15.493	0.000	0.843	0.683
SCS_5_3M	0.654	0.081	8.073	0.000	0.597	0.536
SCS_6_3M	0.802	0.075	10.735	0.000	0.732	0.606
SCS_7_3M	0.571	0.083	6.845	0.000	0.521	0.466
SCS_8_3M	0.868	0.058	14.999	0.000	0.792	0.704
SCS_9_3M	0.463	0.070	6.590	0.000	0.423	0.447
SCS_10_3M	0.496	0.087	5.680	0.000	0.453	0.425
SCS_11_3M	0.781	0.063	12.337	0.000	0.713	0.662
SCS_12_3M	0.753	0.071	10.643	0.000	0.687	0.651
SCS_13_3M	0.726	0.077	9.445	0.000	0.662	0.594
SCS_14_3M	0.573	0.063	9.156	0.000	0.523	0.516
SCS_15_3M	0.695	0.077	8.987	0.000	0.634	0.589
SCS_16_3M	0.943	0.053	17.707	0.000	0.861	0.772
SCS_17_3M	0.656	0.082	7.999	0.000	0.599	0.572
SCS_18_3M	0.717	0.067	10.676	0.000	0.654	0.592
SCS_19_3M	0.713	0.079	9.076	0.000	0.651	0.648
SCS_20_3M	0.721	0.080	9.072	0.000	0.658	0.588
SCS_21_3M	0.957	0.055	17.506	0.000	0.873	0.734
SCS_22_3M	0.480	0.092	5.222	0.000	0.438	0.440
SCS_23_3M	0.746	0.064	11.611	0.000	0.681	0.653
SCS_24_3M	0.750	0.076	9.861	0.000	0.684	0.578

SCS_25_3M	0.842	0.067	12.546	0.000	0.768	0.654
SCS_26_3M	0.680	0.076	8.971	0.000	0.621	0.608

SCS_6M=~

SCS_1R_6M	1.000			0.818	0.736	
SCS_2R_6M	1.052	0.072	14.645	0.000	0.861	0.761
SCS_3_6M	0.527	0.116	4.527	0.000	0.431	0.409
SCS_4R_6M	0.952	0.067	14.212	0.000	0.779	0.686
SCS_5_6M	0.702	0.088	7.945	0.000	0.575	0.545
SCS_6R_6M	1.126	0.069	16.405	0.000	0.922	0.742
SCS_7_6M	0.599	0.103	5.807	0.000	0.490	0.449
SCS_8R_6M	0.920	0.064	14.373	0.000	0.753	0.702
SCS_9_6M	0.353	0.092	3.838	0.000	0.289	0.305
SCS_10_6M	0.647	0.109	5.960	0.000	0.529	0.493
SCS_11R_6M	0.887	0.082	10.865	0.000	0.726	0.645
SCS_12_6M	0.749	0.088	8.492	0.000	0.613	0.600
SCS_13R_6M	0.932	0.075	12.469	0.000	0.763	0.688
SCS_14_6M	0.629	0.095	6.611	0.000	0.515	0.502
SCS_15_6M	0.728	0.100	7.252	0.000	0.596	0.523
SCS_16R_6M	1.163	0.067	17.406	0.000	0.952	0.855
SCS_17_6M	0.697	0.095	7.339	0.000	0.570	0.564
SCS_18R_6M	0.814	0.083	9.849	0.000	0.667	0.619
SCS_19_6M	0.840	0.086	9.723	0.000	0.688	0.628
SCS_20R_6M	0.794	0.089	8.945	0.000	0.650	0.573
SCS_21R_6M	0.982	0.066	14.909	0.000	0.804	0.683
SCS_22_6M	0.545	0.104	5.236	0.000	0.446	0.449
SCS_23_6M	0.814	0.092	8.809	0.000	0.666	0.618
SCS_24R_6M	0.801	0.101	7.890	0.000	0.655	0.531
SCS_25R_6M	0.900	0.083	10.808	0.000	0.737	0.675
SCS_26_6M	0.675	0.095	7.093	0.000	0.553	0.540

Covariances:

	Est.	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1~~SCS_1_3M	0.188	0.040	4.673	0.000	0.188	0.331
SCS_2~~SCS_2_3M	0.183	0.057	3.212	0.001	0.183	0.244
SCS_3~~SCS_3_3M	0.127	0.057	2.238	0.025	0.127	0.145
SCS_4~~SCS_4_3M	0.313	0.070	4.486	0.000	0.313	0.357
SCS_5~~SCS_5_3M	0.187	0.056	3.366	0.001	0.187	0.210
SCS_6~~SCS_6_3M	0.170	0.053	3.220	0.001	0.170	0.194
SCS_7~~SCS_7_3M	0.222	0.060	3.674	0.000	0.222	0.233
SCS_8~~SCS_8_3M	0.143	0.037	3.845	0.000	0.143	0.241
SCS_9~~SCS_9_3M	0.219	0.048	4.534	0.000	0.219	0.275
SCS_10~~SCS_10_3M	0.092	0.052	1.779	0.075	0.092	0.099
SCS_11~~SCS_11_3M	0.118	0.044	2.655	0.008	0.118	0.161
SCS_12~~SCS_12_3M	0.090	0.038	2.402	0.016	0.090	0.136
SCS_13~~SCS_13_3M	0.218	0.070	3.133	0.002	0.218	0.277
SCS_14~~SCS_14_3M	0.088	0.049	1.806	0.071	0.088	0.118
SCS_15~~SCS_15_3M	0.153	0.043	3.585	0.000	0.153	0.187
SCS_16~~SCS_16_3M	0.008	0.041	0.198	0.843	0.008	0.015
SCS_17~~SCS_17_3M	0.054	0.036	1.503	0.133	0.054	0.076

SCS_18~~SCS_18_3M	0.078	0.065	1.202	0.229	0.078	0.090
SCS_19~~SCS_19_3M	0.024	0.043	0.573	0.566	0.024	0.040
SCS_20~~SCS_20_3M	0.241	0.060	4.022	0.000	0.241	0.301
SCS_21~~SCS_21_3M	0.140	0.048	2.923	0.003	0.140	0.216
SCS_22~~SCS_22_3M	0.091	0.052	1.770	0.077	0.091	0.111
SCS_23~~SCS_23_3M	0.116	0.051	2.252	0.024	0.116	0.185
SCS_24~~SCS_24_3M	0.349	0.079	4.420	0.000	0.349	0.345
SCS_25~~SCS_25_3M	0.099	0.051	1.951	0.051	0.099	0.141
SCS_26~~SCS_26_3M	0.126	0.046	2.763	0.006	0.126	0.186
SCS_1~~SCS_1R_6M	0.151	0.051	2.960	0.003	0.151	0.244
SCS_2~~SCS_2R_6M	0.238	0.058	4.094	0.000	0.238	0.356
SCS_3~~SCS_3_6M	0.105	0.054	1.923	0.054	0.105	0.116
SCS_4~~SCS_4R_6M	0.251	0.057	4.411	0.000	0.251	0.313
SCS_5~~SCS_5_6M	0.090	0.041	2.183	0.029	0.090	0.108
SCS_6~~SCS_6R_6M	0.260	0.053	4.885	0.000	0.260	0.344
SCS_7~~SCS_7_6M	0.090	0.051	1.759	0.079	0.090	0.095
SCS_8~~SCS_8R_6M	0.135	0.040	3.359	0.001	0.135	0.238
SCS_9~~SCS_9_6M	0.203	0.062	3.292	0.001	0.203	0.239
SCS_10~~SCS_10_6M	0.149	0.042	3.555	0.000	0.149	0.164
SCS_11~~SCS_11R_6M	0.167	0.059	2.833	0.005	0.167	0.214
SCS_12~~SCS_12_6M	0.018	0.040	0.442	0.658	0.018	0.026
SCS_13~~SCS_13R_6M	0.121	0.065	1.882	0.060	0.121	0.172
SCS_14~~SCS_14_6M	0.112	0.036	3.119	0.002	0.112	0.147
SCS_15~~SCS_15_6M	0.164	0.051	3.225	0.001	0.164	0.179
SCS_16~~SCS_16R_6M	0.081	0.037	2.169	0.030	0.081	0.187
SCS_17~~SCS_17_6M	-0.027	0.033	-0.827	0.408	-0.027	-0.039
SCS_18~~SCS_18R_6M	0.185	0.056	3.298	0.001	0.185	0.225
SCS_19~~SCS_19_6M	0.040	0.042	0.947	0.344	0.040	0.058
SCS_20~~SCS_20R_6M	0.227	0.062	3.651	0.000	0.227	0.276
SCS_21~~SCS_21R_6M	0.272	0.048	5.627	0.000	0.272	0.395
SCS_22~~SCS_22_6M	0.140	0.042	3.316	0.001	0.140	0.171
SCS_23~~SCS_23_6M	0.121	0.043	2.854	0.004	0.121	0.181
SCS_24~~SCS_24R_6M	0.428	0.092	4.669	0.000	0.428	0.391
SCS_25~~SCS_25R_6M	0.141	0.039	3.581	0.000	0.141	0.221
SCS_26~~SCS_26_6M	0.189	0.046	4.131	0.000	0.189	0.263
SCS_1_3M~~SCS_1R_6M	0.070	0.043	1.647	0.099	0.070	0.136
SCS_2_3M~~SCS_2R_6M	0.174	0.047	3.722	0.000	0.174	0.289
SCS_3_3M~~SCS_3_6M	0.242	0.070	3.476	0.001	0.242	0.268
SCS_4_3M~~SCS_4R_6M	0.230	0.055	4.165	0.000	0.230	0.309
SCS_5_3M~~SCS_5_6M	0.149	0.051	2.924	0.003	0.149	0.180
SCS_6_3M~~SCS_6R_6M	0.168	0.050	3.379	0.001	0.168	0.210
SCS_7_3M~~SCS_7_6M	0.115	0.060	1.933	0.053	0.115	0.119
SCS_8_3M~~SCS_8R_6M	0.156	0.040	3.888	0.000	0.156	0.255
SCS_9_3M~~SCS_9_6M	0.201	0.049	4.074	0.000	0.201	0.263
SCS_10_3M~~SCS_10_6M	0.075	0.051	1.476	0.140	0.075	0.084
SCS_11_3M~~SCS_11R_6M	0.098	0.049	1.988	0.047	0.098	0.141
SCS_12_3M~~SCS_12_6M	0.048	0.039	1.235	0.217	0.048	0.073
SCS_13_3M~~SCS_13R_6M	0.217	0.056	3.853	0.000	0.217	0.300
SCS_14_3M~~SCS_14_6M	0.090	0.048	1.859	0.063	0.090	0.117
SCS_15_3M~~SCS_15_6M	0.209	0.047	4.445	0.000	0.209	0.247

SCS_16_3M~~SCS_16R_6M	0.070	0.034	2.067	0.039	0.070	0.172
SCS_17_3M~~SCS_17_6M	0.086	0.039	2.222	0.026	0.086	0.121
SCS_18_3M~~SCS_18R_6M	0.100	0.052	1.922	0.055	0.100	0.133
SCS_19_3M~~SCS_19_6M	0.012	0.040	0.301	0.763	0.012	0.019

[reachedgetOption("max.print")--omitted396rows]

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	0.677	0.062	11.012	0.000	0.677	0.476
SCS_2	0.834	0.088	9502	0.000	0.834	0.562
SCS_3	0.872	0.084	10.396	0.000	0.872	0.863
SCS_4	0.944	0.091	10.351	0.000	0.944	0.616
SCS_5	0.896	0.080	11.180	0.000	0.896	0.774
SCS_6	0.828	0.089	9.303	0.000	0.828	0.544
SCS_7	0.933	0.075	12.383	0.000	0.933	0.763
SCS_8	0.549	0.061	8.949	0.000	0.549	0.466
SCS_9	0.886	0.080	11.024	0.000	0.886	0.788
SCS_10	0.934	0.092	10.166	0.000	0.934	0.782
SCS_11	0.826	0.091	9.114	0.000	0.826	0.655
SCS_12	0.685	0.066	10.354	0.000	0.685	0.589
SCS_13	0.767	0.085	9.067	0.000	0.767	0.666
SCS_14	0.734	0.060	12.172	0.000	0.734	0.752
SCS_15	0.886	0.085	10.473	0.000	0.886	0.725
SCS_16	0.563	0.070	8.072	0.000	0.563	0.473
SCS_17	0.700	0.067	10.392	0.000	0.700	0.676
SCS_18	0.946	0.103	9.153	0.000	0.946	0.738
SCS_19	0.648	0.074	8.801	0.000	0.648	0.577
SCS_20	0.782	0.082	9.551	0.000	0.782	0.646
SCS_21	0.647	0.063	10.234	0.000	0.647	0.513
SCS_22	0.851	0.082	10.417	0.000	0.851	0.807
SCS_23	0.629	0.078	8.037	0.000	0.629	0.545
SCS_24	1.095	0.107	10.236	0.000	1.095	0.751
SCS_25	0.631	0.060	10.448	0.000	0.631	0.517
SCS_26	0.699	0.070	10.027	0.000	0.699	0.635
SCS_1_3M	0.477	0.056	8.554	0.000	0.477	0.364
SCS_2_3M	0.674	0.069	9.813	0.000	0.674	0.523
SCS_3_3M	0.883	0.083	10.626	0.000	0.883	0.935
SCS_4_3M	0.814	0.087	9.380	0.000	0.814	0.534
SCS_5_3M	0.884	0.087	10.136	0.000	0.884	0.713
SCS_6_3M	0.925	0.112	8.258	0.000	0.925	0.633
SCS_7_3M	0.977	0.078	12.603	0.000	0.977	0.783
SCS_8_3M	0.638	0.065	9.766	0.000	0.638	0.504
SCS_9_3M	0.716	0.067	10.655	0.000	0.716	0.800
SCS_10_3M	0.928	0.067	13.821	0.000	0.928	0.819
SCS_11_3M	0.653	0.063	10.387	0.000	0.653	0.562
SCS_12_3M	0.642	0.062	10.305	0.000	0.642	0.576
SCS_13_3M	0.806	0.096	8.417	0.000	0.806	0.648
SCS_14_3M	0.752	0.066	11.462	0.000	0.752	0.733
SCS_15_3M	0.756	0.061	12.286	0.000	0.756	0.653

SCS_16_3M	0.504	0.058	8.678	0.000	0.504	0.405
SCS_17_3M	0.737	0.075	9.812	0.000	0.737	0.673
SCS_18_3M	0.792	0.084	9.400	0.000	0.792	0.649
SCS_19_3M	0.585	0.075	7.812	0.000	0.585	0.580
SCS_20_3M	0.822	0.090	9.163	0.000	0.822	0.655
SCS_21_3M	0.652	0.065	10.073	0.000	0.652	0.461
SCS_22_3M	0.799	0.074	10.725	0.000	0.799	0.806
SCS_23_3M	0.625	0.071	8.799	0.000	0.625	0.574
SCS_24_3M	0.935	0.085	11.042	0.000	0.935	0.666
SCS_25_3M	0.790	0.089	8.914	0.000	0.790	0.572
SCS_26_3M	0.657	0.062	10.666	0.000	0.657	0.630
SCS_1R_6M	0.566	0.071	8.010	0.000	0.566	0.458
SCS_2R_6M	0.539	0.060	8.970	0.000	0.539	0.421
SCS_3_6M	0.927	0.100	9.269	0.000	0.927	0.833
SCS_4R_6M	0.683	0.068	10.065	0.000	0.683	0.530
SCS_5_6M	0.781	0.063	12.426	0.000	0.781	0.703
SCS_6R_6M	0.693	0.080	8.620	0.000	0.693	0.449
SCS_7_6M	0.949	0.091	10.417	0.000	0.949	0.798
SCS_8R_6M	0.586	0.065	9.026	0.000	0.586	0.508
SCS_9_6M	0.818	0.074	11.020	0.000	0.818	0.907
SCS_10_6M	0.875	0.077	11.349	0.000	0.875	0.757
SCS_11R_6M	0.739	0.085	8.717	0.000	0.739	0.584
SCS_12_6M	0.667	0.079	8.468	0.000	0.667	0.640
SCS_13R_6M	0.648	0.064	10.101	0.000	0.648	0.527
SCS_14_6M	0.786	0.081	9.692	0.000	0.786	0.748
SCS_15_6M	0.944	0.088	10.715	0.000	0.944	0.727
SCS_16R_6M	0.334	0.044	7.519	0.000	0.334	0.269
SCS_17_6M	0.696	0.080	8.650	0.000	0.696	0.682
SCS_18R_6M	0.716	0.074	9.733	0.000	0.716	0.617
SCS_19_6M	0.726	0.087	8.382	0.000	0.726	0.606
SCS_20R_6M	0.863	0.089	9.648	0.000	0.863	0.672
SCS_21R_6M	0.737	0.076	9.655	0.000	0.737	0.533
SCS_22_6M	0.789	0.067	11.747	0.000	0.789	0.798
SCS_23_6M	0.717	0.089	8.067	0.000	0.717	0.618
SCS_24R_6M	1.092	0.102	10.667	0.000	1.092	0.718
SCS_25R_6M	0.649	0.072	8.970	0.000	0.649	0.544
SCS_26_6M	0.740	0.065	11.331	0.000	0.740	0.708
SCS	0.745	0.100	7.453	0.000	1.000	1.000
SCS_3M	0.833	0.094	8.857	0.000	1.000	1.000
SCS_6M	0.670	0.096	6.985	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1	0.524
SCS_2	0.438
SCS_3	0.137
SCS_4	0.384
SCS_5	0.226
SCS_6	0.456
SCS_7	0.237

SCS_8	0.534
SCS_9	0.212
SCS_10	0.218
SCS_11	0.345
SCS_12	0.411
SCS_13	0.334
SCS_14	0.248
SCS_15	0.275
SCS_16	0.527
SCS_17	0.324
SCS_18	0.262
SCS_19	0.423
SCS_20	0.354
SCS_21	0.487
SCS_22	0.193
SCS_23	0.455
SCS_24	0.249
SCS_25	0.483
SCS_26	0.365
SCS_1_3M	0.636
SCS_2_3M	0.477
SCS_3_3M	0.065
SCS_4_3M	0.466
SCS_5_3M	0.287
SCS_6_3M	0.367
SCS_7_3M	0.217
SCS_8_3M	0.496
SCS_9_3M	0.200
SCS_10_3M	0.181
SCS_11_3M	0.438
SCS_12_3M	0.424
SCS_13_3M	0.352
SCS_14_3M	0.267
SCS_15_3M	0.347
SCS_16_3M	0.595
SCS_17_3M	0.327
SCS_18_3M	0.351
SCS_19_3M	0.420
SCS_20_3M	0.345
SCS_21_3M	0.539
SCS_22_3M	0.194
SCS_23_3M	0.426
SCS_24_3M	0.334
SCS_25_3M	0.428
SCS_26_3M	0.370
SCS_1R_6M	0.542
SCS_2R_6M	0.579
SCS_3_6M	0.167
SCS_4R_6M	0.470
SCS_5_6M	0.297

SCS_6R_6M	0.551
SCS_7_6M	0.202
SCS_8R_6M	0.492
SCS_9_6M	0.093
SCS_10_6M	0.243
SCS_11R_6M	0.416
SCS_12_6M	0.360
SCS_13R_6M	0.473
SCS_14_6M	0.252
SCS_15_6M	0.273
SCS_16R_6M	0.731
SCS_17_6M	0.318
SCS_18R_6M	0.383
SCS_19_6M	0.394
SCS_20R_6M	0.328
SCS_21R_6M	0.467
SCS_22_6M	0.202
SCS_23_6M	0.382
SCS_24R_6M	0.282
SCS_25R_6M	0.456
SCS_26_6M	0.292

Appendix I

SCS Longitudinal Metric Invariance

Note: ~~ = co-vary

long.SCS.1.2.3.b <- "SCS=~ h1*SCS_1 + h2*SCS_2 + h3*SCS_3 + h4*SCS_4 + h5*SCS_5 + h6*SCS_6 + h7*SCS_7 + h8*SCS_8 + h9*SCS_9 + h10*SCS_10 + h11*SCS_11 + h12*SCS_12 + h13*SCS_13 + h14*SCS_14 + h15*SCS_15 + h16*SCS_16 + h17*SCS_17 + h18*SCS_18 + h19*SCS_19 + h20*SCS_20 + h21*SCS_21 + h22*SCS_22 + h23*SCS_23 + h24*SCS_24 + h25*SCS_25 + h26*SCS_26

SCS_3M=~ h1*SCS_1_3M + h2*SCS_2_3M + h3*SCS_3_3M + h4*SCS_4_3M + h5*SCS_5_3M + h6*SCS_6_3M + h7*SCS_7_3M + h8*SCS_8_3M + h9*SCS_9_3M + h10*SCS_10_3M +h11*SCS_11_3M + h12*SCS_12_3M + h13*SCS_13_3M + h14*SCS_14_3M + h15*SCS_15_3M + h16*SCS_16_3M + h17*SCS_17_3M + h18*SCS_18_3M + h19*SCS_19_3M + h20*SCS_20_3M +h21*SCS_21_3M + h22*SCS_22_3M + h23*SCS_23_3M + h24*SCS_24_3M + h25*SCS_25_3M + h26*SCS_26_3M

SCS_6M=~ h1*SCS_1R_6M + h2*SCS_2R_6M + h3*SCS_3_6M + h4*SCS_4R_6M + h5*SCS_5_6M + h6*SCS_6R_6M + h7*SCS_7_6M + h8*SCS_8R_6M + h9*SCS_9_6M + h10*SCS_10_6M +h11*SCS_11R_6M + h12*SCS_12_6M + h13*SCS_13R_6M + h14*SCS_14_6M + h15*SCS_15_6M + h16*SCS_16R_6M + h17*SCS_17_6M + h18*SCS_18R_6M + h19*SCS_19_6M + h20*SCS_20R_6M +h21*SCS_21R_6M + h22*SCS_22_6M + h23*SCS_23_6M + h24*SCS_24R_6M + h25*SCS_25R_6M + h26*SCS_26_6M

SCS_1~~SCS_1_3M
SCS_2~~SCS_2_3M
SCS_3~~SCS_3_3M
SCS_4~~SCS_4_3M
SCS_5~~SCS_5_3M
SCS_6~~SCS_6_3M
SCS_7~~SCS_7_3M
SCS_8~~SCS_8_3M
SCS_9~~SCS_9_3M
SCS_10~~SCS_10_3M
SCS_11~~SCS_11_3M
SCS_12~~SCS_12_3M
SCS_13~~SCS_13_3M
SCS_14~~SCS_14_3M
SCS_15~~SCS_15_3M
SCS_16~~SCS_16_3M
SCS_17~~SCS_17_3M
SCS_18~~SCS_18_3M
SCS_19~~SCS_19_3M
SCS_20~~SCS_20_3M
SCS_21~~SCS_21_3M
SCS_22~~SCS_22_3M

SCS_23~~SCS_23_3M
SCS_24~~SCS_24_3M
SCS_25~~SCS_25_3M
SCS_26~~SCS_26_3M

SCS_1~~SCS_1R_6M
SCS_2~~SCS_2R_6M
SCS_3~~SCS_3_6M
SCS_4~~SCS_4R_6M
SCS_5~~SCS_5_6M
SCS_6~~SCS_6R_6M
SCS_7~~SCS_7_6M
SCS_8~~SCS_8R_6M
SCS_9~~SCS_9_6M
SCS_10~~SCS_10_6M
SCS_11~~SCS_11R_6M
SCS_12~~SCS_12_6M
SCS_13~~SCS_13R_6M
SCS_14~~SCS_14_6M
SCS_15~~SCS_15_6M
SCS_16~~SCS_16R_6M
SCS_17~~SCS_17_6M
SCS_18~~SCS_18R_6M
SCS_19~~SCS_19_6M
SCS_20~~SCS_20R_6M
SCS_21~~SCS_21R_6M
SCS_22~~SCS_22_6M
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SCS_26~~SCS_26_6M

SCS_1_3M~~SCS_1R_6M
SCS_2_3M~~SCS_2R_6M
SCS_3_3M~~SCS_3_6M
SCS_4_3M~~SCS_4R_6M
SCS_5_3M~~SCS_5_6M
SCS_6_3M~~SCS_6R_6M
SCS_7_3M~~SCS_7_6M
SCS_8_3M~~SCS_8R_6M
SCS_9_3M~~SCS_9_6M
SCS_10_3M~~SCS_10_6M
SCS_11_3M~~SCS_11R_6M
SCS_12_3M~~SCS_12_6M
SCS_13_3M~~SCS_13R_6M
SCS_14_3M~~SCS_14_6M
SCS_15_3M~~SCS_15_6M
SCS_16_3M~~SCS_16R_6M
SCS_17_3M~~SCS_17_6M
SCS_18_3M~~SCS_18R_6M

SCS_19_3M~~SCS_19_6M
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SCS_25_3M~~SCS_25R_6M
SCS_26_3M~~SCS_26_6M

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SCS_4R_6M~~SCS_25R_6M
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SCS_3_6M~~SCS_17_6M
SCS_4R_6M~~SCS_6R_6M
SCS_4R_6M~~SCS_24R_6M
SCS_5_6M~~ SCS_9_6M
SCS_5_6M~~SCS_23_6M
SCS_6R_6M~~SCS_21R_6M
SCS_8R_6M~~SCS_11R_6M
SCS_10_6M~~SCS_15_6M
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SCS_20R_6M~~SCS_21R_6M
SCS_22_6M~~SCS_23_6M
SCS_1R_6M~~SCS_6R_6M
SCS_1R_6M~~SCS_13R_6M
SCS_1R_6M~~SCS_16R_6M
SCS_1R_6M~~SCS_25R_6M
SCS_2R_6M~~SCS_8R_6M
SCS_2R_6M~~SCS_11R_6M
SCS_2R_6M~~SCS_21R_6M
SCS_3_6M~~SCS_9_6M
SCS_7_6M~~SCS_17_6M
SCS_10_6M~~SCS_22_6M
SCS_5_6M~~SCS_10_6M
SCS_3_6M~~SCS_15_6M
SCS_4R_6M~~SCS_18R_6M

SCS_7_6M~~SCS_15_6M
SCS_6R_6M~~SCS_11R_6M
SCS_7_6M~~ SCS_9_6M
SCS_9_6M~~SCS_19_6M

##for metric

SCS_1~~SCS_6
SCS_4~~SCS_11
SCS_4~~SCS_18
SCS_6~~SCS_21
SCS_8~~SCS_24
SCS_14~~SCS_26
SCS_6_3M~~SCS_20_3M
SCS_19_3M~~SCS_22_3M
SCS_4R_6M~~SCS_21R_6M
SCS_7_6M~~SCS_22_6M
SCS_2~~SCS_25
SCS_6~~SCS_8
SCS_1~~SCS_16
SCS_5~~SCS_15
SCS_12~~SCS_15"

LSCS.1.2.3.b <- cfa(long.SCS.1.2.3.b, data = JMDFULLDATASET_BL_3M_6M, estimator="MLR", meanstructure=F)summary(LSCS.1.2.3.b, standardised = T, fit.measures = T, rsq = T)

> summary(LSCS.1.2.3.b, standardised = T, fit.measures = T, rsq = T)

lavaan 0.6-6 ended normally after 78 iterations

Estimator	ML	
Optimization method	NLMINB	
Number of free parameters	445	
Number of equality constraints	50	
Number of observations	Used	Total
	242	394
Model Test User Model:		
	Standard	Robust
Test Statistic	4692.945	4427.060
Degrees of freedom	2686	2686
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.060
Yuan-Bentler correction (Mplus variant)		

Model Test Baseline Model:

Test statistic	16090.904	14699.227
Degrees of freedom	3003	3003
P-value	0.000	0.000

Scaling correction factor		1.095

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.847	0.851
Tucker-Lewis Index (TLI)	0.829	0.834
Robust Comparative Fit Index (CFI)		0.856
Robust Tucker-Lewis Index (TLI)		0.839

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-23065.440	-23065.440
Scaling correction factor for the MLR correction	1.106	
Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.084	
Akaike (AIC)	46920.880	46920.880
Bayesian (BIC)	48299.011	48299.011
Sample-size adjusted Bayesian (BIC)	47046.930	47046.930

Root Mean Square Error of Approximation:

RMSEA	0.056	0.052
90 Percent confidence interval – Lower	0.053	0.049
90 Percent confidence interval – Upper	0.058	0.054
P-value RMSEA <= 0.05	0.000	0.137
Robust RMSEA		0.053
90 Percent confidence interval – Lower		0.050
90 Percent confidence interval – Upper		0.056

Standardised Root Mean Square Residual:

SRMR	0.099	0.099

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all

SCS=~								
SCS_1	(h1)	1.000				0.857	0.722	
SCS_2	(h2)	0.944	0.056	16.778		0.000	0.809	0.665
SCS_3	(h3)	0.385	0.080	4.821		0.000	0.330	0.332
SCS_4	(h4)	0.908	0.045	19.983		0.000	0.778	0.626
SCS_5	(h5)	0.649	0.066	9.764		0.000	0.556	0.506
SCS_6	(h6)	0.967	0.051	18.952		0.000	0.828	0.674
SCS_7	(h7)	0.572	0.071	8.103		0.000	0.490	0.451
SCS_8	(h8)	0.876	0.049	17.916		0.000	0.751	0.711
SCS_9	(h9)	0.447	0.069	6.460		0.000	0.383	0.373
SCS_10	(h10)	0.560	0.077	7.269		0.000	0.479	0.443
SCS_11	(h11)	0.814	0.054	15.152		0.000	0.697	0.610
SCS_12	(h12)	0.748	0.057	13.190		0.000	0.641	0.609
SCS_13	(h13)	0.780	0.053	14.586		0.000	0.668	0.608
SCS_14	(h14)	0.556	0.063	8.801		0.000	0.476	0.485
SCS_15	(h15)	0.699	0.073	9.583		0.000	0.599	0.536
SCS_16	(h16)	0.993	0.040	24.737		0.000	0.851	0.752
SCS_17	(h17)	0.657	0.067	9.843		0.000	0.563	0.557
SCS_18	(h18)	0.716	0.053	13.514		0.000	0.614	0.535
SCS_19	(h19)	0.772	0.058	13.422		0.000	0.661	0.632
SCS_20	(h20)	0.769	0.064	12.026		0.000	0.659	0.598
SCS_21	(h21)	0.936	0.044	21.230		0.000	0.802	0.706
SCS_22	(h22)	0.522	0.072	7.302		0.000	0.447	0.436
SCS_23	(h23)	0.792	0.053	14.815		0.000	0.678	0.647
SCS_24	(h24)	0.747	0.075	9.975		0.000	0.640	0.523
SCS_25	(h25)	0.865	0.053	16.446		0.000	0.741	0.682
SCS_26	(h26)	0.701	0.068	10.366		0.000	0.600	0.581
SCS_3M=~								
SCS_1_3M	(h1)	1.000				0.882	0.784	
SCS_2_3M	(h2)	0.944	0.056	16.778		0.000	0.833	0.713
SCS_3_3M	(h3)	0.385	0.080	4.821		0.000	0.339	0.339
SCS_4_3M	(h4)	0.908	0.045	19.983		0.000	0.801	0.663
SCS_5_3M	(h5)	0.649	0.066	9.764		0.000	0.572	0.518
SCS_6_3M	(h6)	0.967	0.051	18.952		0.000	0.853	0.663
SCS_7_3M	(h7)	0.572	0.071	8.103		0.000	0.505	0.454
SCS_8_3M	(h8)	0.876	0.049	17.916		0.000	0.773	0.695
SCS_9_3M	(h9)	0.447	0.069	6.460		0.000	0.395	0.422
SCS_10_3	(h10)	0.560	0.077	7.269		0.000	0.494	0.456
SCS_11_3	(h11)	0.814	0.054	15.152		0.000	0.718	0.665
SCS_12_3	(h12)	0.748	0.057	13.139		0.000	0.660	0.634
SCS_13_3	(h13)	0.780	0.053	14.586		0.000	0.688	0.609
SCS_14_3	(h14)	0.556	0.063	8.801		0.000	0.490	0.491
SCS_15_3	(h15)	0.699	0.073	9.583		0.000	0.616	0.578
SCS_16_3	(h16)	0.993	0.040	24.737		0.000	0.876	0.778
SCS_17_3	(h17)	0.657	0.067	9.843		0.000	0.580	0.560
SCS_18_3	(h18)	0.716	0.053	13.514		0.000	0.632	0.579
SCS_19_3	(h19)	0.772	0.058	13.422		0.000	0.681	0.664
SCS_20_3	(h20)	0.769	0.064	12.026		0.000	0.678	0.599
SCS_21_3	(h21)	0.936	0.044	21.230		0.000	0.826	0.713
SCS_22_3	(h22)	0.522	0.072	7.302		0.000	0.461	0.459

SCS_23_3	(h23)	0.792	0.053	14.815	0.000	0.699	0.662
SCS_24_3	(h24)	0.747	0.075	9.975	0.000	0.659	0.562
SCS_25_3	(h25)	0.865	0.053	16.446	0.000	0.763	0.652
SCS_26_3	(h26)	0.701	0.068	10.366	0.000	0.618	0.606
SCS_6M=~							
SCS_1R_6	(h1)	1.000			0.895	0.767	
SCS_2R_	(h2)	0.944	0.056	16.778	0.000	0.845	0.753
SCS_3_6M	(h3)	0.385	0.080	4.821	0.000	0.344	0.334
SCS_4R_6	(h4)	0.908	0.045	19.983	0.000	0.812	0.702
SCS_5_6M	(h5)	0.649	0.066	9.764	0.000	0.580	0.549
SCS_6R_6	(h6)	0.967	0.051	18.952	0.000	0.865	0.719
SCS_7_6M	(h7)	0.572	0.071	8.103	0.000	0.512	0.466
SCS_8R_6	(h8)	0.876	0.049	17.916	0.000	0.784	0.716
SCS_9_6M	(h9)	0.447	0.069	6.460	0.000	0.400	0.403
SCS_10_6	(h10)	0.560	0.077	7.269	0.000	0.501	0.471
SCS_11R_	(h11)	0.814	0.054	15.152	0.000	0.728	0.646
SCS_12_6	(h12)	0.748	0.057	13.139	0.000	0.669	0.634
SCS_13R_	(h13)	0.780	0.053	14.586	0.000	0.698	0.652
SCS_14_6	(h14)	0.556	0.063	8.801	0.000	0.497	0.489
SCS_15_6	(h15)	0.699	0.073	9.583	0.000	0.625	0.542
SCS_16R_	(h16)	0.993	0.040	24.737	0.000	0.889	0.834
SCS_17_6	(h17)	0.657	0.067	9.843	0.000	0.588	0.577
SCS_18R_	(h18)	0.716	0.053	13.514	0.000	0.641	0.603
SCS_19_6	(h19)	0.772	0.058	13.422	0.000	0.691	0.629
SCS_20R_	(h20)	0.769	0.064	12.026	0.000	0.688	0.596
SCS_21R_	(h21)	0.936	0.044	21.230	0.000	0.838	0.700
SCS_22_6	(h22)	0.522	0.072	7.302	0.000	0.467	0.465
SCS_23_6	(h23)	0.792	0.053	14.815	0.000	0.709	0.643
SCS_24R_	(h24)	0.747	0.075	9.975	0.000	0.668	0.539
SCS_25R_	(h25)	0.865	0.053	16.446	0.000	0.774	0.693
SCS_26_6	(h26)	0.701	0.068	10.366	0.000	0.627	0.589

Covariances:

	Est.	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1~~SCS_1_3M	0.190	0.040	4.700	0.000	0.190	0.331
SCS_2~~SCS_2_3M	0.180	0.056	3.193	0.001	0.180	0.242
SCS_3~~SCS_3_3M	0.124	0.057	2.186	0.029	0.124	0.141
SCS_4~~SCS_4_3M	0.311	0.069	4.492	0.000	0.311	0.355
SCS_5~~SCS_5_3M	0.183	0.056	3.286	0.001	0.183	0.205
SCS_6~~SCS_6_3M	0.171	0.053	3.251	0.001	0.171	0.195
SCS_7~~SCS_7_3M	0.226	0.061	3.688	0.000	0.226	0.235
SCS_8~~SCS_8_3M	0.139	0.037	3.764	0.000	0.139	0.234
SCS_9~~SCS_9_3M	0.223	0.049	4.550	0.000	0.223	0.277
SCS_10~~SCS_10_3M	0.093	0.052	1.788	0.074	0.093	0.099
SCS_11~~SCS_11_3M	0.117	0.044	2.652	0.008	0.117	0.160
SCS_12~~SCS_12_3M	0.090	0.038	2.379	0.017	0.090	0.134
SCS_13~~SCS_13_3M	0.213	0.069	3.096	0.002	0.213	0.273
SCS_14~~SCS_14_3M	0.090	0.049	1.836	0.066	0.090	0.121
SCS_15~~SCS_15_3M	0.153	0.043	3.577	0.000	0.153	0.187
SCS_16~~SCS_16_3M	0.009	0.041	0.215	0.830	0.009	0.017

SCS_17~~SCS_17_3M	0.054	0.036	1.498	0.134	0.054	0.075
SCS_18~~SCS_18_3M	0.077	0.065	1.189	0.234	0.077	0.089
SCS_19~~SCS_19_3M	0.026	0.043	0.602	0.547	0.026	0.042
SCS_20~~SCS_20_3M	0.241	0.060	4.029	0.000	0.241	0.301
SCS_21~~SCS_21_3M	0.139	0.048	2.905	0.004	0.139	0.213
SCS_22~~SCS_22_3M	0.090	0.051	1.753	0.080	0.090	0.109
SCS_23~~SCS_23_3M	0.115	0.052	2.230	0.026	0.115	0.182
SCS_24~~SCS_24_3M	0.346	0.079	4.408	0.000	0.346	0.342
SCS_25~~SCS_25_3M	0.099	0.051	1.952	0.051	0.099	0.140
SCS_26~~SCS_26_3M	0.127	0.046	2.776	0.005	0.127	0.187
SCS_1~~SCS_1R_6M	0.152	0.051	2.981	0.003	0.152	0.247
SCS_2~~SCS_2R_6M	0.237	0.057	4.157	0.000	0.237	0.354
SCS_3~~SCS_3_6M	0.109	0.054	2.034	0.042	0.109	0.120
SCS_4~~SCS_4R_6M	0.252	0.057	4.449	0.000	0.252	0.316
SCS_5~~SCS_5_6M	0.090	0.041	2.192	0.028	0.090	0.108
SCS_6~~SCS_6R_6M	0.254	0.053	4.790	0.000	0.254	0.335
SCS_7~~SCS_7_6M	0.090	0.051	1.747	0.081	0.090	0.095
SCS_8~~SCS_8R_6M	0.131	0.040	3.245	0.001	0.131	0.231
SCS_9~~SCS_9_6M	0.196	0.062	3.137	0.002	0.196	0.226
SCS_10~~SCS_10_6M	0.151	0.042	3.614	0.000	0.151	0.166
SCS_11~~SCS_11R_6M	0.169	0.059	2.857	0.004	0.169	0.216
SCS_12~~SCS_12_6M	0.019	0.040	0.461	0.645	0.019	0.027
SCS_13~~SCS_13R_6M	0.118	0.064	1.826	0.068	0.118	0.166
SCS_14~~SCS_14_6M	0.112	0.036	3.120	0.002	0.112	0.147
SCS_15~~SCS_15_6M	0.167	0.051	3.281	0.001	0.167	0.183
SCS_16~~SCS_16R_6M	0.077	0.037	2.059	0.040	0.077	0.176
SCS_17~~SCS_17_6M	-0.028	0.033	-0.856	0.392	-0.028	-0.040
SCS_18~~SCS_18R_6M	0.184	0.056	3.287	0.001	0.184	0.223
SCS_19~~SCS_19_6M	0.038	0.043	0.893	0.372	0.038	0.055
SCS_20~~SCS_20R_6M	0.224	0.062	3.607	0.000	0.224	0.274
SCS_21~~SCS_21R_6M	0.273	0.048	5.636	0.000	0.273	0.397
SCS_22~~SCS_22_6M	0.140	0.043	3.280	0.001	0.140	0.170
SCS_23~~SCS_23_6M	0.118	0.043	2.777	0.005	0.118	0.175
SCS_24~~SCS_24R_6M	0.422	0.091	4.640	0.000	0.422	0.387
SCS_25~~SCS_25R_6M	0.140	0.039	3.562	0.000	0.140	0.219
SCS_26~~SCS_26_6M	0.187	0.045	4.124	0.000	0.187	0.258
SCS_1_3M~~SCS_1R_6M	0.067	0.043	1.554	0.120	0.067	0.129
SCS_2_3M~~SCS_2R_6M	0.174	0.047	3.732	0.000	0.174	0.287
SCS_3_3M~~SCS_3_6M	0.234	0.069	3.380	0.001	0.234	0.256
SCS_4_3M~~SCS_4R_6M	0.227	0.055	4.129	0.000	0.227	0.305
SCS_5_3M~~SCS_5_6M	0.152	0.052	2.939	0.003	0.152	0.182
SCS_6_3M~~SCS_6R_6M	0.160	0.049	3.231	0.001	0.160	0.198
SCS_7_3M~~SCS_7_6M	0.113	0.060	1.885	0.059	0.113	0.117
SCS_8_3M~~SCS_8R_6M	0.154	0.040	3.833	0.000	0.154	0.252
SCS_9_3M~~SCS_9_6M	0.198	0.050	3.982	0.000	0.198	0.258
SCS_10_3M~~SCS_10_6M	0.075	0.051	1.480	0.139	0.075	0.083
SCS_11_3M~~SCS_11R_6M	0.099	0.049	2.004	0.045	0.099	0.143
SCS_12_3M~~SCS_12_6M	0.048	0.039	1.233	0.218	0.048	0.074
SCS_13_3M~~SCS_13R_6M	0.213	0.056	3.814	0.000	0.213	0.293
SCS_14_3M~~SCS_14_6M	0.090	0.048	1.855	0.064	0.090	0.116

SCS_15_3M~~SCS_15_6M	0.208	0.047	4.419	0.000	0.208	0.246
SCS_16_3M~~SCS_16R_6M	0.069	0.035	1.997	0.046	0.069	0.166
SCS_17_3M~~SCS_17_6M	0.086	0.039	2.216	0.027	0.086	0.120
SCS_18_3M~~SCS_18R_6M	0.099	0.052	1.903	0.057	0.099	0.131
SCS_19_3M~~SCS_19_6M	0.012	0.041	0.281	0.779	0.012	0.018

[reached getOption("max.print") -- omitted 396 rows]

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	0.675	0.060	11.190	0.000	0.675	0.479
SCS_2	0.825	0.084	9.855	0.000	0.825	0.558
SCS_3	0.876	0.080	10.930	0.000	0.876	0.890
SCS_4	0.937	0.089	10.477	0.000	0.937	0.608
SCS_5	0.899	0.080	11.277	0.000	0.899	0.744
SCS_6	0.823	0.086	9.555	0.000	0.823	0.545
SCS_7	0.941	0.073	12.823	0.000	0.941	0.797
SCS_8	0.551	0.059	9.293	0.000	0.551	0.494
SCS_9	0.908	0.077	11.764	0.000	0.908	0.861
SCS_10	0.939	0.088	10.706	0.000	0.939	0.803
SCS_11	0.822	0.088	9.321	0.000	0.822	0.628
SCS_12	0.698	0.066	10.626	0.000	0.698	0.629
SCS_13	0.763	0.084	9.140	0.000	0.763	0.631
SCS_14	0.736	0.059	12.372	0.000	0.736	0.765
SCS_15	0.889	0.083	10.652	0.000	0.889	0.713
SCS_16	0.556	0.069	8.088	0.000	0.556	0.434
SCS_17	0.705	0.066	10.628	0.000	0.705	0.690
SCS_18	0.941	0.103	9.178	0.000	0.941	0.714
SCS_19	0.658	0.073	8.991	0.000	0.658	0.601
SCS_20	0.781	0.080	9.739	0.000	0.781	0.643
SCS_21	0.646	0.062	10.435	0.000	0.646	0.501
SCS_22	0.855	0.079	10.790	0.000	0.855	0.810
SCS_23	0.640	0.075	8.522	0.000	0.640	0.582
SCS_24	1.090	0.106	10.308	0.000	1.090	0.727
SCS_25	0.634	0.060	10.564	0.000	0.634	0.535
SCS_26	0.706	0.068	10.335	0.000	0.706	0.662
SCS_1_3M	0.487	0.055	8.800	0.000	0.487	0.385
SCS_2_3M	0.672	0.069	9.815	0.000	0.672	0.492
SCS_3_3M	0.885	0.086	10.244	0.000	0.885	0.885
SCS_4_3M	0.819	0.085	9.621	0.000	0.819	0.561
SCS_5_3M	0.891	0.085	10.437	0.000	0.891	0.731
SCS_6_3M	0.927	0.116	8.027	0.000	0.927	0.560
SCS_7_3M	0.981	0.077	12.674	0.000	0.981	0.794
SCS_8_3M	0.640	0.064	9.935	0.000	0.640	0.517
SCS_9_3M	0.718	0.067	10.683	0.000	0.718	0.822
SCS_10_3M	0.927	0.067	13.766	0.000	0.927	0.792
SCS_11_3M	0.649	0.061	10.707	0.000	0.649	0.557
SCS_12_3M	0.646	0.061	10.542	0.000	0.646	0.597
SCS_13_3M	0.802	0.094	8.517	0.000	0.802	0.629
SCS_14_3M	0.755	0.066	11.477	0.000	0.755	0.759
SCS_15_3M	0.758	0.061	12.463	0.000	0.758	0.666

SCS_16_3M	0.500	0.057	8.706	0.000	0.500	0.394
SCS_17_3M	0.737	0.073	10.122	0.000	0.737	0.687
SCS_18_3M	0.793	0.082	9.674	0.000	0.793	0.665
SCS_19_3M	0.588	0.074	7.954	0.000	0.588	0.559
SCS_20_3M	0.821	0.088	9.296	0.000	0.821	0.641
SCS_21_3M	0.659	0.064	10.293	0.000	0.659	0.491
SCS_22_3M	0.797	0.073	10.869	0.000	0.797	0.790
SCS_23_3M	0.625	0.069	9.002	0.000	0.625	0.562
SCS_24_3M	0.941	0.084	11.151	0.000	0.941	0.684
SCS_25_3M	0.790	0.087	9.119	0.000	0.790	0.576
SCS_26_3M	0.659	0.060	10.920	0.000	0.659	0.633
SCS_1R_6M	0.561	0.070	8.073	0.000	0.561	0.412
SCS_2R_6M	0.543	0.060	9.107	0.000	0.543	0.432
SCS_3_6M	0.943	0.097	9.746	0.000	0.943	0.888
SCS_4R_6M	0.677	0.067	10.119	0.000	0.677	0.507
SCS_5_6M	0.780	0.062	12.616	0.000	0.780	0.698
SCS_6R_6M	0.699	0.080	8.770	0.000	0.699	0.483
SCS_7_6M	0.946	0.091	10.412	0.000	0.946	0.783
SCS_8R_6M	0.585	0.065	9.000	0.000	0.585	0.488
SCS_9_6M	0.826	0.078	10.646	0.000	0.826	0.838
SCS_10_6M	0.879	0.075	11.738	0.000	0.879	0.778
SCS_11R_6M	0.741	0.082	9.009	0.000	0.741	0.583
SCS_12_6M	0.666	0.079	8.393	0.000	0.666	0.598
SCS_13R_6M	0.660	0.063	10.402	0.000	0.660	0.575
SCS_14_6M	0.786	0.079	9.960	0.000	0.786	0.761
SCS_15_6M	0.942	0.088	10.733	0.000	0.942	0.707
SCS_16R_6M	0.346	0.044	7.860	0.000	0.346	0.305
SCS_17_6M	0.694	0.080	8.710	0.000	0.694	0.667
SCS_18R_6M	0.720	0.072	9.955	0.000	0.720	0.637
SCS_19_6M	0.727	0.085	8.567	0.000	0.727	0.604
SCS_20R_6M	0.859	0.089	9.666	0.000	0.859	0.645
SCS_21R_6M	0.731	0.075	9.697	0.000	0.731	0.510
SCS_22_6M	0.789	0.066	11.890	0.000	0.789	0.783
SCS_23_6M	0.711	0.089	8.022	0.000	0.711	0.586
SCS_24R_6M	1.091	0.101	10.786	0.000	1.091	0.709
SCS_25R_6M	0.647	0.072	8.974	0.000	0.647	0.519
SCS_26_6M	0.740	0.067	11.133	0.000	0.740	0.653
SCS	0.734	0.079	9.345	0.000	1.000	1.000
SCS_3M	0.778	0.087	8.900	0.000	1.000	1.000
SCS_6M	0.800	0.088	9.045	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1	0.521
SCS_2	0.442
SCS_3	0.110
SCS_4	0.392
SCS_5	0.256
SCS_6	0.455
SCS_7	0.203

SCS_8	0.506
SCS_9	0.139
SCS_10	0.197
SCS_11	0.372
SCS_12	0.371
SCS_13	0.369
SCS_14	0.235
SCS_15	0.287
SCS_16	0.566
SCS_17	0.310
SCS_18	0.286
SCS_19	0.399
SCS_20	0.357
SCS_21	0.499
SCS_22	0.190
SCS_23	0.418
SCS_24	0.273
SCS_25	0.465
SCS_26	0.338
SCS_1_3M	0.615
SCS_2_3M	0.508
SCS_3_3M	0.115
SCS_4_3M	0.439
SCS_5_3M	0.269
SCS_6_3M	0.440
SCS_7_3M	0.206
SCS_8_3M	0.483
SCS_9_3M	0.178
SCS_10_3M	0.208
SCS_11_3M	0.443
SCS_12_3M	0.403
SCS_13_3M	0.371
SCS_14_3M	0.241
SCS_15_3M	0.334
SCS_16_3M	0.606
SCS_17_3M	0.313
SCS_18_3M	0.335
SCS_19_3M	0.441
SCS_20_3M	0.359
SCS_21_3M	0.509
SCS_22_3M	0.210
SCS_23_3M	0.438
SCS_24_3M	0.316
SCS_25_3M	0.424
SCS_26_3M	0.367
SCS_1R_6M	0.588
SCS_2R_6M	0.568
SCS_3_6M	0.112
SCS_4R_6M	0.493
SCS_5_6M	0.302

SCS_6R_6M	0.517
SCS_7_6M	0.217
SCS_8R_6M	0.512
SCS_9_6M	0.162
SCS_10_6M	0.222
SCS_11R_6M	0.417
SCS_12_6M	0.402
SCS_13R_6M	0.425
SCS_14_6M	0.239
SCS_15_6M	0.293
SCS_16R_6M	0.695
SCS_17_6M	0.333
SCS_18R_6M	0.363
SCS_19_6M	0.396
SCS_20R_6M	0.355
SCS_21R_6M	0.490
SCS_22_6M	0.217
SCS_23_6M	0.414
SCS_24R_6M	0.291
SCS_25R_6M	0.481
SCS_26_6M	0.347

Appendix J

SCS Longitudinal Scalar Invariance

Note: ~~ = co-vary

long.SCS.1.2.3.c <- "SCS=~ h1*SCS_1 + h2*SCS_2 + h3*SCS_3 + h4*SCS_4 + h5*SCS_5 + h6*SCS_6 + h7*SCS_7 + h8*SCS_8 + h9*SCS_9 + h10*SCS_10 + h11*SCS_11 + h12*SCS_12 + h13*SCS_13 + h14*SCS_14 + h15*SCS_15 + h16*SCS_16 + h17*SCS_17 + h18*SCS_18 + h19*SCS_19 + h20*SCS_20 + h21*SCS_21 + h22*SCS_22 + h23*SCS_23 + h24*SCS_24 + h25*SCS_25 + h26*SCS_26

SCS_3M=~ h1*SCS_1_3M + h2*SCS_2_3M + h3*SCS_3_3M + h4*SCS_4_3M + h5*SCS_5_3M + h6*SCS_6_3M + h7*SCS_7_3M + h8*SCS_8_3M + h9*SCS_9_3M + h10*SCS_10_3M + h11*SCS_11_3M + h12*SCS_12_3M + h13*SCS_13_3M + h14*SCS_14_3M + h15*SCS_15_3M + h16*SCS_16_3M + h17*SCS_17_3M + h18*SCS_18_3M + h19*SCS_19_3M + h20*SCS_20_3M + h21*SCS_21_3M + h22*SCS_22_3M + h23*SCS_23_3M + h24*SCS_24_3M + h25*SCS_25_3M + h26*SCS_26_3M

SCS_6M=~ h1*SCS_1R_6M + h2*SCS_2R_6M + h3*SCS_3_6M + h4*SCS_4R_6M + h5*SCS_5_6M + h6*SCS_6R_6M + h7*SCS_7_6M + h8*SCS_8R_6M + h9*SCS_9_6M + h10*SCS_10_6M + h11*SCS_11R_6M + h12*SCS_12_6M + h13*SCS_13R_6M + h14*SCS_14_6M + h15*SCS_15_6M + h16*SCS_16R_6M + h17*SCS_17_6M + h18*SCS_18R_6M + h19*SCS_19_6M + h20*SCS_20R_6M + h21*SCS_21R_6M + h22*SCS_22_6M + h23*SCS_23_6M + h24*SCS_24R_6M + h25*SCS_25R_6M + h26*SCS_26_6M

SCS_1~~SCS_1_3M
SCS_2~~SCS_2_3M
SCS_3~~SCS_3_3M
SCS_4~~SCS_4_3M
SCS_5~~SCS_5_3M
SCS_6~~SCS_6_3M
SCS_7~~SCS_7_3M
SCS_8~~SCS_8_3M
SCS_9~~SCS_9_3M
SCS_10~~SCS_10_3M
SCS_11~~SCS_11_3M
SCS_12~~SCS_12_3M
SCS_13~~SCS_13_3M
SCS_14~~SCS_14_3M
SCS_15~~SCS_15_3M
SCS_16~~SCS_16_3M
SCS_17~~SCS_17_3M
SCS_18~~SCS_18_3M
SCS_19~~SCS_19_3M
SCS_20~~SCS_20_3M
SCS_21~~SCS_21_3M
SCS_22~~SCS_22_3M

SCS_23~~SCS_23_3M
SCS_24~~SCS_24_3M
SCS_25~~SCS_25_3M
SCS_26~~SCS_26_3M

SCS_1~~SCS_1R_6M
SCS_2~~SCS_2R_6M
SCS_3~~SCS_3_6M
SCS_4~~SCS_4R_6M
SCS_5~~SCS_5_6M
SCS_6~~SCS_6R_6M
SCS_7~~SCS_7_6M
SCS_8~~SCS_8R_6M
SCS_9~~SCS_9_6M
SCS_10~~SCS_10_6M
SCS_11~~SCS_11R_6M
SCS_12~~SCS_12_6M
SCS_13~~SCS_13R_6M
SCS_14~~SCS_14_6M
SCS_15~~SCS_15_6M
SCS_16~~SCS_16R_6M
SCS_17~~SCS_17_6M
SCS_18~~SCS_18R_6M
SCS_19~~SCS_19_6M
SCS_20~~SCS_20R_6M
SCS_21~~SCS_21R_6M
SCS_22~~SCS_22_6M
SCS_23~~SCS_23_6M
SCS_24~~SCS_24R_6M
SCS_25~~SCS_25R_6M
SCS_26~~SCS_26_6M

SCS_1_3M~~SCS_1R_6M
SCS_2_3M~~SCS_2R_6M
SCS_3_3M~~SCS_3_6M
SCS_4_3M~~SCS_4R_6M
SCS_5_3M~~SCS_5_6M
SCS_6_3M~~SCS_6R_6M
SCS_7_3M~~SCS_7_6M
SCS_8_3M~~SCS_8R_6M
SCS_9_3M~~SCS_9_6M
SCS_10_3M~~SCS_10_6M
SCS_11_3M~~SCS_11R_6M
SCS_12_3M~~SCS_12_6M
SCS_13_3M~~SCS_13R_6M
SCS_14_3M~~SCS_14_6M
SCS_15_3M~~SCS_15_6M
SCS_16_3M~~SCS_16R_6M
SCS_17_3M~~SCS_17_6M
SCS_18_3M~~SCS_18R_6M

SCS_19_3M~~SCS_19_6M
SCS_20_3M~~SCS_20R_6M
SCS_21_3M~~SCS_21R_6M
SCS_22_3M~~SCS_22_6M
SCS_23_3M~~SCS_23_6M
SCS_24_3M~~SCS_24R_6M
SCS_25_3M~~SCS_25R_6M
SCS_26_3M~~SCS_26_6M

SCS_1~i1*1
SCS_1_3M~i1*1
SCS_1R_6M~i1*1
SCS_2~i2*1
SCS_2_3M~i2*1
SCS_2R_6M~i2*1
SCS_3~i3*1
SCS_3_3M~i3*1
SCS_3_6M~i3*1
SCS_4~i4*1
SCS_4_3M~i4*1
SCS_4R_6M~i4*1
SCS_5~i5*1
SCS_5_3M~i5*1
SCS_5_6M~i5*1
SCS_6~i6*1
SCS_6_3M~i6*1
SCS_6R_6M~i6*1
SCS_7~i7*1
SCS_7_3M~i7*1
SCS_7_6M~i7*1
SCS_8~i8*1
SCS_8_3M~i8*1
SCS_8R_6M~i8*1
SCS_9~i9*1
SCS_9_3M~i9*1
SCS_9_6M~i9*1
SCS_10~i10*1
SCS_10_3M~i10*1
SCS_10_6M~i10*1
SCS_11~i11*1
SCS_11_3M~i11*1
SCS_11R_6M~i11*1
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SCS_12_6M~i12*1
SCS_13~i13*1
SCS_13_3M~i13*1
SCS_13R_6M~i13*1
SCS_14~i14*1
SCS_14_3M~i14*1

SCS_14_6M~i14*1
SCS_15~i15*1
SCS_15_3M~i15*1
SCS_15_6M~i15*1
SCS_16~i16*1
SCS_16_3M~i16*1
SCS_16R_6M~i16*1
SCS_17~i17*1
SCS_17_3M~i17*1
SCS_17_6M~i17*1
SCS_18~i18*1
SCS_18_3M~i18*1
SCS_18R_6M~i18*1
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SCS_19_3M~i19*1
SCS_19_6M~i19*1
SCS_20~i20*1
SCS_20_3M~i20*1
SCS_20R_6M~i20*1
SCS_21~i21*1
SCS_21_3M~i21*1
SCS_21R_6M~i21*1
SCS_22~i22*1
SCS_22_3M~i22*1
SCS_22_6M~i22*1
SCS_23~i23*1
SCS_23_3M~i23*1
SCS_23_6M~i23*1
SCS_24~i24*1
SCS_24_3M~i24*1
SCS_24R_6M~i24*1
SCS_25~i25*1
SCS_25_3M~i25*1
SCS_25R_6M~i25*1
SCS_26~i26*1
SCS_26_3M~i26*1
SCS_26_6M~i26*1

SCS_7~~SCS_10
SCS_1~~SCS_2
SCS_5~~SCS_12
SCS_7~~SCS_15
SCS_9~~SCS_14
SCS_10~~SCS_15
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SCS_17_6M~~SCS_26_6M
SCS_2R_6M~~SCS_24R_6M
SCS_3_6M~~SCS_14_6M

SCS_4R_6M~~SCS_16R_6M
SCS_4R_6M~~SCS_25R_6M
SCS_5_6M~~SCS_15_6M
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SCS_3_6M~~SCS_17_6M
SCS_4R_6M~~SCS_6R_6M
SCS_4R_6M~~SCS_24R_6M
SCS_5_6M~~SCS_9_6M
SCS_5_6M~~SCS_23_6M
SCS_6R_6M~~SCS_21R_6M
SCS_8R_6M~~SCS_11R_6M
SCS_10_6M~~SCS_15_6M
SCS_12_6M~~SCS_15_6M
SCS_19_6M~~SCS_23_6M
SCS_20R_6M~~SCS_21R_6M
SCS_22_6M~~SCS_23_6M
SCS_1R_6M~~SCS_6R_6M
SCS_1R_6M~~SCS_13R_6M
SCS_1R_6M~~SCS_16R_6M
SCS_1R_6M~~SCS_25R_6M
SCS_2R_6M~~SCS_8R_6M
SCS_2R_6M~~SCS_11R_6M
SCS_2R_6M~~SCS_21R_6M
SCS_3_6M~~SCS_9_6M
SCS_7_6M~~SCS_17_6M
SCS_10_6M~~SCS_22_6M
SCS_5_6M~~SCS_10_6M
SCS_3_6M~~SCS_15_6M
SCS_4R_6M~~SCS_18R_6M
SCS_7_6M~~SCS_15_6M
SCS_6R_6M~~SCS_11R_6M
SCS_7_6M~~ SCS_9_6M
SCS_9_6M~~SCS_19_6M

##scalar

SCS_1~~SCS_6
SCS_4~~SCS_11
SCS_4~~SCS_18
SCS_6~~SCS_21
SCS_8~~SCS_24
SCS_14~~SCS_26
SCS_6_3M~~SCS_20_3M
SCS_19_3M~~SCS_22_3M
SCS_4R_6M~SCS_21R_6M
SCS_7_6M~~SCS_22_6M

SCS_2~~SCS_25

```
SCS_6~~SCS_8
SCS_1~~SCS_16
SCS_5~~SCS_15
SCS_12~~SCS_15"

LSCS.1.2.3.c <- cfa(long.SCS.1.2.3.c, data = JMDFULLDATASET_BL_3M_6M,
estimator="MLR", meanstructure=F)summary(LSCS.1.2.3.c, standardised = T, fit.measures
= T, rsq = T)

subset(modificationindices(LSCS.1.2.3.c), mi > 5)
```

```
lavaan 0.6-6 ended normally after 133 iterations

Estimator                                  ML
Optimization method                        NLMINB
Number of free parameters                  523
Number of equality constraints             102
Number of observations                     Used          Total
                                           242           394
Model Test User Model:
                                           Standard      Robust
    Test Statistic                         4750.497      4490.397
    Degrees of freedom                     2738          2738
    P-value (Chi-square)                   0.000         0.000
    Scaling correction factor                            1.058
    Yuan-Bentler correction (Mplus variant)

Model Test Baseline Model:

    Test statistic                         16090.904     14699.227
    Degrees of freedom                     3003          3003
    P-value                                0.000         0.000
    Scaling correction factor                            1.095

User Model versus Baseline Model:

    Comparative Fit Index (CFI)            0.846         0.850
    Tucker-Lewis Index (TLI)               0.831         0.836
    Robust Comparative Fit Index (CFI)                   0.855
    Robust Tucker-Lewis Index (TLI)                      0.841

Loglikelihood and Information Criteria:

    Loglikelihood user model (H0)          -23094.216    -23094.216
    Scaling correction factor              0.996
    for the MLR correction

Loglikelihood unrestricted model (H1)      NA            NA
    Scaling correction factor
    for the MLR correction                 1.082
```

Akaike (AIC)	47030.432	47030.432
Bayesian (BIC)	48499.275	48499.275
Sample-size adjusted Bayesian (BIC)	47164.779	47164.779

Root Mean Square Error of Approximation:

RMSEA	0.055	0.051
90 Percent confidence interval – Lower	0.052	0.049
90 Percent confidence interval – Upper	0.058	0.054
P-value RMSEA <= 0.05	0.000	0.185
Robust RMSEA		0.053
90 Percent confidence interval – Lower		0.050
90 Percent confidence interval – Upper		0.056

Standardised Root Mean Square Residual:

SRMR	0.098	0.098

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

		Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS=~							
SCS_1	(h1)	1.000			0.859	0.723	
SCS_2	(h2)	0.943	0.055	17.026	0.000	0.810	0.666
SCS_3	(h3)	0.382	0.080	4.781	0.000	0.328	0.331
SCS_4	(h4)	0.906	0.045	19.915	0.000	0.778	0.627
SCS_5	(h5)	0.646	0.066	9.804	0.000	0.555	0.506
SCS_6	(h6)	0.965	0.051	19.031	0.000	0.829	0.675
SCS_7	(h7)	0.567	0.070	8.050	0.000	0.487	0.448
SCS_8	(h8)	0.878	0.049	17.955	0.000	0.754	0.710
SCS_9	(h9)	0.449	0.069	6.539	0.000	0.386	0.374
SCS_10	(h10)	0.556	0.077	7.264	0.000	0.478	0.442
SCS_11	(h11)	0.812	0.053	15.187	0.000	0.698	0.610
SCS_12	(h12)	0.746	0.057	13.112	0.000	0.641	0.608
SCS_13	(h13)	0.780	0.053	14.667	0.000	0.670	0.608
SCS_14	(h14)	0.551	0.063	8.744	0.000	0.474	0.483
SCS_15	(h15)	0.696	0.073	9.580	0.000	0.598	0.535
SCS_16	(h16)	0.988	0.040	24.868	0.000	0.849	0.750
SCS_17	(h17)	0.654	0.067	9.825	0.000	0.562	0.556
SCS_18	(h18)	0.714	0.053	13.562	0.000	0.614	0.535

SCS_19	(h19)	0.770	0.057	13.462	0.000	0.662	0.632
SCS_20	(h20)	0.772	0.064	12.118	0.000	0.663	0.600
SCS_21	(h21)	0.935	0.044	21.244	0.000	0.803	0.706
SCS_22	(h22)	0.521	0.071	7.320	0.000	0.447	0.435
SCS_23	(h23)	0.789	0.053	14.821	0.000	0.678	0.646
SCS_24	(h24)	0.743	0.074	10.015	0.000	0.639	0.522
SCS_25	(h25)	0.862	0.053	16.409	0.000	0.741	0.681
SCS_26	(h26)	0.696	0.067	10.355	0.000	0.598	0.579
SCS_3M=~							
SCS_1_3M	(h1)	1.000			0.884	0.786	
SCS_2_3M	(h2)	0.943	0.055	17.026	0.000	0.834	0.713
SCS_3_3M	(h3)	0.382	0.080	4.781	0.000	0.338	0.338
SCS_4_3M	(h4)	0.906	0.045	19.915	0.000	0.801	0.663
SCS_5_3M	(h5)	0.646	0.066	9.804	0.000	0.572	0.518
SCS_6_3M	(h6)	0.965	0.051	19.031	0.000	0.854	0.663
SCS_7_3M	(h7)	0.567	0.070	8.050	0.000	0.501	0.451
SCS_8_3M	(h8)	0.878	0.049	17.955	0.000	0.776	0.696
SCS_9_3M	(h9)	0.449	0.069	6.539	0.000	0.397	0.423
SCS_10_3M	(h10)	0.556	0.077	7.264	0.000	0.492	0.454
SCS_11_3M	(h11)	0.812	0.053	15.187	0.000	0.718	0.666
SCS_12_3M	(h12)	0.746	0.057	13.112	0.000	0.660	0.634
SCS_13_3M	(h13)	0.780	0.053	14.667	0.000	0.690	0.610
SCS_14_3M	(h14)	0.551	0.063	8.744	0.000	0.488	0.488
SCS_15_3M	(h15)	0.696	0.073	9.580	0.000	0.615	0.575
SCS_16_3M	(h16)	0.988	0.040	24.868	0.000	0.874	0.776
SCS_17_3M	(h17)	0.654	0.067	9.825	0.000	0.578	0.558
SCS_18_3M	(h18)	0.714	0.053	13.562	0.000	0.632	0.578
SCS_19_3M	(h19)	0.770	0.057	13.462	0.000	0.681	0.664
SCS_20_3M	(h20)	0.772	0.064	12.118	0.000	0.683	0.602
SCS_21_3M	(h21)	0.935	0.044	21.244	0.000	0.827	0.714
SCS_22_3M	(h22)	0.521	0.071	7.320	0.000	0.461	0.458
SCS_23_3M	(h23)	0.789	0.053	14.821	0.000	0.698	0.661
SCS_24_3M	(h24)	0.743	0.074	10.015	0.000	0.657	0.561
SCS_25_3M	(h25)	0.862	0.053	16.409	0.000	0.762	0.650
SCS_26_3M	(h26)	0.696	0.067	10.355	0.000	0.616	0.604
SCS_6M=~							
SCS_1R_6M	(h1)	1.000			0.898	0.768	
SCS_2R_6M	(h2)	0.943	0.055	17.026	0.000	0.847	0.755
SCS_3_6M	(h3)	0.382	0.080	4.781	0.000	0.343	0.333
SCS_4R_6M	(h4)	0.906	0.045	19.915	0.000	0.814	0.703
SCS_5_6M	(h5)	0.646	0.066	9.804	0.000	0.581	0.549
SCS_6R_6M	(h6)	0.965	0.051	19.031	0.000	0.867	0.720
SCS_7_6M	(h7)	0.567	0.070	8.050	0.000	0.509	0.461
SCS_8R_6M	(h8)	0.878	0.049	17.955	0.000	0.788	0.714
SCS_9_6M	(h9)	0.449	0.069	6.539	0.000	0.404	0.405
SCS_10_6M	(h10)	0.556	0.077	7.264	0.000	0.500	0.469
SCS_11R_6M	(h11)	0.812	0.053	15.187	0.000	0.730	0.646
SCS_12_6M	(h12)	0.746	0.057	13.112	0.000	0.670	0.634

SCS_13R_6M	(h13)	0.780	0.053	14.667	0.000	0.701	0.653
SCS_14_6M	(h14)	0.551	0.063	8.744	0.000	0.495	0.484
SCS_15_6M	(h15)	0.696	0.073	9.580	0.000	0.625	0.540
SCS_16R_6M	(h16)	0.988	0.040	24.868	0.000	0.888	0.833
SCS_17_6M	(h17)	0.654	0.067	9.825	0.000	0.587	0.575
SCS_18R_6M	(h18)	0.714	0.053	13.562	0.000	0.642	0.604
SCS_19_6M	(h19)	0.770	0.057	13.462	0.000	0.692	0.630
SCS_20R_6M	(h20)	0.772	0.064	12.118	0.000	0.694	0.596
SCS_21R_6M	(h21)	0.935	0.044	21.244	0.000	0.840	0.701
SCS_22_6M	(h22)	0.521	0.071	7.320	0.000	0.468	0.465
SCS_23_6M	(h23)	0.789	0.053	14.821	0.000	0.709	0.643
SCS_24R_6M	(h24)	0.743	0.074	10.015	0.000	0.668	0.539
SCS_25R_6M	(h25)	0.862	0.053	16.409	0.000	0.774	0.693
SCS_26_6M	(h26)	0.696	0.067	10.355	0.000	0.626	0.587

Covariances:

	Est.	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1~~SCS_1_3M	0.190	0.040	4.709	0.000	0.190	0.331
SCS_2~~SCS_2_3M	0.180	0.056	3.193	0.001	0.180	0.242
SCS_3~~SCS_3_3M	0.125	0.057	2.177	0.030	0.125	0.141
SCS_4~~SCS_4_3M	0.311	0.069	4.497	0.000	0.311	0.355
SCS_5~~SCS_5_3M	0.183	0.056	3.285	0.001	0.183	0.204
SCS_6~~SCS_6_3M	0.169	0.052	3.236	0.001	0.169	0.194
SCS_7~~SCS_7_3M	0.226	0.061	3.702	0.000	0.226	0.234
SCS_8~~SCS_8_3M	0.140	0.037	3.750	0.000	0.140	0.234
SCS_9~~SCS_9_3M	0.215	0.050	4.333	0.000	0.215	0.264
SCS_10~~SCS_10_3M	0.090	0.052	1.747	0.081	0.090	0.096
SCS_11~~SCS_11_3M	0.118	0.044	2.669	0.008	0.118	0.161
SCS_12~~SCS_12_3M	0.090	0.038	2.375	0.018	0.090	0.134
SCS_13~~SCS_13_3M	0.211	0.069	3.045	0.002	0.211	0.270
SCS_14~~SCS_14_3M	0.089	0.049	1.830	0.067	0.089	0.120
SCS_15~~SCS_15_3M	0.151	0.043	3.495	0.000	0.151	0.183
SCS_16~~SCS_16_3M	0.004	0.041	0.108	0.914	0.004	0.008
SCS_17~~SCS_17_3M	0.053	0.036	1.469	0.142	0.053	0.074
SCS_18~~SCS_18_3M	0.078	0.065	1.199	0.230	0.078	0.090
SCS_19~~SCS_19_3M	0.026	0.043	0.597	0.550	0.026	0.041
SCS_20~~SCS_20_3M	0.243	0.060	4.033	0.000	0.243	0.303
SCS_21~~SCS_21_3M	0.137	0.048	2.879	0.004	0.137	0.210
SCS_22~~SCS_22_3M	0.089	0.051	1.742	0.082	0.089	0.108
SCS_23~~SCS_23_3M	0.115	0.052	2.223	0.026	0.115	0.182
SCS_24~~SCS_24_3M	0.344	0.078	4.394	0.000	0.344	0.340
SCS_25~~SCS_25_3M	0.099	0.051	1.962	0.050	0.099	0.140
SCS_26~~SCS_26_3M	0.127	0.046	2.762	0.006	0.127	0.186
SCS_1~~SCS_1R_6M	0.151	0.051	2.963	0.003	0.151	0.246
SCS_2~~SCS_2R_6M	0.236	0.057	4.167	0.000	0.236	0.353
SCS_3~~SCS_3_6M	0.110	0.054	2.046	0.041	0.110	0.121
SCS_4~~SCS_4R_6M	0.252	0.057	4.443	0.000	0.252	0.316
SCS_5~~SCS_5_6M	0.090	0.041	2.193	0.028	0.090	0.108
SCS_6~~SCS_6R_6M	0.254	0.053	4.809	0.000	0.254	0.336
SCS_7~~SCS_7_6M	0.083	0.051	1.637	0.102	0.083	0.087

SCS_8~~SCS_8R_6M	0.122	0.041	2.961	0.003	0.122	0.210
SCS_9~~SCS_9_6M	0.193	0.063	3.049	0.002	0.193	0.222
SCS_10~~SCS_10_6M	0.150	0.041	3.624	0.000	0.150	0.165
SCS_11~~SCS_11R_6M	0.168	0.059	2.850	0.004	0.168	0.215
SCS_12~~SCS_12_6M	0.018	0.040	0.446	0.656	0.018	0.026
SCS_13~~SCS_13R_6M	0.117	0.064	1.812	0.070	0.117	0.164
SCS_14~~SCS_14_6M	0.110	0.036	3.063	0.002	0.110	0.143
SCS_15~~SCS_15_6M	0.167	0.051	3.281	0.001	0.167	0.181
SCS_16~~SCS_16R_6M	0.075	0.038	1.983	0.047	0.075	0.171
SCS_17~~SCS_17_6M	-0.028	0.033	-0.836	0.403	-0.028	-0.040
SCS_18~~SCS_18R_6M	0.183	0.056	3.261	0.001	0.183	0.222
SCS_19~~SCS_19_6M	0.038	0.042	0.888	0.374	0.038	0.055
SCS_20~~SCS_20R_6M	0.217	0.063	3.471	0.001	0.217	0.262
SCS_21~~SCS_21R_6M	0.273	0.048	5.640	0.000	0.273	0.396
SCS_22~~SCS_22_6M	0.140	0.043	3.286	0.001	0.140	0.171
SCS_23~~SCS_23_6M	0.118	0.042	2.784	0.005	0.118	0.175
SCS_24~~SCS_24R_6M	0.422	0.091	4.642	0.000	0.422	0.386
SCS_25~~SCS_25R_6M	0.140	0.040	3.535	0.000	0.140	0.219
SCS_26~~SCS_26_6M	0.185	0.045	4.112	0.000	0.185	0.256
SCS_1_3M~~SCS_1R_6M	0.067	0.043	1.551	0.121	0.067	0.129
SCS_2_3M~~SCS_2R_6M	0.173	0.046	3.731	0.000	0.173	0.286
SCS_3_3M~~SCS_3_6M	0.234	0.069	3.381	0.001	0.234	0.256
SCS_4_3M~~SCS_4R_6M	0.226	0.055	4.101	0.000	0.226	0.303
SCS_5_3M~~SCS_5_6M	0.152	0.051	2.948	0.003	0.152	0.182
SCS_6_3M~~SCS_6R_6M	0.159	0.049	3.228	0.001	0.159	0.198
SCS_7_3M~~SCS_7_6M	0.110	0.060	1.835	0.067	0.110	0.113
SCS_8_3M~~SCS_8R_6M	0.152	0.041	3.738	0.000	0.152	0.245
SCS_9_3M~~SCS_9_6M	0.198	0.049	4.014	0.000	0.198	0.256
SCS_10_3M~~SCS_10_6M	0.073	0.050	1.460	0.144	0.073	0.080
SCS_11_3M~~SCS_11R_6M	0.099	0.049	2.000	0.045	0.099	0.143
SCS_12_3M~~SCS_12_6M	0.048	0.039	1.235	0.217	0.048	0.074
SCS_13_3M~~SCS_13R_6M	0.214	0.056	3.846	0.000	0.214	0.294
SCS_14_3M~~SCS_14_6M	0.087	0.048	1.807	0.071	0.087	0.111
SCS_15_3M~~SCS_15_6M	0.207	0.047	4.389	0.000	0.207	0.243
SCS_16_3M~~SCS_16R_6M	0.070	0.035	2.009	0.045	0.070	0.168
SCS_17_3M~~SCS_17_6M	0.087	0.039	2.241	0.025	0.087	0.121
SCS_18_3M~~SCS_18R_6M	0.098	0.052	1.869	0.062	0.098	0.129
SCS_19_3M~~SCS_19_6M	0.011	0.041	0.275	0.783	0.011	0.017

[reached getOption("max.print") -- omitted 396 rows]

Intercepts:

		Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	(i1)	2.612	0.063	41.698	0.000	2.612	2.198
SCS_1_3M	(i1)	2.612	0.063	41.698	0.000	2.612	2.320
SCS_1R_6M	(i1)	2.612	0.063	41.698	0.000	2.612	2.234
SCS_2	(i2)	2.502	0.064	39.105	0.000	2.502	2.055
SCS_2_3M	(i2)	2.502	0.064	39.105	0.000	2.502	2.139
SCS_2R_6M	(i2)	2.502	0.064	39.105	0.000	2.502	2.228

SCS_3	(i3)	3.198	0.052	60.991	0.000	3.198	3.224
SCS_3_3M	(i3)	3.198	0.052	60.991	0.000	3.198	3.200
SCS_3_6M	(i3)	3.198	0.052	60.991	0.000	3.198	3.102
SCS_4	(i4)	2.763	0.064	43.227	0.000	2.763	2.225
SCS_4_3M	(i4)	2.763	0.064	43.227	0.000	2.763	2.286
SCS_4R_6	(i4)	2.763	0.064	43.227	0.000	2.763	2.388
SCS_5	(i5)	3.050	0.060	51.052	0.000	3.050	2.777
SCS_5_3M	(i5)	3.050	0.060	51.052	0.000	3.050	2.763
SCS_5_6M	(i5)	3.050	0.060	51.052	0.000	3.050	2.885
SCS_6	(i6)	2.553	0.066	38.651	0.000	2.553	2.078
SCS_6_3M	(i6)	2.553	0.066	38.651	0.000	2.553	1.983
SCS_6R_6M	(i6)	2.553	0.066	38.651	0.000	2.553	2.120
SCS_7	(i7)	3.050	0.061	49.633	0.000	3.050	2.807
SCS_7_3M	(i7)	3.050	0.061	49.633	0.000	3.050	2.744
SCS_7_6M	(i7)	3.050	0.061	49.633	0.000	3.050	2.758
SCS_8	(i8)	2.427	0.058	41.663	0.000	2.427	2.284
SCS_8_3M	(i8)	2.427	0.058	41.663	0.000	2.427	2.178
SCS_8R_6M	(i8)	2.427	0.058	41.663	0.000	2.427	2.197
SCS_9	(i9)	3.457	0.053	64.941	0.000	3.457	3.353
SCS_9_3M	(i9)	3.457	0.053	64.941	0.000	3.457	3.682
SCS_9_6M	(i9)	3.457	0.053	64.941	0.000	3.457	3.473
SCS_10	(i10)	2.971	0.060	49.625	0.000	2.971	2.747
SCS_10_3M	(i10)	2.971	0.060	49.625	0.000	2.971	2.741
SCS_10_6M	(i10)	2.971	0.060	49.625	0.000	2.971	2.785
SCS_11	(i11)	2.961	0.059	50.490	0.000	2.961	2.588
SCS_11_3M	(i11)	2.961	0.059	50.490	0.000	2.961	2.744
SCS_11R_6M	(i11)	2.961	0.059	50.490	0.000	2.961	2.623
SCS_12	(i12)	2.790	0.059	47.224	0.000	2.790	2.649
SCS_12_3M	(i12)	2.790	0.059	47.224	0.000	2.790	2.682
SCS_12_6M	(i12)	2.790	0.059	47.224	0.000	2.790	2.641
SCS_13	(i13)	2.619	0.060	43.589	0.000	2.619	2.377
SCS_13_3M	(i13)	2.619	0.060	43.589	0.000	2.619	2.316
SCS_13R_6M	(i13)	2.619	0.060	43.589	0.000	2.619	2.442
SCS_14	(i14)	3.259	0.053	61.186	0.000	3.259	3.325
SCS_14_3M	(i14)	3.259	0.053	61.186	0.000	3.259	3.265
SCS_14_6M	(i14)	3.259	0.053	61.186	0.000	3.259	3.187
SCS_15	(i15)	3.089	0.062	50.014	0.000	3.089	2.765
SCS_15_3M	(i15)	3.089	0.062	50.014	0.000	3.089	2.887
SCS_15_6M	(i15)	3.089	0.062	50.014	0.000	3.089	2.668
SCS_16	(i16)	2.587	0.060	43.338	0.000	2.587	2.286
SCS_16_3M	(i16)	2.587	0.060	43.338	0.000	2.587	2.298
SCS_16R_6M	(i16)	2.587	0.060	43.338	0.000	2.587	2.428
SCS_17	(i17)	3.230	0.054	59.399	0.000	3.230	3.198
SCS_17_3M	(i17)	3.230	0.054	59.399	0.000	3.230	3.118
SCS_17_6M	(i17)	3.230	0.054	59.399	0.000	3.230	3.164
SCS_18	(i18)	2.642	0.056	46.852	0.000	2.642	2.302
SCS_18_3M	(i18)	2.642	0.056	46.852	0.000	2.642	2.419
SCS_18R_6M	(i18)	2.642	0.056	46.852	0.000	2.642	2.484
SCS_19	(i19)	2.838	0.057	49.470	0.000	2.838	2.711
SCS_19_3M	(i19)	2.838	0.057	49.470	0.000	2.838	2.766

SCS_19_6M	(i19)	2.838	0.057	49.470	0.000	2.838	2.584
SCS_20	(i20)	2.735	0.061	44.817	0.000	2.735	2.474
SCS_20_3M	(i20)	2.735	0.061	44.817	0.000	2.735	2.410
SCS_20R_6M	(i20)	2.735	0.061	44.817	0.000	2.735	2.349
SCS_21	(i21)	2.763	0.063	43.951	0.000	2.763	2.429
SCS_21_3M	(i21)	2.763	0.063	43.951	0.000	2.763	2.384
SCS_21R_6M	(i21)	2.763	0.063	43.951	0.000	2.763	2.304
SCS_22	(i22)	2.844	0.055	51.279	0.000	2.844	2.768
SCS_22_3M	(i22)	2.844	0.055	51.279	0.000	2.844	2.828
SCS_22_6M	(i22)	2.844	0.055	51.279	0.000	2.844	2.828
SCS_23	(i23)	2.855	0.057	50.109	0.000	2.855	2.721
SCS_23_3M	(i23)	2.855	0.057	50.109	0.000	2.855	2.706
SCS_23_6M	(i23)	2.855	0.057	50.109	0.000	2.855	2.590
SCS_24	(i24)	3.122	0.068	46.138	0.000	3.122	2.550
SCS_24_3M	(i24)	3.122	0.068	46.138	0.000	3.122	2.664
SCS_24R_6M	(i24)	3.122	0.068	46.138	0.000	3.122	2.519
SCS_25	(i25)	2.424	0.060	40.475	0.000	2.424	2.229
SCS_25_3M	(i25)	2.424	0.060	40.475	0.000	2.424	2.068
SCS_25R_6M	(i25)	2.424	0.060	40.475	0.000	2.424	2.170
SCS_26	(i26)	3.002	0.059	51.157	0.000	3.002	2.908
SCS_26_3M	(i26)	3.002	0.059	51.157	0.000	3.002	2.945
SCS_26_6M	(i26)	3.002	0.059	51.157	0.000	3.002	2.819
SCS		0.000			0.000	0.000	
SCS_3M		0.000			0.000	0.000	
SCS_6M		0.000			0.000	0.000	

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	0.675	0.060	11.244	0.000	0.675	0.478
SCS_2	0.825	0.084	9.855	0.000	0.825	0.557
SCS_3	0.877	0.080	10.945	0.000	0.877	0.891
SCS_4	0.936	0.089	10.471	0.000	0.936	0.607
SCS_5	0.899	0.080	11.264	0.000	0.899	0.744
SCS_6	0.821	0.085	9.639	0.000	0.821	0.544
SCS_7	0.943	0.073	12.897	0.000	0.943	0.799
SCS_8	0.561	0.060	9.362	0.000	0.561	0.497
SCS_9	0.914	0.079	11.629	0.000	0.914	0.860
SCS_10	0.941	0.088	10.703	0.000	0.941	0.805
SCS_11	0.823	0.088	9.352	0.000	0.823	0.628
SCS_12	0.699	0.066	10.620	0.000	0.699	0.630
SCS_13	0.765	0.083	9.270	0.000	0.765	0.630
SCS_14	0.736	0.059	12.397	0.000	0.736	0.767
SCS_15	0.891	0.084	10.620	0.000	0.891	0.714
SCS_16	0.560	0.069	8.088	0.000	0.560	0.437
SCS_17	0.705	0.066	10.640	0.000	0.705	0.691
SCS_18	0.941	0.102	9.188	0.000	0.941	0.714
SCS_19	0.658	0.073	8.983	0.000	0.658	0.601
SCS_20	0.782	0.080	9.777	0.000	0.782	0.640
SCS_21	0.648	0.062	10.477	0.000	0.648	0.501
SCS_22	0.856	0.079	10.823	0.000	0.856	0.810

SCS_23	0.641	0.075	8.508	0.000	0.641	0.582
SCS_24	1.091	0.105	10.354	0.000	1.091	0.728
SCS_25	0.634	0.061	10.396	0.000	0.634	0.536
SCS_26	0.708	0.069	10.246	0.000	0.708	0.664
SCS_1_3M	0.486	0.055	8.803	0.000	0.486	0.383
SCS_2_3M	0.672	0.068	9.846	0.000	0.672	0.491
SCS_3_3M	0.885	0.086	10.238	0.000	0.885	0.886
SCS_4_3M	0.820	0.085	9.642	0.000	0.820	0.561
SCS_5_3M	0.892	0.085	10.464	0.000	0.892	0.732
SCS_6_3M	0.929	0.114	8.136	0.000	0.929	0.560
SCS_7_3M	0.984	0.078	12.665	0.000	0.984	0.797
SCS_8_3M	0.640	0.064	9.952	0.000	0.640	0.515
SCS_9_3M	0.723	0.066	10.949	0.000	0.723	0.821
SCS_10_3M	0.932	0.068	13.726	0.000	0.932	0.794
SCS_11_3M	0.649	0.061	10.705	0.000	0.649	0.557
SCS_12_3M	0.647	0.061	10.538	0.000	0.647	0.598
SCS_13_3M	0.803	0.095	8.489	0.000	0.803	0.628
SCS_14_3M	0.758	0.066	11.554	0.000	0.758	0.761
SCS_15_3M	0.766	0.062	12.457	0.000	0.766	0.669
SCS_16_3M	0.504	0.057	8.830	0.000	0.504	0.397
SCS_17_3M	0.739	0.073	10.124	0.000	0.739	0.688
SCS_18_3M	0.794	0.082	9.633	0.000	0.794	0.665
SCS_19_3M	0.589	0.074	7.963	0.000	0.589	0.559
SCS_20_3M	0.821	0.088	9.311	0.000	0.821	0.638
SCS_21_3M	0.659	0.064	10.269	0.000	0.659	0.491
SCS_22_3M	0.800	0.074	10.835	0.000	0.800	0.790
SCS_23_3M	0.626	0.070	8.997	0.000	0.626	0.562
SCS_24_3M	0.942	0.084	11.176	0.000	0.942	0.685
SCS_25_3M	0.793	0.088	9.054	0.000	0.793	0.577
SCS_26_3M	0.660	0.060	10.915	0.000	0.660	0.635
SCS_1R_6M	0.561	0.070	8.030	0.000	0.561	0.410
SCS_2R_6M	0.543	0.060	9.100	0.000	0.543	0.431
SCS_3_6M	0.945	0.098	9.669	0.000	0.945	0.889
SCS_4R_6M	0.676	0.067	10.087	0.000	0.676	0.505
SCS_5_6M	0.780	0.062	12.630	0.000	0.780	0.698
SCS_6R_6M	0.698	0.080	8.767	0.000	0.698	0.481
SCS_7_6M	0.963	0.094	10.251	0.000	0.963	0.788
SCS_8R_6M	0.599	0.069	8.727	0.000	0.599	0.491
SCS_9_6M	0.828	0.078	10.624	0.000	0.828	0.836
SCS_10_6M	0.888	0.076	11.722	0.000	0.888	0.780
SCS_11R_6M	0.742	0.083	8.957	0.000	0.742	0.582
SCS_12_6M	0.667	0.080	8.384	0.000	0.667	0.598
SCS_13R_6M	0.659	0.064	10.379	0.000	0.659	0.573
SCS_14_6M	0.801	0.083	9.640	0.000	0.801	0.765
SCS_15_6M	0.950	0.089	10.656	0.000	0.950	0.709
SCS_16R_6M	0.347	0.044	7.868	0.000	0.347	0.305
SCS_17_6M	0.698	0.081	8.599	0.000	0.698	0.669
SCS_18R_6M	0.719	0.072	9.922	0.000	0.719	0.636
SCS_19_6M	0.728	0.085	8.574	0.000	0.728	0.603
SCS_20R_6M	0.875	0.092	9.536	0.000	0.875	0.645

SCS_21R_6M	0.732	0.076	9.657	0.000	0.732	0.509
SCS_22_6M	0.792	0.066	11.922	0.000	0.792	0.784
SCS_23_6M	0.712	0.089	8.031	0.000	0.712	0.586
SCS_24R_6M	1.091	0.101	10.813	0.000	1.091	0.710
SCS_25R_6M	0.648	0.073	8.872	0.000	0.648	0.519
SCS_26_6M	0.743	0.066	11.197	0.000	0.743	0.655
SCS	0.738	0.078	9.408	0.000	1.000	1.000
SCS_3M	0.782	0.088	8.913	0.000	1.000	1.000
SCS_6M	0.807	0.089	9.043	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1	0.522
SCS_2	0.443
SCS_3	0.109
SCS_4	0.393
SCS_5	0.256
SCS_6	0.456
SCS_7	0.201
SCS_8	0.503
SCS_9	0.140
SCS_10	0.195
SCS_11	0.372
SCS_12	0.370
SCS_13	0.370
SCS_14	0.233
SCS_15	0.286
SCS_16	0.563
SCS_17	0.309
SCS_18	0.286
SCS_19	0.399
SCS_20	0.360
SCS_21	0.499
SCS_22	0.190
SCS_23	0.418
SCS_24	0.272
SCS_25	0.464
SCS_26	0.336
SCS_1_3M	0.617
SCS_2_3M	0.509
SCS_3_3M	0.114
SCS_4_3M	0.439
SCS_5_3M	0.268
SCS_6_3M	0.440
SCS_7_3M	0.203
SCS_8_3M	0.485
SCS_9_3M	0.179
SCS_10_3M	0.206
SCS_11_3M	0.443
SCS_12_3M	0.402

SCS_13_3M	0.372
SCS_14_3M	0.239
SCS_15_3M	0.331
SCS_16_3M	0.603
SCS_17_3M	0.312
SCS_18_3M	0.335
SCS_19_3M	0.441
SCS_20_3M	0.362
SCS_21_3M	0.509
SCS_22_3M	0.210
SCS_23_3M	0.438
SCS_24_3M	0.315
SCS_25_3M	0.423
SCS_26_3M	0.365
SCS_1R_6M	0.590
SCS_2R_6M	0.569
SCS_3_6M	0.111
SCS_4R_6M	0.495
SCS_5_6M	0.302
SCS_6R_6M	0.519
SCS_7_6M	0.212
SCS_8R_6M	0.509
SCS_9_6M	0.164
SCS_10_6M	0.220
SCS_11R_6M	0.418
SCS_12_6M	0.402
SCS_13R_6M	0.427
SCS_14_6M	0.235
SCS_15_6M	0.291
SCS_16R_6M	0.695
SCS_17_6M	0.331
SCS_18R_6M	0.364
SCS_19_6M	0.397
SCS_20R_6M	0.355
SCS_21R_6M	0.491
SCS_22_6M	0.216
SCS_23_6M	0.414
SCS_24R_6M	0.290
SCS_25R_6M	0.481
SCS_26_6M	0.345

Appendix K

SCS-16 Longitudinal Configural Invariance

Note: ~~ = co-vary

long.SCS.1.2.3.s.a <- "SCS=~ SCS_1 + SCS_2 + SCS_4 + SCS_6 + SCS_8 + SCS_11 + SCS_13 + SCS_16 + SCS_25 + SCS_3 + SCS_5 + SCS_12 + SCS_15 + SCS_19 + SCS_22 + SCS_26

SCS_3M=~ SCS_1_3M + SCS_2_3M + SCS_4_3M + SCS_6_3M + SCS_8_3M + SCS_11_3M + SCS_13_3M + SCS_16_3M + SCS_25_3M +SCS_3_3M + SCS_5_3M + SCS_12_3M + SCS_15_3M + SCS_19_3M + SCS_22_3M + SCS_26_3M

SCS_6M=~ SCS_1R_6M + SCS_2R_6M + SCS_4R_6M + SCS_6R_6M + SCS_8R_6M + SCS_11R_6M + SCS_13R_6M + SCS_16R_6M + SCS_25R_6M + SCS_3_6M + SCS_5_6M + SCS_12_6M + SCS_15_6M + SCS_19_6M + SCS_22_6M + SCS_26_6M

SCS_1~~SCS_1_3M
SCS_2~~SCS_2_3M
SCS_3~~SCS_3_3M
SCS_4~~SCS_4_3M
SCS_5~~SCS_5_3M
SCS_6~~SCS_6_3M
SCS_8~~SCS_8_3M
SCS_11~~SCS_11_3M
SCS_12~~SCS_12_3M
SCS_13~~SCS_13_3M
SCS_15~~SCS_15_3M
SCS_16~~SCS_16_3M
SCS_19~~SCS_19_3M
SCS_22~~SCS_22_3M
SCS_25~~SCS_25_3M
SCS_26~~SCS_26_3M

SCS_1~~SCS_1R_6M
SCS_2~~SCS_2R_6M
SCS_3~~SCS_3_6M
SCS_4~~SCS_4R_6M
SCS_5~~SCS_5_6M
SCS_6~~SCS_6R_6M
SCS_8~~SCS_8R_6M
SCS_11~~SCS_11R_6M
SCS_12~~SCS_12_6M
SCS_13~~SCS_13R_6M
SCS_15~~SCS_15_6M
SCS_16~~SCS_16R_6M
SCS_19~~SCS_19_6M
SCS_22~~SCS_22_6M
SCS_25~~SCS_25R_6M

SCS_26~~SCS_26_6M

SCS_1_3M~~SCS_1R_6M
SCS_2_3M~~SCS_2R_6M
SCS_3_3M~~SCS_3_6M
SCS_4_3M~~SCS_4R_6M
SCS_5_3M~~SCS_5_6M
SCS_6_3M~~SCS_6R_6M
SCS_8_3M~~SCS_8R_6M
SCS_11_3M~~SCS_11R_6M
SCS_12_3M~~SCS_12_6M
SCS_13_3M~~SCS_13R_6M
SCS_15_3M~~SCS_15_6M
SCS_16_3M~~SCS_16R_6M
SCS_19_3M~~SCS_19_6M
SCS_22_3M~~SCS_22_6M
SCS_25_3M~~SCS_25R_6M
SCS_26_3M~~SCS_26_6M

#configuralimprovement

SCS_19_6M~~SCS_26_6M
SCS_12_6M~~SCS_22_6M
SCS_5_6M~~SCS_22_6M
SCS_6R_6M~~SCS_25R_6M
SCS_15_3M~~SCS_26_3M
SCS_12_3M~~SCS_19_3M
SCS_12_3M~~SCS_15_3M
SCS_2_3M~~SCS_6_3M
SCS_5~~SCS_12
SCS_15_6M~~SCS_22_6M
SCS_5_6M~~SCS_12_6M
SCS_22_3M~~SCS_26_3M
SCS_15_3M~~SCS_19_3M
SCS_12_3M~~SCS_26_3M
SCS_3_3M~~SCS_15_3M
SCS_8_3M~~SCS_11_3M
SCS_12~~SCS_19
SCS_5~~SCS_15
SCS_11~~SCS_16
SCS_15_6M~~SCS_26_6M
SCS_12_6M~~SCS_15_6M
SCS_19_3M~~SCS_26_3M
SCS_5_3M~~SCS_22_3M
SCS_5_3M~~SCS_19_3M
SCS_5_3M~~SCS_12_3M
SCS_3_3M~~SCS_5_3M
SCS_11_3M~~SCS_16_3M
SCS_2_3M~~SCS_4_3M
SCS_1_3M~~SCS_2_3M

```
SCS_22~~SCS_26
SCS_19~~SCS_26
SCS_15~~SCS_26
SCS_5~~SCS_19
SCS_5~~SCS_22
SCS_3~~SCS_22
SCS_6~~SCS_8
SCS_1~~SCS_2
SCS_1~~SCS_6
SCS_15~~SCS_19
SCS_15~~SCS_22
SCS_2~~SCS_4
SCS_4~~SCS_11
SCS_4~~SCS_25
SCS_8~~SCS_13
SCS_11~~SCS_25
SCS_13~~SCS_16
SCS_5~~SCS_26
SCS_1_3M~~SCS_6_3M
SCS_15_6M~~SCS_19_6M
SCS_5_6M~~SCS_15_6M
SCS_4R_6M~~SCS_6R_6M
SCS_2R_6M~~SCS_16R_6M
SCS_5_3M~~SCS_15_3M
SCS_12~~SCS_26
SCS_4_3M~~SCS_6_3M"

LSCS.1.2.3.s.a <- cfa(long.SCS.1.2.3.s.a, data = JMDFULLDATASET_BL_3M_6M,
estimator="MLR", meanstructure=F) summary(LSCS.1.2.3.s.a, standardised = T,
fit.measures = T, rsq = T)

subset(modificationindices(LSCS.1.2.3.s.a), mi > 4)
```

```
lavaan 0.6-6 ended normally after 75 iterations

Estimator                                ML
Optimization method                      NLMINB
Number of free parameters                202
Number of observations                   Used          Total
                                         242           394
Model Test User Model:
                                         Standard      Robust
      Test Statistic                     1761.556      1574.323
      Degrees of freedom                 974           974
      P-value (Chi-square)               0.000         0.000
      Scaling correction factor                        1.119
      Yuan-Bentler correction (Mplus variant)

Model Test Baseline Model:
```

Test statistic	8383.250	7301.164
Degrees of freedom	1128	1128
P-value	0.000	0.000
Scaling correction factor		1.148

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.891	0.903
Tucker-Lewis Index (TLI)	0.874	0.887
Robust Comparative Fit Index (CFI)		0.905
Robust Tucker-Lewis Index (TLI)		0.890

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-14429.496	-14429.496
Scaling correction factor for the MLR correction	1.117	
Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.129	
Akaike (AIC)	29262.993	29262.993
Bayesian (BIC)	29967.758	29967.758
Sample-size adjusted Bayesian (BIC)	29327.454	29327.454

Root Mean Square Error of Approximation:

RMSEA	0.058	0.050
90 Percent confidence interval – Lower	0.053	0.046
90 Percent confidence interval – Upper	0.062	0.055
P-value RMSEA <= 0.05	0.002	0.425
Robust RMSEA		0.053
90 Percent confidence interval – Lower		0.049
90 Percent confidence interval – Upper		0.058

Standardised Root Mean Square Residual:

SRMR	0.094	0.094

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS=~						
SCS_1	1.000			0.892	0.745	
SCS_2	0.971	0.079	12.238	0.000	0.867	0.704
SCS_4	0.881	0.069	12.746	0.000	0.786	0.639
SCS_6	0.946	0.077	12.297	0.000	0.844	0.684
SCS_8	0.912	0.073	12.565	0.000	0.814	0.745
SCS_11	0.755	0.084	9.000	0.000	0.674	0.598
SCS_13	0.718	0.076	9.405	0.000	0.641	0.585
SCS_16	0.946	0.072	13.191	0.000	0.845	0.773
SCS_25	0.910	0.077	11.800	0.000	0.812	0.728
SCS_3	0.338	0.097	3.468	0.001	0.301	0.294
SCS_5	0.514	0.085	6.043	0.000	0.459	0.440
SCS_12	0.721	0.074	9.770	0.000	0.643	0.602
SCS_15	0.572	0.087	6.587	0.000	0.510	0.458
SCS_19	0.730	0.073	10.053	0.000	0.651	0.621
SCS_22	0.472	0.089	5.287	0.000	0.421	0.412
SCS_26	0.649	0.077	8.486	0.000	0.579	0.562
SCS_3M=~						
SCS_1_3M	1.000			0.930	0.811	
SCS_2_3M	0.873	0.063	13.866	0.000	0.812	0.705
SCS_4_3M	0.913	0.061	14.889	0.000	0.849	0.687
SCS_6_3M	0.808	0.072	11.246	0.000	0.752	0.620
SCS_8_3M	0.898	0.055	16.434	0.000	0.835	0.736
SCS_11_3M	0.782	0.063	12.413	0.000	0.728	0.674
SCS_13_3M	0.724	0.075	9.689	0.000	0.673	0.593
SCS_16_3M	0.932	0.054	17.345	0.000	0.867	0.778
SCS_25_3M	0.851	0.069	12.343	0.000	0.791	0.674
SCS_3_3M	0.204	0.095	2.157	0.031	0.190	0.192
SCS_5_3M	0.600	0.078	7.662	0.000	0.558	0.506
SCS_12_3M	0.688	0.070	9.818	0.000	0.640	0.611
SCS_15_3M	0.599	0.072	8.361	0.000	0.557	0.515
SCS_19_3M	0.663	0.076	8.706	0.000	0.617	0.621
SCS_22_3M	0.447	0.089	5.023	0.000	0.416	0.407
SCS_26_3M	0.613	0.072	8.459	0.000	0.570	0.564
SCS_6M=~						
SCS_1R_6M	1.000			0.812	0.730	
SCS_2R_6M	1.052	0.073	14.468	0.000	0.855	0.742
SCS_4R_6M	0.940	0.069	13.607	0.000	0.764	0.670
SCS_6R_6M	1.129	0.073	15.460	0.000	0.917	0.745
SCS_8R_6M	0.950	0.069	13.852	0.000	0.772	0.711
SCS_11R_6M	0.884	0.087	10.156	0.000	0.719	0.635
SCS_13R_6M	0.939	0.078	11.984	0.000	0.763	0.678
SCS_16R_6M	1.175	0.073	16.052	0.000	0.955	0.855
SCS_25R_6M	0.920	0.087	10.580	0.000	0.748	0.679
SCS_3_6M	0.503	0.117	4.288	0.000	0.409	0.389
SCS_5_6M	0.712	0.085	8.367	0.000	0.578	0.541
SCS_12_6M	0.744	0.083	8.920	0.000	0.604	0.598
SCS_15_6M	0.682	0.093	7.336	0.000	0.554	0.495

SCS_19_6M	0.853	0.084	10.139	0.000	0.693	0.629
SCS_22_6M	0.541	0.100	5.387	0.000	0.439	0.426
SCS_26_6M	0.655	0.094	6.941	0.000	0.532	0.507

Covariances:

	Esti.	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1~~SCS_1_3M	0.194	0.041	4.669	0.000	0.194	0.362
SCS_2~~SCS_2_3M	0.200	0.060	3.351	0.001	0.200	0.280
SCS_3~~SCS_3_3M	0.317	0.056	5.691	0.000	0.317	0.333
SCS_4~~SCS_4_3M	0.319	0.074	4.294	0.000	0.319	0.376
SCS_5~~SCS_5_3M	0.187	0.058	3.227	0.001	0.187	0.210
SCS_6~~SCS_6_3M	0.215	0.053	4.021	0.000	0.215	0.251
SCS_8~~SCS_8_3M	0.170	0.038	4.497	0.000	0.170	0.304
SCS_11~~SCS_11_3M	0.119	0.046	2.581	0.010	0.119	0.166
SCS_12~~SCS_12_3M	0.082	0.043	1.889	0.059	0.082	0.115
SCS_13~~SCS_13_3M	0.341	0.082	4.145	0.000	0.341	0.419
SCS_15~~SCS_15_3M	0.205	0.050	4.136	0.000	0.205	0.223
SCS_16~~SCS_16_3M	0.021	0.040	0.531	0.595	0.021	0.044
SCS_19~~SCS_19_3M	0.042	0.039	1.070	0.285	0.042	0.065
SCS_22~~SCS_22_3M	0.162	0.059	2.739	0.006	0.162	0.186
SCS_25~~SCS_25_3M	0.096	0.066	1.454	0.146	0.096	0.145
SCS_26~~SCS_26_3M	0.153	0.046	3.344	0.001	0.153	0.215
SCS_1~~SCS_1R_6M	0.160	0.053	2.992	0.003	0.160	0.263
SCS_2~~SCS_2R_6M	0.276	0.060	4.579	0.000	0.276	0.409
SCS_3~~SCS_3_6M	0.281	0.066	4.287	0.000	0.281	0.296
SCS_4~~SCS_4R_6M	0.261	0.064	4.106	0.000	0.261	0.326
SCS_5~~SCS_5_6M	0.116	0.044	2.644	0.008	0.116	0.138
SCS_6~~SCS_6R_6M	0.228	0.052	4.400	0.000	0.228	0.308
SCS_8~~SCS_8R_6M	0.126	0.044	2.890	0.004	0.126	0.226
SCS_11~~SCS_11R_6M	0.202	0.059	3.397	0.001	0.202	0.256
SCS_12~~SCS_12_6M	0.083	0.042	2.004	0.045	0.083	0.120
SCS_13~~SCS_13R_6M	0.199	0.069	2.882	0.004	0.199	0.271
SCS_15~~SCS_15_6M	0.298	0.062	4.811	0.000	0.298	0.309
SCS_16~~SCS_16R_6M	0.081	0.034	2.429	0.015	0.081	0.203
SCS_19~~SCS_19_6M	0.066	0.041	1.611	0.107	0.066	0.094
SCS_22~~SCS_22_6M	0.139	0.050	2.795	0.005	0.139	0.160
SCS_25~~SCS_25R_6M	0.182	0.046	3.958	0.000	0.182	0.294
SCS_26~~SCS_26_6M	0.242	0.053	4.606	0.000	0.242	0.314
SCS_1_3M~~SCS_1R_6M	0.078	0.045	1.737	0.082	0.078	0.153
SCS_2_3M~~SCS_2R_6M	0.205	0.052	3.899	0.000	0.205	0.324
SCS_3_3M~~SCS_3_6M	0.349	0.073	4.768	0.000	0.349	0.370
SCS_4_3M~~SCS_4R_6M	0.214	0.060	3.589	0.000	0.214	0.281
SCS_5_3M~~SCS_5_6M	0.191	0.058	3.301	0.001	0.191	0.223
SCS_6_3M~~SCS_6R_6M	0.218	0.049	4.434	0.000	0.218	0.279
SCS_8_3M~~SCS_8R_6M	0.157	0.043	3.671	0.000	0.157	0.268
SCS_11_3M~~SCS_11R_6M	0.136	0.051	2.685	0.007	0.136	0.195
SCS_12_3M~~SCS_12_6M	0.091	0.041	2.198	0.028	0.091	0.135
SCS_13_3M~~SCS_13R_6M	0.301	0.061	4.895	0.000	0.301	0.398
SCS_15_3M~~SCS_15_6M	0.326	0.054	6.060	0.000	0.326	0.361
SCS_16_3M~~SCS_16R_6M	0.039	0.033	1.213	0.225	0.039	0.098

SCS_19_3M~~SCS_19_6M	0.041	0.039	1.062	0.288	0.041	0.062
SCS_22_3M~~SCS_22_6M	0.222	0.052	4.310	0.000	0.222	0.256
SCS_25_3M~~SCS_25R_6M	0.124	0.052	2.392	0.017	0.124	0.177
SCS_26_3M~~SCS_26_6M	0.182	0.046	3.974	0.000	0.182	0.241
SCS_19_6M~~SCS_26_6M	0.280	0.072	3.911	0.000	0.280	0.360
SCS_12_6M~~SCS_22_6M	0.282	0.068	4.165	0.000	0.282	0.373
SCS_5_6M~~SCS_22_6M	0.305	0.066	4.636	0.000	0.305	0.363
SCS_6R_6M~~SCS_25R_6M	0.182	0.051	3.542	0.000	0.182	0.274
SCS_15_3M~~SCS_26_3M	0.192	0.052	3.713	0.000	0.192	0.247
SCS_12_3M~~SCS_19_3M	0.296	0.058	5.099	0.000	0.296	0.460
SCS_15_3M	0.258	0.051	5.058	0.000	0.258	0.335
SCS_2_3M~~SCS_6_3M	0.224	0.056	3.983	0.000	0.224	0.289
SCS_5~~SCS_12	0.281	0.062	4.516	0.000	0.281	0.351
SCS_15_6M~~SCS_22_6M	0.237	0.082	2.904	0.004	0.237	0.261
SCS_5_6M~~SCS_12_6M	0.212	0.060	3.511	0.000	0.212	0.290
SCS_22_3M~~SCS_26_3M	0.148	0.065	2.291	0.022	0.148	0.190
SCS_15_3M~~SCS_19_3M	0.201	0.045	4.480	0.000	0.201	0.278
SCS_12_3M~~SCS_26_3M	0.169	0.052	3.274	0.001	0.169	0.245
SCS_3_3M~~SCS_15_3M	0.179	0.052	3.420	0.001	0.179	0.198
SCS_8_3M~~SCS_11_3M	0.129	0.044	2.920	0.003	0.129	0.210
SCS_12~~SCS_19	0.310	0.067	4.657	0.000	0.310	0.442
SCS_5~~SCS_15	0.243	0.065	3.725	0.000	0.243	0.262
SCS_11~~SCS_16	0.104	0.064	1.627	0.104	0.104	0.167
SCS_15_6M~~SCS_26_6M	0.175	0.066	2.650	0.008	0.175	0.199
SCS_12_6M~~SCS_15_6M	0.140	0.077	1.815	0.070	0.140	0.177
SCS_19_3M~~SCS_26_3M	0.086	0.045	1.917	0.055	0.086	0.132
SCS_5_3M~~SCS_22_3M	0.063	0.067	0.943	0.346	0.063	0.071
SCS_19_3M	0.223	0.064	3.499	0.000	0.223	0.302

[reached getOption("max.print") -- omitted 62 rows]

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	0.638	0.059	10.760	0.000	0.638	0.445
SCS_2	0.763	0.090	8.449	0.000	0.763	0.504
SCS_4	0.895	0.088	10.177	0.000	0.895	0.592
SCS_6	0.808	0.095	8.545	0.000	0.808	0.532
SCS_8	0.532	0.057	9.342	0.000	0.532	0.445
SCS_11	0.816	0.089	9.215	0.000	0.816	0.642
SCS_13	0.789	0.095	8.320	0.000	0.789	0.658
SCS_16	0.479	0.071	6.748	0.000	0.479	0.402
SCS_25	0.584	0.066	8.871	0.000	0.584	0.470
SCS_3	0.958	0.090	10.625	0.000	0.958	0.913
SCS_5	0.878	0.071	12.303	0.000	0.878	0.806
SCS_12	0.730	0.070	10.369	0.000	0.730	0.638
SCS_15	0.983	0.086	11.478	0.000	0.983	0.791
SCS_19	0.675	0.071	9.548	0.000	0.675	0.614
SCS_22	0.867	0.081	10.715	0.000	0.867	0.830
SCS_26	0.725	0.067	10.870	0.000	0.725	0.684
SCS_1_3M	0.449	0.054	8.293	0.000	0.449	0.342
SCS_2_3M	0.667	0.073	9.149	0.000	0.667	0.503

SCS_4_3M	0.806	0.090	8.999	0.000	0.806	0.528
SCS_6_3M	0.906	0.110	8.262	0.000	0.906	0.616
SCS_8_3M	0.589	0.063	9.400	0.000	0.589	0.458
SCS_11_3M	0.636	0.066	9.691	0.000	0.636	0.546
SCS_13_3M	0.836	0.102	8.197	0.000	0.836	0.648
SCS_16_3M	0.490	0.062	7.861	0.000	0.490	0.395
SCS_25_3M	0.750	0.088	8.480	0.000	0.750	0.545
SCS_3_3M	0.947	0.083	11.362	0.000	0.947	0.963
SCS_5_3M	0.906	0.089	10.209	0.000	0.906	0.744
SCS_12_3M	0.686	0.066	10.407	0.000	0.686	0.626
SCS_15_3M	0.862	0.068	12.682	0.000	0.862	0.735
SCS_19_3M	0.605	0.070	8.602	0.000	0.605	0.614
SCS_22_3M	0.872	0.079	11.068	0.000	0.872	0.835
SCS_26_3M	0.697	0.060	11.717	0.000	0.697	0.682
SCS_1R_6M	0.579	0.078	7.404	0.000	0.579	0.467
SCS_2R_6M	0.597	0.070	8.514	0.000	0.597	0.450
SCS_4R_6M	0.717	0.072	9.966	0.000	0.717	0.551
SCS_6R_6M	0.675	0.075	9.035	0.000	0.675	0.445
SCS_8R_6M	0.582	0.068	8.513	0.000	0.582	0.494
SCS_11R_6M	0.764	0.087	8.812	0.000	0.764	0.597
SCS_13R_6M	0.682	0.070	9.772	0.000	0.682	0.540
SCS_16R_6M	0.335	0.047	7.188	0.000	0.335	0.268
SCS_25R_6M	0.653	0.073	8.929	0.000	0.653	0.539
SCS_3_6M	0.940	0.099	9.513	0.000	0.940	0.849
SCS_5_6M	0.809	0.069	11.756	0.000	0.809	0.707
SCS_12_6M	0.656	0.073	9.014	0.000	0.656	0.642
SCS_15_6M	0.947	0.084	11.340	0.000	0.947	0.755
SCS_19_6M	0.736	0.091	8.128	0.000	0.736	0.605
SCS_22_6M	0.869	0.081	10.725	0.000	0.869	0.818
SCS_26_6M	0.819	0.076	10.738	0.000	0.819	0.743
SCS	0.796	0.104	7.648	0.000	1.000	1.000
SCS_3M	0.865	0.096	9.038	0.000	1.000	1.000
SCS_6M	0.660	0.098	6.747	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1	0.555
SCS_2	0.496
SCS_4	0.408
SCS_6	0.468
SCS_8	0.555
SCS_11	0.358
SCS_13	0.342
SCS_16	0.598
SCS_25	0.530
SCS_3	0.087
SCS_5	0.194
SCS_12	0.362
SCS_15	0.209
SCS_19	0.386

SCS_22	0.170
SCS_26	0.316
SCS_1_3M	0.658
SCS_2_3M	0.497
SCS_4_3M	0.472
SCS_6_3M	0.384
SCS_8_3M	0.542
SCS_11_3M	0.454
SCS_13_3M	0.352
SCS_16_3M	0.605
SCS_25_3M	0.455
SCS_3_3M	0.037
SCS_5_3M	0.256
SCS_12_3M	0.374
SCS_15_3M	0.265
SCS_19_3M	0.386
SCS_22_3M	0.165
SCS_26_3M	0.318
SCS_1R_6M	0.533
SCS_2R_6M	0.550
SCS_4R_6M	0.449
SCS_6R_6M	0.555
SCS_8R_6M	0.506
SCS_11R_6M	0.403
SCS_13R_6M	0.460
SCS_16R_6M	0.732
SCS_25R_6M	0.461
SCS_3_6M	0.151
SCS_5_6M	0.293
SCS_12_6M	0.358
SCS_15_6M	0.245
SCS_19_6M	0.395
SCS_22_6M	0.182
SCS_26_6M	0.257

Appendix L

SCS-16 Longitudinal Metric Invariance

Note: ~~ = co-vary

long.SCS.1.2.3.s.b <- "SCS=~ h1*SCS_1 + h2*SCS_2 + h3*SCS_3 + h4*SCS_4 +
h5*SCS_5 + h6*SCS_6 + h8*SCS_8 + h11*SCS_11 + h12*SCS_12 + h13*SCS_13 +
h15*SCS_15 + h16*SCS_16 + h19*SCS_19 + h22*SCS_22 + h25*SCS_25 + h26*SCS_26

SCS_3M=~ h1*SCS_1_3M + h2*SCS_2_3M + h3*SCS_3_3M + h4*SCS_4_3M +
h5*SCS_5_3M + h6*SCS_6_3M + h8*SCS_8_3M + h11*SCS_11_3M + h12*SCS_12_3M
+ h13*SCS_13_3M + h15*SCS_15_3M + h16*SCS_16_3M + h19*SCS_19_3M +
h22*SCS_22_3M + h25*SCS_25_3M + h26*SCS_26_3M

SCS_6M=~ h1*SCS_1R_6M + h2*SCS_2R_6M + h3*SCS_3_6M + h4*SCS_4R_6M +
h5*SCS_5_6M + h6*SCS_6R_6M + h8*SCS_8R_6M + h11*SCS_11R_6M +
h12*SCS_12_6M + h13*SCS_13R_6M + h15*SCS_15_6M + h16*SCS_16R_6M +
h19*SCS_19_6M + h22*SCS_22_6M + h25*SCS_25R_6M + h26*SCS_26_6M

SCS_1~~SCS_1_3M
SCS_2~~SCS_2_3M
SCS_3~~SCS_3_3M
SCS_4~~SCS_4_3M
SCS_5~~SCS_5_3M
SCS_6~~SCS_6_3M
SCS_8~~SCS_8_3M
SCS_11~~SCS_11_3M
SCS_12~~SCS_12_3M
SCS_13~~SCS_13_3M
SCS_15~~SCS_15_3M
SCS_16~~SCS_16_3M
SCS_19~~SCS_19_3M
SCS_22~~SCS_22_3M
SCS_25~~SCS_25_3M
SCS_26~~SCS_26_3M

SCS_1~~SCS_1R_6M
SCS_2~~SCS_2R_6M
SCS_3~~SCS_3_6M
SCS_4~~SCS_4R_6M
SCS_5~~SCS_5_6M
SCS_6~~SCS_6R_6M
SCS_8~~SCS_8R_6M
SCS_11~~SCS_11R_6M
SCS_12~~SCS_12_6M
SCS_13~~SCS_13R_6M
SCS_15~~SCS_15_6M
SCS_16~~SCS_16R_6M
SCS_19~~SCS_19_6M

SCS_22~~SCS_22_6M
SCS_25~~SCS_25R_6M
SCS_26~~SCS_26_6M

SCS_1_3M~~SCS_1R_6M
SCS_2_3M~~SCS_2R_6M
SCS_3_3M~~SCS_3_6M
SCS_4_3M~~SCS_4R_6M
SCS_5_3M~~SCS_5_6M
SCS_6_3M~~SCS_6R_6M
SCS_8_3M~~SCS_8R_6M
SCS_11_3M~~SCS_11R_6M
SCS_12_3M~~SCS_12_6M
SCS_13_3M~~SCS_13R_6M
SCS_15_3M~~SCS_15_6M
SCS_16_3M~~SCS_16R_6M
SCS_19_3M~~SCS_19_6M
SCS_22_3M~~SCS_22_6M

SCS_25_3M~~SCS_25R_6M
SCS_26_3M~~SCS_26_6M

#metricimprovement

SCS_19_6M~~SCS_26_6M
SCS_12_6M~~SCS_22_6M
SCS_5_6M~~SCS_22_6M
SCS_6R_6M~~SCS_25R_6M
SCS_15_3M~~SCS_26_3M
SCS_12_3M~~SCS_19_3M
SCS_12_3M~~SCS_15_3M
SCS_2_3M~~SCS_6_3M
SCS_5~~SCS_12

SCS_15_6M~~SCS_22_6M
SCS_5_6M~~SCS_12_6M
SCS_22_3M~~SCS_26_3M
SCS_15_3M~~SCS_19_3M
SCS_12_3M~~SCS_26_3M
SCS_3_3M~~SCS_15_3M
SCS_8_3M~~SCS_11_3M
SCS_12~~SCS_19
SCS_5~~SCS_15
SCS_11~~SCS_16

SCS_15_6M~~SCS_26_6M
SCS_12_6M~~SCS_15_6M
SCS_19_3M~~SCS_26_3M
SCS_5_3M~~SCS_22_3M
SCS_5_3M~~SCS_19_3M

SCS_5_3M~~SCS_12_3M
SCS_3_3M~~SCS_5_3M
SCS_11_3M~SCS_16_3M
SCS_2_3M~~SCS_4_3M
SCS_1_3M~~SCS_2_3M
SCS_22~~SCS_26
SCS_19~~SCS_26
SCS_15~~SCS_26
SCS_5~~SCS_19
SCS_5~~SCS_22
SCS_3~~SCS_22
SCS_6~~SCS_8
SCS_1~~SCS_2
SCS_1~~SCS_6

SCS_15~~SCS_19
SCS_15~~SCS_22
SCS_2~~SCS_4
SCS_4~~SCS_11
SCS_4~~SCS_25
SCS_8~~SCS_13
SCS_11~~SCS_25
SCS_13~~SCS_16
SCS_5~~SCS_26
SCS_1_3M~~SCS_6_3M

SCS_15_6M~~SCS_19_6M
SCS_5_6M~~SCS_15_6M
SCS_4R_6M~~SCS_6R_6M
SCS_2R_6M~~SCS_16R_6M
SCS_5_3M~~SCS_15_3M
SCS_12~~SCS_26
SCS_4_3M~~SCS_6_3M"

lavaan 0.6-6 ended normally after 60 iterations

Estimator	ML	
Optimization method	NLMINB	
Number of free parameters	202	
Number of equality constraints	30	
Number of observations	Used	Total
	242	394
Model Test User Model:		
	Standard	Robust
Test Statistic	1801.717	1622.899
Degrees of freedom	1004	1004
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.110
Yuan-Bentler correction (Mplus variant)		

Model Test Baseline Model:

Test statistic	8383.250	7301.164
Degrees of freedom	1128	1128
P-value	0.000	0.000
Scaling correction factor		1.148

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.890	0.903
Tucker-Lewis Index (TLI)	0.876	0.887
Robust Comparative Fit Index (CFI)		0.903
Robust Tucker-Lewis Index (TLI)		0.891

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-14449.577	-14449.577
Scaling correction factor for the MLR correction	1.054	
Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.129	
Akaike (AIC)	29243.154	29243.154
Bayesian (BIC)	29843.251	29843.251
Sample-size adjusted Bayesian (BIC)	29298.042	29298.042

Root Mean Square Error of Approximation:

RMSEA	0.057	0.050
90 Percent confidence interval – Lower	0.053	0.046
90 Percent confidence interval – Upper	0.062	0.055
P-value RMSEA <= 0.05	0.003	0.423
Robust RMSEA		0.053
90 Percent confidence interval – Lower		0.048
90 Percent confidence interval – Upper		0.058

Standardised Root Mean Square Residual:

SRMR	0.097	0.097

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed

Observed information based on Hessian

Latent Variables:

		Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS=~							
SCS_1	(h1)	1.000			0.872	0.737	
SCS_2	(h2)	0.952	0.057	16.564	0.000	0.830	0.688
SCS_3	(h3)	0.340	0.082	4.135	0.000	0.297	0.290
SCS_4	(h4)	0.901	0.047	19.337	0.000	0.785	0.640
SCS_5	(h5)	0.609	0.065	9.420	0.000	0.531	0.493
SCS_6	(h6)	0.971	0.051	18.948	0.000	0.847	0.685
SCS_8	(h8)	0.907	0.047	19.232	0.000	0.791	0.734
SCS_11	(h11)	0.809	0.055	14.610	0.000	0.706	0.616
SCS_12	(h12)	0.712	0.056	12.783	0.000	0.621	0.587
SCS_13	(h13)	0.788	0.056	14.122	0.000	0.687	0.613
SCS_15	(h15)	0.635	0.064	9.859	0.000	0.553	0.487
SCS_16	(h16)	1.012	0.042	24.032	0.000	0.882	0.789
SCS_19	(h19)	0.733	0.056	13.167	0.000	0.639	0.613
SCS_22	(h22)	0.491	0.071	6.947	0.000	0.429	0.418
SCS_25	(h25)	0.878	0.057	15.462	0.000	0.766	0.705
SCS_26	(h26)	0.638	0.066	9.702	0.000	0.556	0.546
SCS_3M=~							
SCS_1_3M	(h1)	1.000			0.882	0.791	
SCS_2_3M	(h2)	0.952	0.057	16.564	0.000	0.840	0.717
SCS_3_3M	(h3)	0.340	0.082	4.135	0.000	0.300	0.295
SCS_4_3M	(h4)	0.901	0.047	19.337	0.000	0.794	0.661
SCS_5_3M	(h5)	0.609	0.065	9.420	0.000	0.537	0.490
SCS_6_3M	(h6)	0.971	0.051	18.948	0.000	0.857	0.670
SCS_8_3M	(h8)	0.907	0.047	19.232	0.000	0.800	0.719
SCS_11_3M	(h11)	0.809	0.055	14.610	0.000	0.714	0.667
SCS_12_3M	(h12)	0.712	0.056	12.783	0.000	0.628	0.604
SCS_13_3M	(h13)	0.788	0.056	14.122	0.000	0.695	0.606
SCS_15_3M	(h15)	0.635	0.064	9.859	0.000	0.560	0.517
SCS_16_3M	(h16)	1.012	0.042	24.032	0.000	0.893	0.789
SCS_19_3M	(h19)	0.733	0.056	13.167	0.000	0.646	0.639
SCS_22_3M	(h22)	0.491	0.071	6.947	0.000	0.434	0.422
SCS_25_3M	(h25)	0.878	0.057	15.462	0.000	0.775	0.666
SCS_26_3M	(h26)	0.638	0.066	9.702	0.000	0.563	0.559
SCS_6M=~							
SCS_1R_6M	(h1)	1.000			0.894	0.763	
SCS_2R_6M	(h2)	0.952	0.057	16.564	0.000	0.851	0.741
SCS_3_6M	(h3)	0.340	0.082	4.135	0.000	0.304	0.296
SCS_4R_6M	(h4)	0.901	0.047	19.337	0.000	0.805	0.692
SCS_5_6M	(h5)	0.609	0.065	9.420	0.000	0.544	0.517
SCS_6R_6M	(h6)	0.971	0.051	18.948	0.000	0.868	0.724
SCS_8R_6M	(h8)	0.907	0.047	19.232	0.000	0.811	0.729
SCS_11R_6M	(h11)	0.809	0.055	14.610	0.000	0.723	0.638
SCS_12_6M	(h12)	0.712	0.056	12.783	0.000	0.636	0.618
SCS_13R_6M	(h13)	0.788	0.056	14.122	0.000	0.704	0.645
SCS_15_6M	(h15)	0.635	0.064	9.859	0.000	0.567	0.504

SCS_16R_6M	(h16)	1.012	0.042	24.032	0.000	0.904	0.837
SCS_19_6M	(h19)	0.733	0.056	13.167	0.000	0.655	0.605
SCS_22_6M	(h22)	0.491	0.071	6.947	0.000	0.439	0.426
SCS_25R_6M	(h25)	0.878	0.057	15.462	0.000	0.785	0.698
SCS_26_6M	(h26)	0.638	0.066	9.702	0.000	0.570	0.534

Covariances:

	Est	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1~~SCS_1_3M	0.195	0.042	4.663	0.000	0.195	0.358
SCS_2~~SCS_2_3M	0.198	0.059	3.365	0.001	0.198	0.277
SCS_3~~SCS_3_3M	0.307	0.055	5.564	0.000	0.307	0.324
SCS_4~~SCS_4_3M	0.315	0.074	4.272	0.000	0.315	0.370
SCS_5~~SCS_5_3M	0.183	0.059	3.129	0.002	0.183	0.205
SCS_6~~SCS_6_3M	0.216	0.054	4.033	0.000	0.216	0.253
SCS_8~~SCS_8_3M	0.169	0.038	4.409	0.000	0.169	0.298
SCS_11~~SCS_11_3M	0.119	0.046	2.573	0.010	0.119	0.165
SCS_12~~SCS_12_3M	0.083	0.044	1.902	0.057	0.083	0.117
SCS_13~~SCS_13_3M	0.338	0.082	4.139	0.000	0.338	0.418
SCS_15~~SCS_15_3M	0.204	0.050	4.114	0.000	0.204	0.222
SCS_16~~SCS_16_3M	0.020	0.040	0.496	0.620	0.020	0.042
SCS_19~~SCS_19_3M	0.043	0.039	1.105	0.269	0.043	0.068
SCS_22~~SCS_22_3M	0.161	0.059	2.743	0.006	0.161	0.186
SCS_25~~SCS_25_3M	0.095	0.065	1.450	0.147	0.095	0.142
SCS_26~~SCS_26_3M	0.156	0.046	3.365	0.001	0.156	0.219
SCS_1~~SCS_1R_6M	0.157	0.054	2.913	0.004	0.157	0.259
SCS_2~~SCS_2R_6M	0.272	0.060	4.572	0.000	0.272	0.403
SCS_3~~SCS_3_6M	0.289	0.067	4.340	0.000	0.289	0.301
SCS_4~~SCS_4R_6M	0.258	0.063	4.100	0.000	0.258	0.326
SCS_5~~SCS_5_6M	0.117	0.044	2.644	0.008	0.117	0.139
SCS_6~~SCS_6R_6M	0.226	0.052	4.313	0.000	0.226	0.304
SCS_8~~SCS_8R_6M	0.125	0.044	2.856	0.004	0.125	0.224
SCS_11~~SCS_11R_6M	0.203	0.059	3.429	0.001	0.203	0.258
SCS_12~~SCS_12_6M	0.083	0.042	1.997	0.046	0.083	0.120
SCS_13~~SCS_13R_6M	0.198	0.069	2.875	0.004	0.198	0.268
SCS_15~~SCS_15_6M	0.299	0.062	4.817	0.000	0.299	0.310
SCS_16~~SCS_16R_6M	0.080	0.034	2.333	0.020	0.080	0.196
SCS_19~~SCS_19_6M	0.066	0.042	1.595	0.111	0.066	0.093
SCS_22~~SCS_22_6M	0.139	0.050	2.803	0.005	0.139	0.160
SCS_25~~SCS_25R_6M	0.181	0.046	3.966	0.000	0.181	0.292
SCS_26~~SCS_26_6M	0.239	0.052	4.580	0.000	0.239	0.310
SCS_1_3M~~SCS_1R_6M	0.075	0.046	1.639	0.101	0.075	0.146
SCS_2_3M~~SCS_2R_6M	0.204	0.052	3.912	0.000	0.204	0.323
SCS_3_3M~~SCS_3_6M	0.336	0.073	4.610	0.000	0.336	0.352
SCS_4_3M~~SCS_4R_6M	0.208	0.059	3.499	0.000	0.208	0.274
SCS_5_3M~~SCS_5_6M	0.195	0.058	3.351	0.001	0.195	0.227
SCS_6_3M~~SCS_6R_6M	0.210	0.049	4.263	0.000	0.210	0.268
SCS_8_3M~~SCS_8R_6M	0.156	0.043	3.606	0.000	0.156	0.264
SCS_11_3M~~SCS_11R_6M	0.136	0.051	2.693	0.007	0.136	0.195
SCS_12_3M~~SCS_12_6M	0.090	0.041	2.184	0.029	0.090	0.135
SCS_13_3M~~SCS_13R_6M	0.302	0.061	4.929	0.000	0.302	0.396

SCS_15_3M~~SCS_15_6M	0.325	0.054	6.051	0.000	0.325	0.360
SCS_16_3M~~SCS_16R_6M	0.038	0.033	1.131	0.258	0.038	0.092
SCS_19_3M~~SCS_19_6M	0.042	0.040	1.057	0.290	0.042	0.062
SCS_22_3M~~SCS_22_6M	0.220	0.051	4.296	0.000	0.220	0.254
SCS_25_3M~~SCS_25R_6M	0.119	0.052	2.274	0.023	0.119	0.171
SCS_26_3M~~SCS_26_6M	0.181	0.045	3.984	0.000	0.181	0.240
SCS_19_6M~~SCS_26_6M	0.277	0.071	3.911	0.000	0.277	0.357
SCS_12_6M~~SCS_22_6M	0.279	0.067	4.183	0.000	0.279	0.371
SCS_5_6M~~SCS_22_6M	0.304	0.064	4.740	0.000	0.304	0.363
SCS_6R_6M~~SCS_25R_6M	0.181	0.051	3.554	0.000	0.181	0.272
SCS_15_3M~~SCS_26_3M	0.192	0.052	3.698	0.000	0.192	0.247
SCS_12_3M~~SCS_19_3M	0.294	0.058	5.038	0.000	0.294	0.457
SCS_15_3M	0.258	0.050	5.160	0.000	0.258	0.337
SCS_2_3M~~SCS_6_3M	0.221	0.056	3.954	0.000	0.221	0.285
SCS_5~~SCS_12	0.277	0.062	4.463	0.000	0.277	0.345
SCS_15_6M~~SCS_22_6M	0.236	0.081	2.920	0.003	0.236	0.260
SCS_5_6M~~SCS_12_6M	0.209	0.060	3.472	0.001	0.209	0.287
SCS_22_3M~~SCS_26_3M	0.147	0.064	2.279	0.023	0.147	0.189
SCS_15_3M~~SCS_19_3M	0.200	0.045	4.394	0.000	0.200	0.277
SCS_12_3M~~SCS_26_3M	0.169	0.052	3.259	0.001	0.169	0.244
SCS_3_3M~~SCS_15_3M	0.179	0.053	3.373	0.001	0.179	0.198
SCS_8_3M~~SCS_11_3M	0.134	0.044	3.059	0.002	0.134	0.216
SCS_12~~SCS_19	0.313	0.066	4.716	0.000	0.313	0.444
SCS_5~~SCS_15	0.244	0.066	3.676	0.000	0.244	0.263
SCS_11~~SCS_16	0.100	0.062	1.597	0.110	0.100	0.161
SCS_15_6M~~SCS_26_6M	0.175	0.066	2.655	0.008	0.175	0.200
SCS_12_6M~~SCS_15_6M	0.140	0.077	1.814	0.070	0.140	0.178
SCS_19_3M~~SCS_26_3M	0.085	0.045	1.875	0.061	0.085	0.130
SCS_5_3M~~SCS_22_3M	0.061	0.067	0.915	0.360	0.061	0.069
SCS_19_3M	0.225	0.064	3.499	0.000	0.225	0.303

[reached getOption("max.print") -- omitted 62 rows]

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	0.640	0.058	10.983	0.000	0.640	0.457
SCS_2	0.766	0.086	8.898	0.000	0.766	0.527
SCS_3	0.957	0.086	11.150	0.000	0.957	0.916
SCS_4	0.891	0.086	10.394	0.000	0.891	0.591
SCS_5	0.878	0.073	12.080	0.000	0.878	0.757
SCS_6	0.810	0.091	8.869	0.000	0.810	0.530
SCS_8	0.536	0.056	9.569	0.000	0.536	0.461
SCS_11	0.813	0.085	9.527	0.000	0.813	0.620
SCS_12	0.734	0.069	10.681	0.000	0.734	0.656
SCS_13	0.784	0.094	8.389	0.000	0.784	0.624
SCS_15	0.983	0.087	11.356	0.000	0.983	0.762
SCS_16	0.473	0.069	6.860	0.000	0.473	0.378
SCS_19	0.678	0.069	9.812	0.000	0.678	0.624
SCS_22	0.868	0.079	10.944	0.000	0.868	0.825
SCS_25	0.593	0.065	9.106	0.000	0.593	0.503
SCS_26	0.730	0.066	11.092	0.000	0.730	0.702

SCS_1_3M	0.466	0.054	8.585	0.000	0.466	0.375
SCS_2_3M	0.667	0.072	9.238	0.000	0.667	0.486
SCS_3_3M	0.943	0.084	11.176	0.000	0.943	0.913
SCS_4_3M	0.815	0.088	9.242	0.000	0.815	0.564
SCS_5_3M	0.911	0.087	10.523	0.000	0.911	0.760
SCS_6_3M	0.902	0.111	8.114	0.000	0.902	0.551
SCS_8_3M	0.598	0.062	9.594	0.000	0.598	0.483
SCS_11_3M	0.637	0.063	10.173	0.000	0.637	0.556
SCS_12_3M	0.685	0.065	10.614	0.000	0.685	0.635
SCS_13_3M	0.835	0.100	8.347	0.000	0.835	0.633
SCS_15_3M	0.861	0.067	12.782	0.000	0.861	0.733
SCS_16_3M	0.482	0.061	7.920	0.000	0.482	0.377
SCS_19_3M	0.606	0.069	8.804	0.000	0.606	0.592
SCS_22_3M	0.866	0.077	11.317	0.000	0.866	0.822
SCS_25_3M	0.752	0.087	8.669	0.000	0.752	0.556
SCS_26_3M	0.698	0.059	11.891	0.000	0.698	0.688
SCS_1R_6M	0.574	0.077	7.416	0.000	0.574	0.418
SCS_2R_6M	0.595	0.068	8.715	0.000	0.595	0.451
SCS_3_6M	0.962	0.096	10.017	0.000	0.962	0.912
SCS_4R_6M	0.706	0.071	9.946	0.000	0.706	0.522
SCS_5_6M	0.811	0.067	12.064	0.000	0.811	0.733
SCS_6R_6M	0.682	0.074	9.222	0.000	0.682	0.475
SCS_8R_6M	0.581	0.069	8.420	0.000	0.581	0.469
SCS_11R_6M	0.762	0.084	9.102	0.000	0.762	0.593
SCS_12_6M	0.654	0.072	9.029	0.000	0.654	0.618
SCS_13R_6M	0.695	0.069	10.030	0.000	0.695	0.584
SCS_15_6M	0.947	0.082	11.496	0.000	0.947	0.746
SCS_16R_6M	0.349	0.046	7.644	0.000	0.349	0.300
SCS_19_6M	0.742	0.087	8.522	0.000	0.742	0.634
SCS_22_6M	0.868	0.078	11.064	0.000	0.868	0.818
SCS_25R_6M	0.648	0.072	8.955	0.000	0.648	0.513
SCS_26_6M	0.814	0.075	10.863	0.000	0.814	0.715
SCS	0.760	0.079	9.640	0.000	1.000	1.000
SCS_3M	0.778	0.089	8.739	0.000	1.000	1.000
SCS_6M	0.799	0.090	8.894	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1	0.543
SCS_2	0.473
SCS_3	0.084
SCS_4	0.409
SCS_5	0.243
SCS_6	0.470
SCS_8	0.539
SCS_11	0.380
SCS_12	0.344
SCS_13	0.376
SCS_15	0.238
SCS_16	0.622

SCS_19	0.376
SCS_22	0.175
SCS_25	0.497
SCS_26	0.298
SCS_1_3M	0.625
SCS_2_3M	0.514
SCS_3_3M	0.087
SCS_4_3M	0.436
SCS_5_3M	0.240
SCS_6_3M	0.449
SCS_8_3M	0.517
SCS_11_3M	0.444
SCS_12_3M	0.365
SCS_13_3M	0.367
SCS_15_3M	0.267
SCS_16_3M	0.623
SCS_19_3M	0.408
SCS_22_3M	0.178
SCS_25_3M	0.444
SCS_26_3M	0.312
SCS_1R_6M	0.582
SCS_2R_6M	0.549
SCS_3_6M	0.088
SCS_4R_6M	0.478
SCS_5_6M	0.267
SCS_6R_6M	0.525
SCS_8R_6M	0.531
SCS_11R_6M	0.407
SCS_12_6M	0.382
SCS_13R_6M	0.416
SCS_15_6M	0.254
SCS_16R_6M	0.700
SCS_19_6M	0.366
SCS_22_6M	0.182
SCS_25R_6M	0.487
SCS_26_6M	0.285

Appendix M

SCS-16 Longitudinal Scalar Invariance

Note: ~~ = co-vary

```
long.SCS.1.2.3.s.c <- "SCS =~ h1*SCS_1 + h2*SCS_2 + h3*SCS_3 + h4*SCS_4 +
h5*SCS_5 + h6*SCS_6 + h8*SCS_8 + h11*SCS_11 + h12*SCS_12 + h13*SCS_13 +
h15*SCS_15 + h16*SCS_16 + h19*SCS_19 + h22*SCS_22 + h25*SCS_25 + h26*SCS_26

SCS_3M =~ h1*SCS_1_3M + h2*SCS_2_3M + h3*SCS_3_3M + h4*SCS_4_3M +
h5*SCS_5_3M + h6*SCS_6_3M + h8*SCS_8_3M + h11*SCS_11_3M + h12*SCS_12_3M
+ h13*SCS_13_3M + h15*SCS_15_3M +h16*SCS_16_3M + h19*SCS_19_3M +
h22*SCS_22_3M + h25*SCS_25_3M + h26*SCS_26_3M

SCS_6M =~ h1*SCS_1R_6M + h2*SCS_2R_6M + h3*SCS_3_6M + h4*SCS_4R_6M +
h5*SCS_5_6M + h6*SCS_6R_6M + h8*SCS_8R_6M + h11*SCS_11R_6M +
h12*SCS_12_6M + h13*SCS_13R_6M + h15*SCS_15_6M + h16*SCS_16R_6M +
h19*SCS_19_6M + h22*SCS_22_6M + h25*SCS_25R_6M + h26*SCS_26_6M

SCS_1~~SCS_1_3M
SCS_2~~SCS_2_3M
SCS_3~~SCS_3_3M
SCS_4~~SCS_4_3M
SCS_5~~SCS_5_3M
SCS_6~~SCS_6_3M
SCS_8~~SCS_8_3M
SCS_11~~SCS_11_3M
SCS_12~~SCS_12_3M
SCS_13~~SCS_13_3M
SCS_15~~SCS_15_3M
SCS_16~~SCS_16_3M
SCS_19~~SCS_19_3M
SCS_22~~SCS_22_3M
SCS_25~~SCS_25_3M
SCS_26~~SCS_26_3M
SCS_1~~SCS_1R_6M
SCS_2~~SCS_2R_6M
SCS_3~~SCS_3_6M
SCS_4~~SCS_4R_6M
SCS_5~~SCS_5_6M
SCS_6~~SCS_6R_6M
SCS_8~~SCS_8R_6M
SCS_11~~SCS_11R_6M
SCS_12~~SCS_12_6M
SCS_13~~SCS_13R_6M
SCS_15~~SCS_15_6M
SCS_16~~SCS_16R_6M
SCS_19~~SCS_19_6M
SCS_22~~SCS_22_6M
```

SCS_25~~SCS_25R_6M
SCS_26~~SCS_26_6M

SCS_1_3M~~SCS_1R_6M
SCS_2_3M~~SCS_2R_6M
SCS_3_3M~~SCS_3_6M
SCS_4_3M~~SCS_4R_6M
SCS_5_3M~~SCS_5_6M
SCS_6_3M~~SCS_6R_6M
SCS_8_3M~~SCS_8R_6M
SCS_11_3M~~SCS_11R_6M
SCS_12_3M~~SCS_12_6M
SCS_13_3M~~SCS_13R_6M
SCS_15_3M~~SCS_15_6M
SCS_16_3M~~SCS_16R_6M
SCS_19_3M~~SCS_19_6M
SCS_22_3M~~SCS_22_6M
SCS_25_3M~~SCS_25R_6M
SCS_26_3M~~SCS_26_6M
SCS_1~i1*1
SCS_1_3M~i1*1
SCS_1R_6M~i1*1
SCS_2~i2*1
SCS_2_3M~i2*1
SCS_2R_6M~i2*1
SCS_3~i3*1
SCS_3_3M~i3*1
SCS_3_6M~i3*1
SCS_4~i4*1
SCS_4_3M~i4*1
SCS_4R_6M~i4*1
SCS_5~i5*1
SCS_5_3M~i5*1
SCS_5_6M~i5*1
SCS_6~i6*1
SCS_6_3M~i6*1
SCS_6R_6M~i6*1
SCS_8~i8*1
SCS_8_3M~i8*1
SCS_8R_6M~i8*1
SCS_11~i11*1
SCS_11_3M~i11*1
SCS_11R_6M~i11*1
SCS_12~i12*1
SCS_12_3M~i12*1
SCS_12_6M~i12*1
SCS_13~i13*1
SCS_13_3M~i13*1
SCS_13R_6M~i13*1
SCS_15~i15*1

```
SCS_15_3M~i15*1
SCS_15_6M~i15*1
SCS_16~i16*1
SCS_16_3M~i16*1
SCS_16R_6M~i16*1
SCS_19~i19*1
SCS_19_3M~i19*1
SCS_19_6M~i19*1
SCS_22~i22*1
SCS_22_3M~i22*1
SCS_22_6M~i22*1
SCS_25~i25*1
SCS_25_3M~i25*1
SCS_25R_6M~i25*1
SCS_26~i26*1
SCS_26_3M~i26*1
SCS_26_6M~i26*1

#scalarimprovement

SCS_19_6M~~SCS_26_6M
SCS_12_6M~~SCS_22_6M
SCS_5_6M~~SCS_22_6M
SCS_6R_6M~~SCS_25R_6M
SCS_15_3M~~SCS_26_3M
SCS_12_3M~~SCS_19_3M
SCS_12_3M~~SCS_15_3M
SCS_2_3M~~SCS_6_3M
SCS_5~~SCS_12
SCS_15_6M~~SCS_22_6M
SCS_5_6M~~SCS_12_6M
SCS_22_3M~~SCS_26_3M
SCS_15_3M~~SCS_19_3M
SCS_12_3M~~SCS_26_3M
SCS_3_3M~~SCS_15_3M
SCS_8_3M~~SCS_11_3M
SCS_12~~SCS_19
SCS_5~~SCS_15
SCS_11~~SCS_16
SCS_15_6M~~SCS_26_6M
SCS_12_6M~~SCS_15_6M
SCS_19_3M~~SCS_26_3M
SCS_5_3M~~SCS_22_3M
SCS_5_3M~~SCS_19_3M
SCS_5_3M~~SCS_12_3M
SCS_3_3M~~SCS_5_3M
SCS_11_3M~~SCS_16_3M
SCS_2_3M~~SCS_4_3M
SCS_1_3M~~SCS_2_3M
```

SCS_22~~SCS_26
SCS_19~~SCS_26
SCS_15~~SCS_26
SCS_5~~SCS_19
SCS_5~~SCS_22
SCS_3~~SCS_22
SCS_6~~SCS_8
SCS_1~~SCS_2
SCS_1~~SCS_6

SCS_15~~SCS_19
SCS_15~~SCS_22
SCS_2~~SCS_4
SCS_4~~SCS_11
SCS_4~~SCS_25
SCS_8~~SCS_13
SCS_11~~SCS_25
SCS_13~~SCS_16
SCS_5~~SCS_26
SCS_1_3M~~SCS_6_3M

SCS_15_6M~~SCS_19_6M
SCS_5_6M~~SCS_15_6M
SCS_4R_6M~~SCS_6R_6M
SCS_2R_6M~~SCS_16R_6M
SCS_5_3M~~SCS_15_3M
SCS_12~~SCS_26
SCS_4_3M~~SCS_6_3M"

lavaan 0.6-6 ended normally after 95 iterations

Estimator	ML	
Optimization method	NLMINB	
Number of free parameters	250	
Number of equality constraints	62	
Number of observations	Used	Total
	242	394
Model Test User Model:		
	Standard	Robust
Test Statistic	1840.803	1664.669
Degrees of freedom	1036	1036
P-value (Chi-square)	0.000	0.000
Scaling correction factor		1.106
Yuan-Bentler correction (Mplus variant)		

Model Test Baseline Model:

Test statistic	8383.250	7301.164
Degrees of freedom	1128	1128
P-value	0.000	0.000

Scaling correction factor		1.148

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.899	0.900
Tucker-Lewis Index (TLI)	0.879	0.889
Robust Comparative Fit Index (CFI)		0.902
Robust Tucker-Lewis Index (TLI)		0.893

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-14469.120	-14469.120
Scaling correction factor for the MLR correction	0.920	
Loglikelihood unrestricted model (H1)	NA	NA
Scaling correction factor for the MLR correction	1.124	
Akaike (AIC)	29314.240	29314.240
Bayesian (BIC)	29970.160	29970.160
Sample-size adjusted Bayesian (BIC)	29374.233	29374.233

Root Mean Square Error of Approximation:

RMSEA	0.057	0.050
90 Percent confidence interval – Lower	0.052	0.046
90 Percent confidence interval – Upper	0.061	0.054
P-value RMSEA <= 0.05	0.005	0.484
Robust RMSEA		0.053
90 Percent confidence interval – Lower		0.048
90 Percent confidence interval – Upper		0.057

Standardised Root Mean Square Residual:

SRMR	0.096	0.096

Parameter Estimates:

Standard errors	Sandwich
Information bread	Observed
Observed information based on	Hessian

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS =~						

SCS_1	(h1)	1.000				0.874	0.737
SCS_2	(h2)	0.952	0.057	16.762	0.000	0.832	0.689
SCS_3	(h3)	0.337	0.083	4.082	0.000	0.295	0.288
SCS_4	(h4)	0.899	0.047	19.281	0.000	0.785	0.640
SCS_5	(h5)	0.608	0.064	9.449	0.000	0.531	0.493
SCS_6	(h6)	0.970	0.051	18.995	0.000	0.847	0.686
SCS_8	(h8)	0.908	0.047	19.333	0.000	0.794	0.732
SCS_11	(h11)	0.808	0.055	14.596	0.000	0.706	0.616
SCS_12	(h12)	0.711	0.056	12.776	0.000	0.622	0.587
SCS_13	(h13)	0.788	0.055	14.203	0.000	0.689	0.614
SCS_15	(h15)	0.633	0.064	9.829	0.000	0.553	0.487
SCS_16	(h16)	1.007	0.042	24.146	0.000	0.880	0.786
SCS_19	(h19)	0.732	0.055	13.196	0.000	0.640	0.613
SCS_22	(h22)	0.491	0.070	6.966	0.000	0.429	0.418
SCS_25	(h25)	0.875	0.057	15.387	0.000	0.764	0.704
SCS_26	(h26)	0.635	0.066	9.657	0.000	0.555	0.544
SCS_3M =~							
SCS_1_3M	(h1)	1.000				0.884	0.792
SCS_2_3M	(h2)	0.952	0.057	16.762	0.000	0.841	0.717
SCS_3_3M	(h3)	0.337	0.083	4.082	0.000	0.298	0.293
SCS_4_3M	(h4)	0.899	0.047	19.281	0.000	0.794	0.660
SCS_5_3M	(h5)	0.608	0.064	9.449	0.000	0.537	0.490
SCS_6_3M	(h6)	0.970	0.051	18.995	0.000	0.857	0.669
SCS_8_3M	(h8)	0.908	0.047	19.333	0.000	0.803	0.720
SCS_11_3M	(h11)	0.808	0.055	14.596	0.000	0.714	0.666
SCS_12_3M	(h12)	0.711	0.056	12.776	0.000	0.629	0.605
SCS_13_3M	(h13)	0.788	0.055	14.203	0.000	0.697	0.606
SCS_15_3M	(h15)	0.633	0.064	9.829	0.000	0.559	0.515
SCS_16_3M	(h16)	1.007	0.042	24.146	0.000	0.890	0.787
SCS_19_3M	(h19)	0.732	0.055	13.196	0.000	0.647	0.639
SCS_22_3M	(h22)	0.491	0.070	6.966	0.000	0.433	0.421
SCS_25_3M	(h25)	0.875	0.057	15.387	0.000	0.773	0.665
SCS_26_3M	(h26)	0.635	0.066	9.657	0.000	0.561	0.557
SCS_6M =~							
SCS_1R_6M	(h1)	1.000				0.897	0.764
SCS_2R_6M	(h2)	0.952	0.057	16.762	0.000	0.854	0.742
SCS_3_6M	(h3)	0.337	0.083	4.082	0.000	0.302	0.294
SCS_4R_6M	(h4)	0.899	0.047	19.281	0.000	0.806	0.692
SCS_5_6M	(h5)	0.608	0.064	9.449	0.000	0.545	0.518
SCS_6R_6M	(h6)	0.970	0.051	18.995	0.000	0.870	0.725
SCS_8R_6M	(h8)	0.908	0.047	19.333	0.000	0.814	0.726
SCS_11R_6M	(h11)	0.808	0.055	14.596	0.000	0.725	0.639
SCS_12_6M	(h12)	0.711	0.056	12.776	0.000	0.638	0.619
SCS_13R_6M	(h13)	0.788	0.055	14.203	0.000	0.707	0.647
SCS_15_6M	(h15)	0.633	0.064	9.829	0.000	0.568	0.502
SCS_16R_6M	(h16)	1.007	0.042	24.146	0.000	0.903	0.837
SCS_19_6M	(h19)	0.732	0.055	13.196	0.000	0.656	0.606
SCS_22_6M	(h22)	0.491	0.070	6.966	0.000	0.440	0.426
SCS_25R_6M	(h25)	0.875	0.057	15.387	0.000	0.784	0.697
SCS_26_6M	(h26)	0.635	0.066	9.657	0.000	0.569	0.533

Covariances:

	Est	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1~~SCS_1_3M	0.195	0.042	4.666	0.000	0.195	0.357
SCS_2~~SCS_2_3M	0.198	0.059	3.364	0.001	0.198	0.277
SCS_3~~SCS_3_3M	0.307	0.055	5.532	0.000	0.307	0.323
SCS_4~~SCS_4_3M	0.315	0.074	4.268	0.000	0.315	0.369
SCS_5~~SCS_5_3M	0.183	0.059	3.124	0.002	0.183	0.205
SCS_6M~~SCS_6M_3M	0.215	0.054	4.016	0.000	0.215	0.251
SCS_8~~SCS_8_3M	0.170	0.039	4.396	0.000	0.170	0.298
SCS_11~~SCS_11_3M	0.119	0.046	2.579	0.010	0.119	0.166
SCS_12~~SCS_12_3M	0.083	0.044	1.888	0.059	0.083	0.116
SCS_13~~SCS_13_3M	0.336	0.082	4.090	0.000	0.336	0.415
SCS_15~~SCS_15_3M	0.201	0.050	4.007	0.000	0.201	0.217
SCS_16~~SCS_16_3M	0.017	0.040	0.413	0.680	0.017	0.035
SCS_19~~SCS_19_3M	0.043	0.039	1.102	0.270	0.043	0.068
SCS_22~~SCS_22_3M	0.160	0.059	2.714	0.007	0.160	0.184
SCS_25~~SCS_25_3M	0.095	0.065	1.459	0.145	0.095	0.142
SCS_26~~SCS_26_3M	0.156	0.047	3.335	0.001	0.156	0.218
SCS_1~~SCS_1R_6M	0.156	0.054	2.908	0.004	0.156	0.257
SCS_2~~SCS_2R_6M	0.272	0.059	4.578	0.000	0.272	0.403
SCS_3~~SCS_3_6M	0.289	0.067	4.324	0.000	0.289	0.301
SCS_4~~SCS_4R_6M	0.259	0.063	4.105	0.000	0.259	0.326
SCS_5~~SCS_5_6M	0.118	0.044	2.654	0.008	0.118	0.140
SCS_6M~~SCS_6MR_6M	0.226	0.052	4.322	0.000	0.226	0.304
SCS_8~~SCS_8R_6M	0.113	0.045	2.516	0.012	0.113	0.198
SCS_11~~SCS_11R_6M	0.203	0.059	3.411	0.001	0.203	0.257
SCS_12~~SCS_12_6M	0.082	0.042	1.965	0.049	0.082	0.118
SCS_13~~SCS_13R_6M	0.198	0.069	2.883	0.004	0.198	0.268
SCS_15~~SCS_15_6M	0.302	0.063	4.784	0.000	0.302	0.311
SCS_16~~SCS_16R_6M	0.079	0.035	2.283	0.022	0.079	0.193
SCS_19~~SCS_19_6M	0.066	0.042	1.574	0.115	0.066	0.092
SCS_22~~SCS_22_6M	0.139	0.050	2.783	0.005	0.139	0.160
SCS_25~~SCS_25R_6M	0.181	0.046	3.921	0.000	0.181	0.291
SCS_26~~SCS_26_6M	0.239	0.053	4.555	0.000	0.239	0.310
SCS_1_3M~~SCS_1R_6M	0.075	0.046	1.628	0.104	0.075	0.145
SCS_2_3M~~SCS_2R_6M	0.204	0.052	3.907	0.000	0.204	0.323
SCS_3_3M~~SCS_3_6M	0.336	0.073	4.593	0.000	0.336	0.352
SCS_4_3M~~SCS_4R_6M	0.207	0.059	3.497	0.000	0.207	0.273
SCS_5_3M~~SCS_5_6M	0.195	0.058	3.348	0.001	0.195	0.226
SCS_6_3M~~SCS_6R_6M	0.209	0.049	4.239	0.000	0.209	0.267
SCS_8_3M~~SCS_8R_6M	0.154	0.043	3.564	0.000	0.154	0.259
SCS_11_3M~~SCS_11R_6M	0.136	0.051	2.684	0.007	0.136	0.195
SCS_12_3M~~SCS_12_6M	0.090	0.041	2.187	0.029	0.090	0.135
SCS_13_3M~~SCS_13R_6M	0.302	0.061	4.943	0.000	0.302	0.397
SCS_15_3M~~SCS_15_6M	0.319	0.054	5.887	0.000	0.319	0.350
SCS_16_3M~~SCS_16R_6M	0.038	0.034	1.145	0.252	0.038	0.093
SCS_19_3M~~SCS_19_6M	0.041	0.040	1.046	0.296	0.041	0.062
SCS_22_3M~~SCS_22_6M	0.219	0.052	4.240	0.000	0.219	0.251
SCS_25_3M~~SCS_25R_6M	0.117	0.053	2.198	0.028	0.117	0.166

SCS_26_3M~~SCS_26_6M	0.182	0.045	3.998	0.000	0.182	0.241
SCS_19_6M~~SCS_26_6M	0.277	0.071	3.925	0.000	0.277	0.356
SCS_12_6M~SCS_22_6M	0.279	0.067	4.145	0.000	0.279	0.370
SCS_5_6M~~ SCS_22_6M	0.305	0.064	4.757	0.000	0.305	0.363
SCS_6MR_6M~~SCS_25R_6M	0.181	0.051	3.532	0.000	0.181	0.272
SCS_15_3M~~SCS_26_3M	0.193	0.053	3.652	0.000	0.193	0.248
SCS_12_3M~~SCS_19_3M	0.294	0.058	5.041	0.000	0.294	0.457
SCS_15_3M	0.259	0.051	5.064	0.000	0.259	0.336
SCS_2_3M~~SCS_6M_3M	0.222	0.055	4.025	0.000	0.222	0.286
SCS_5~~SCS_12	0.277	0.062	4.437	0.000	0.277	0.344
SCS_15_6M~~SCS_22_6M	0.241	0.082	2.944	0.003	0.241	0.264
SCS_5_6M~~SCS_12_6M	0.210	0.060	3.469	0.001	0.210	0.288
SCS_22_3M~~SCS_26_3M	0.147	0.065	2.247	0.025	0.147	0.188
SCS_15_3M~~SCS_19_3M	0.200	0.046	4.350	0.000	0.200	0.275
SCS_12_3M~~SCS_26_3M	0.169	0.052	3.263	0.001	0.169	0.244
SCS_3_3M~~SCS_15_3M	0.181	0.054	3.349	0.001	0.181	0.200
SCS_8_3M~~SCS_11_3M	0.134	0.044	3.058	0.002	0.134	0.217
SCS_12~~SCS_19	0.315	0.067	4.704	0.000	0.315	0.446
SCS_5~~SCS_15	0.244	0.066	3.670	0.000	0.244	0.262
SCS_11~~SCS_16	0.100	0.061	1.626	0.104	0.100	0.160
SCS_15_6M~~SCS_26_6M	0.179	0.067	2.667	0.008	0.179	0.202
SCS_12_6M~~SCS_15_6M	0.139	0.078	1.790	0.073	0.139	0.176
SCS_19_3M~~SCS_26_3M	0.085	0.045	1.880	0.060	0.085	0.131
SCS_5_3M~~SCS_22_3M	0.059	0.067	0.876	0.381	0.059	0.066
SCS_19_3M	0.225	0.064	3.521	0.000	0.225	0.303

[reached getOption("max.print") -- omitted 62 rows]

Intercepts:

		Est.	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	(i1)	2.621	0.062	41.962	0.000	2.621	2.211
SCS_1_3M	(i1)	2.621	0.062	41.962	0.000	2.621	2.348
SCS_1R_6M	(i1)	2.621	0.062	41.962	0.000	2.621	2.233
SCS_2	(i2)	2.512	0.063	39.672	0.000	2.512	2.080
SCS_2_3M	(i2)	2.512	0.063	39.672	0.000	2.512	2.142
SCS_2R_6M	(i2)	2.512	0.063	39.672	0.000	2.512	2.184
SCS_3	(i3)	3.184	0.053	59.968	0.000	3.184	3.115
SCS_3_3M	(i3)	3.184	0.053	59.968	0.000	3.184	3.135
SCS_3_6M	(i3)	3.184	0.053	59.968	0.000	3.184	3.100
SCS_4	(i4)	2.763	0.065	42.808	0.000	2.763	2.251
SCS_4_3M	(i4)	2.763	0.065	42.808	0.000	2.763	2.297
SCS_4R_6M	(i4)	2.763	0.065	42.808	0.000	2.763	2.373
SCS_5	(i5)	3.049	0.059	51.287	0.000	3.049	2.831
SCS_5_3M	(i5)	3.049	0.059	51.287	0.000	3.049	2.783
SCS_5_6M	(i5)	3.049	0.059	51.287	0.000	3.049	2.897
SCS_6	(i6)	2.562	0.066	38.854	0.000	2.562	2.073
SCS_6_3M	(i6)	2.562	0.066	38.854	0.000	2.562	2.001
SCS_6R_6M	(i6)	2.562	0.066	38.854	0.000	2.562	2.136
SCS_8	(i8)	2.428	0.059	41.077	0.000	2.428	2.239
SCS_8_3M	(i8)	2.428	0.059	41.077	0.000	2.428	2.179
SCS_8R_6M	(i8)	2.428	0.059	41.077	0.000	2.428	2.165

SCS_11	(i11)	2.972	0.058	51.017	0.000	2.972	2.595
SCS_11_3	(i11)	2.972	0.058	51.017	0.000	2.972	2.774
SCS_11R_6M	(i11)	2.972	0.058	51.017	0.000	2.972	2.619
SCS_12	(i12)	2.791	0.058	47.943	0.000	2.791	2.636
SCS_12_3	(i12)	2.791	0.058	47.943	0.000	2.791	2.686
SCS_12_6M	(i12)	2.791	0.058	47.943	0.000	2.791	2.710
SCS_13	(i13)	2.622	0.060	43.568	0.000	2.622	2.336
SCS_13_3M	(i13)	2.622	0.060	43.568	0.000	2.622	2.282
SCS_13R_6M	(i13)	2.622	0.060	43.568	0.000	2.622	2.399
SCS_15	(i15)	3.106	0.063	49.529	0.000	3.106	2.734
SCS_15_3M	(i15)	3.106	0.063	49.529	0.000	3.106	2.859
SCS_15_6M	(i15)	3.106	0.063	49.529	0.000	3.106	2.749
SCS_16	(i16)	2.580	0.060	42.676	0.000	2.580	2.304
SCS_16_3M	(i16)	2.580	0.060	42.676	0.000	2.580	2.282
SCS_16R_6M	(i16)	2.580	0.060	42.676	0.000	2.580	2.389
SCS_19	(i19)	2.843	0.056	50.475	0.000	2.843	2.726
SCS_19_3M	(i19)	2.843	0.056	50.475	0.000	2.843	2.809
SCS_19_6M	(i19)	2.843	0.056	50.475	0.000	2.843	2.625
SCS_22	(i22)	2.832	0.055	51.134	0.000	2.832	2.761
SCS_22_3M	(i22)	2.832	0.055	51.134	0.000	2.832	2.753
SCS_22_6M	(i22)	2.832	0.055	51.134	0.000	2.832	2.745
SCS_25	(i25)	2.436	0.059	41.004	0.000	2.436	2.245
SCS_25_3M	(i25)	2.436	0.059	41.004	0.000	2.436	2.095
SCS_25R_6M	(i25)	2.436	0.059	41.004	0.000	2.436	2.165
SCS_26	(i26)	2.999	0.058	51.626	0.000	2.999	2.942
SCS_26_3M	(i26)	2.999	0.058	51.626	0.000	2.999	2.981
SCS_26_6M	(i26)	2.999	0.058	51.626	0.000	2.999	2.810
SCS		0.000			0.000	0.000	
SCS_3M		0.000			0.000	0.000	
SCS_6M		0.000			0.000	0.000	

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
SCS_1	0.642	0.058	11.084	0.000	0.642	0.457
SCS_2	0.766	0.086	8.890	0.000	0.766	0.526
SCS_3	0.958	0.086	11.184	0.000	0.958	0.917
SCS_4	0.891	0.086	10.382	0.000	0.891	0.591
SCS_5	0.878	0.073	12.067	0.000	0.878	0.757
SCS_6	0.809	0.090	9.007	0.000	0.809	0.530
SCS_8	0.546	0.056	9.721	0.000	0.546	0.464
SCS_11	0.814	0.085	9.563	0.000	0.814	0.620
SCS_12	0.735	0.069	10.678	0.000	0.735	0.655
SCS_13	0.786	0.092	8.496	0.000	0.786	0.624
SCS_15	0.985	0.087	11.281	0.000	0.985	0.763
SCS_16	0.478	0.069	6.898	0.000	0.478	0.382
SCS_19	0.679	0.069	9.801	0.000	0.679	0.624
SCS_22	0.868	0.079	10.956	0.000	0.868	0.825
SCS_25	0.594	0.066	9.031	0.000	0.594	0.504
SCS_26	0.731	0.067	10.954	0.000	0.731	0.704
SCS_1_3M	0.466	0.054	8.601	0.000	0.466	0.373

SCS_2_3M	0.667	0.072	9.304	0.000	0.667	0.485
SCS_3_3M	0.942	0.084	11.214	0.000	0.942	0.914
SCS_4_3M	0.817	0.088	9.273	0.000	0.817	0.564
SCS_5_3M	0.912	0.087	10.531	0.000	0.912	0.760
SCS_6_3M	0.905	0.110	8.252	0.000	0.905	0.552
SCS_8_3M	0.598	0.062	9.614	0.000	0.598	0.481
SCS_11_3M	0.638	0.063	10.162	0.000	0.638	0.556
SCS_12_3M	0.685	0.065	10.601	0.000	0.685	0.634
SCS_13_3M	0.835	0.101	8.308	0.000	0.835	0.633
SCS_15_3M	0.867	0.068	12.707	0.000	0.867	0.735
SCS_16_3M	0.486	0.061	8.022	0.000	0.486	0.380
SCS_19_3M	0.605	0.069	8.808	0.000	0.605	0.591
SCS_22_3M	0.870	0.078	11.215	0.000	0.870	0.822
SCS_25_3M	0.755	0.088	8.625	0.000	0.755	0.558
SCS_26_3M	0.698	0.059	11.877	0.000	0.698	0.689
SCS_1R_6M	0.574	0.078	7.385	0.000	0.574	0.416
SCS_2R_6M	0.594	0.068	8.700	0.000	0.594	0.449
SCS_3_6M	0.964	0.097	9.959	0.000	0.964	0.913
SCS_4R_6M	0.707	0.071	9.935	0.000	0.707	0.521
SCS_5_6M	0.811	0.067	12.069	0.000	0.811	0.732
SCS_6R_6M	0.681	0.074	9.223	0.000	0.681	0.474
SCS_8R_6M	0.595	0.073	8.196	0.000	0.595	0.473
SCS_11R_6M	0.763	0.084	9.075	0.000	0.763	0.592
SCS_12_6M	0.654	0.073	9.023	0.000	0.654	0.617
SCS_13R_6M	0.695	0.069	10.018	0.000	0.695	0.582
SCS_15_6M	0.955	0.084	11.405	0.000	0.955	0.748
SCS_16R_6M	0.350	0.046	7.652	0.000	0.350	0.300
SCS_19_6M	0.741	0.087	8.519	0.000	0.741	0.632
SCS_22_6M	0.871	0.078	11.121	0.000	0.871	0.818
SCS_25R_6M	0.652	0.074	8.844	0.000	0.652	0.514
SCS_26_6M	0.816	0.075	10.912	0.000	0.816	0.716
SCS	0.764	0.079	9.683	0.000	1.000	1.000
SCS_3M	0.781	0.089	8.735	0.000	1.000	1.000
SCS_6M	0.804	0.091	8.870	0.000	1.000	1.000

R-Square:

	Estimate
SCS_1	0.543
SCS_2	0.474
SCS_3	0.083
SCS_4	0.409
SCS_5	0.243
SCS_6	0.470
SCS_8	0.536
SCS_11	0.380
SCS_12	0.345
SCS_13	0.376
SCS_15	0.237
SCS_16	0.618
SCS_19	0.376

SCS_22	0.175
SCS_25	0.496
SCS_26	0.296
SCS_1_3M	0.627
SCS_2_3M	0.515
SCS_3_3M	0.086
SCS_4_3M	0.436
SCS_5_3M	0.240
SCS_6_3M	0.448
SCS_8_3M	0.519
SCS_11_3M	0.444
SCS_12_3M	0.366
SCS_13_3M	0.367
SCS_15_3M	0.265
SCS_16_3M	0.620
SCS_19_3M	0.409
SCS_22_3M	0.178
SCS_25_3M	0.442
SCS_26_3M	0.311
SCS_1R_6M	0.584
SCS_2R_6M	0.551
SCS_3_6M	0.087
SCS_4R_6M	0.479
SCS_5_6M	0.268
SCS_6R_6M	0.526
SCS_8R_6M	0.527
SCS_11R_6M	0.408
SCS_12_6M	0.383
SCS_13R_6M	0.418
SCS_15_6M	0.252
SCS_16R_6M	0.700
SCS_19_6M	0.368
SCS_22_6M	0.182
SCS_25R_6M	0.486
SCS_26_6M	0.284

Appendix N

Survey Items: Study 3

SECTION A: Background

A1	Are you:	1: Male 2: Female 3: Other (Please specify)
A2	In which month were you born?	[drop down list: January thru December]
A3	What is your age (in years)	[drop down list: 18 thru 39]
A4	In which country do you currently live?	[drop down list] Australia Other
A5	In which country were you born?	[drop down list] Afghanistan Albania Algeria Andorra Angola Antigua and Barbuda Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Barbados Belarus Belgium Belize Benin Bhutan Bolivia Bosnia and Herzegovina Botswana Brazil Brunei Darussalam Bulgaria Burkina Faso Burundi Cambodia Cameroon Canada Cape Verde Central African Republic Chad Chile China Colombia Comoros Democratic Republic of the Congo

		Republic of the Congo Costa Rica Cote d'Ivoire Croatia Cuba Cyprus Czech Republic Denmark Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea Estonia Ethiopia Fiji Finland France Gabon Gambia Georgia Germany Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Honduras Hong Kong Hungary Iceland India Indonesia Iran Iraq Ireland Israel Italy Jamaica Japan Jordan Kazakhstan Kenya Kiribati North Korea South Korea Kuwait Kyrgyzstan Laos

		Latvia Lebanon Lesotho Liberia Libya Liechtenstein Lithuania Luxembourg Republic of Macedonia Madagascar Malawi Malaysia Maldives Mali Malta Marshall Islands Mauritania Mauritius Mexico Micronesia, Federated States of Moldova Monaco Mongolia Montenegro Morocco Mozambique Myanmar Namibia Nauru Nepal Netherlands New Zealand Nicaragua Niger Nigeria Norway Oman Pakistan Palau Panama Papua New Guinea Paraguay Peru Philippines Poland Portugal Qatar Romania Russian Federation Rwanda Saint Kitts and Nevis Saint Lucia Saint Vincent and the Grenadines Samoa San Marino

		Sao Tome and Principe Saudi Arabia Senegal Serbia Seychelles Sierra Leone Singapore Slovakia Slovenia Solomon Islands Somalia South Africa Spain Sri Lanka Sudan Suriname Swaziland Sweden Switzerland Syria Tajikistan Tanzania Thailand Timor-Leste Togo Tonga Trinidad and Tobago Tunisia Turkey Turkmenistan Tuvalu Uganda Ukraine United Arab Emirates United Kingdom United States of America Uruguay Uzbekistan Vanuatu Venezuela Viet Nam Yemen Zambia Zimbabwe
A6	How would you describe your racial or ethnic background?	1: African 2: Arabic 3: Asian 4: Caucasian 5: European 6: Hispanic or Latino 7: Mixed/Multiple ethnic groups 8: Indigenous Australian 9: Other (Please specify)
A7	What is the highest level of education you have completed?	1: Primary school only 2: Some secondary school

		3: All of secondary school (up to Year 12) 4: Tertiary diploma/trade certificate 5: University degree (undergraduate) 6: University degree (postgraduate)
A8	Which of the following best describes the area in which you live?	1: Capital city/Inner suburban 2: Outer suburban 3: Regional centre (pop. 5,000 or more) 4: Rural
A9	Which state do you live in?	1: Australian Capital Territory 2: Northern Territory 3: New South Wales 4: South Australia 5: Queensland 6: Tasmania 7: Victoria 8: Western Australia
A10	What is the postcode or suburb/town where you live?	[Entre manually]
A11	What is your employment status?	1: Working full-time 2: Working part-time 3: Working casually, sessionally, or temping 4: Unemployed 5: Retired 6: Household duties 7: Receiving a pension/benefit 8: Student 9: Volunteer 10: Other (please specify)
A12	What is your height? What is your weight?	[Entre manually in cm.] [Entre manually in kg.]

SECTION B: Sexual Orientation

S1	How would you describe your sexual orientation?	1: Straight or heterosexual 2: Gay or homosexual 3: Bisexual 4: Other (please specify): ___________

SECTION C: Well-Being

	Below are some statements about feelings and thoughts. Please tick the box that best describes your experience of each over the last two weeks.	
WB-a	I’ve been feeling optimistic about the future	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time

WB-b	I've been feeling useful	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-c	I've been feeling relaxed	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-d	I've been feeling interested in other people	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-e	I've had energy to spare	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-f	I've been dealing with problems well	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-g	I've been thinking clearly	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-h	I've been feeling good about myself	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-i	I've been feeling close to other people	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-j	I've been feeling confident	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-k	I've been able to make up my own mind about things	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-l	I've been feeling loved	1: None of the time 2: Rarely 3: Some of the time 4: Often

		5: All the time
WB-m	I've been interested in new things	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time
WB-n	I've been feeling cheerful	1: None of the time 2: Rarely 3: Some of the time 4: Often 5: All the time

SECTION E: Body Appreciation

BAS-2	Below is a list of attributes relating to the appreciation of your body. Please indicate whether the question is true about you never, seldom, sometimes, often, or always.	
BAS-2-a	I respect my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-b	I feel good about my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-c	I feel that my body has at least some good qualities.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-d	I take a positive attitude towards my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-e	I am attentive to my body's needs.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-f	I feel love for my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-g	I appreciate the different and unique characteristics of my body.	1: Never 2: Seldom 3: Sometimes

		4: Often 5: Always
BAS-2-h	My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-i	I am comfortable in my body.	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always
BAS-2-j	I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors).	1: Never 2: Seldom 3: Sometimes 4: Often 5: Always

SECTION F: Self-Compassion

	Now we would like to ask you some questions about how you would typically act towards yourself in difficult times.	
SC-a	I’m disapproving and judgmental about my own flaws and inadequacies.	1: Almost never 2: 3: 4: 5: Almost always
SC-b	When I’m feeling down I tend to obsess and fixate on everything that’s wrong.	1: Almost never 2: 3: 4: 5: Almost always
SC-c	When things are going badly for me, I see the difficulties as part of life that everyone goes through.	1: Almost never 2: 3: 4: 5: Almost always
SC-d	When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.	1: Almost never 2: 3: 4: 5: Almost always
SC-e	I try to be loving towards myself when I’m feeling emotional pain.	1: Almost never 2: 3: 4: 5: Almost always

SC-f	When I fail at something important to me I become consumed by feelings of inadequacy.	1: Almost never 2: 3: 4: 5: Almost always
SC-g	When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.	1: Almost never 2: 3: 4: 5: Almost always
SC-h	When times are really difficult, I tend to be tough on myself.	1: Almost never 2: 3: 4: 5: Almost always
SC-i	When something upsets me I try to keep my emotions in balance.	1: Almost never 2: 3: 4: 5: Almost always
SC-j	When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.	1: Almost never 2: 3: 4: 5: Almost always
SC-k	I’m intolerant and impatient towards those aspects of my personality I don't like.	1: Almost never 2: 3: 4: 5: Almost always
SC-l	When I’m going through a very hard time, I give myself the caring and tenderness I need.	1: Almost never 2: 3: 4: 5: Almost always
SC-m	When I’m feeling down, I tend to feel like most other people are probably happier than I am.	1: Almost never 2: 3: 4: 5: Almost always
SC-n	When something painful happens I try to take a balanced view of the situation.	1: Almost never 2: 3: 4: 5: Almost always
SC-o	I try to see my failings as part of the human condition.	1: Almost never 2: 3: 4: 5: Almost always

SC-p	When I see aspects of myself that I don’t like, I get down on myself.	1: Almost never 2: 3: 4: 5: Almost always
SC-q	When I fail at something important to me I try to keep things in perspective.	1: Almost never 2: 3: 4: 5: Almost always
SC-r	When I’m really struggling, I tend to feel like other people must be having an easier time of it.	1: Almost never 2: 3: 4: 5: Almost always
SC-s	I’m kind to myself when I’m experiencing suffering.	1: Almost never 2: 3: 4: 5: Almost always
SC-t	When something upsets me I get carried away with my feelings.	1: Almost never 2: 3: 4: 5: Almost always
SC-u	I can be a bit cold-hearted towards myself when I'm experiencing suffering.	1: Almost never 2: 3: 4: 5: Almost always
SC-v	When I'm feeling down I try to approach my feelings with curiosity and openness.	1: Almost never 2: 3: 4: 5: Almost always
SC-w	I’m tolerant of my own flaws and inadequacies.	1: Almost never 2: 3: 4: 5: Almost always
SC-x	When something painful happens I tend to blow the incident out of proportion.	1: Almost never 2: 3: 4: 5: Almost always
SC-y	When I fail at something that's important to me, I tend to feel alone in my failure.	1: Almost never 2: 3: 4: 5: Almost always

SC-z	I try to be understanding and patient towards those aspects of my personality I don't like.	1: Almost never 2: 3: 4: 5: Almost always

SECTION G: Body Dissatisfaction

BSQ	We would like to know how you have been feeling about your appearance over the PAST FOUR WEEKS. Please read each question and fill in the appropriate response. Please answer all of the questions.	
BSQ-a	Has feeling bored made you brood about your shape?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-b	Have you thought that your lower body is too large for the rest of you?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-c	Have you been worried about your flesh not being firm enough?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-d	Have you felt so bad about your shape that you have cried?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-e	Have you avoided running because your flesh might wobble?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-f	Has being with thin, lean, or muscular people made you self-conscious about your shape?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-g	Have you worried about the lower part of your body spreading out when sitting down?	1: Always 2: Usually 3: Often 4: Sometimes

		5: Rarely 6: Never
BSQ-h	Has eating even a small amount of food made you feel fat?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-i	Have you avoided wearing clothes which make you particularly aware of the shape of your body?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-j	Has eating sweets, cakes, or other high-calorie food made you feel fat?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-k	Have you felt ashamed of your body?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-l	Has worry about your shape made you diet?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-m	Have you felt happiest about your shape when your stomach has been empty (e.g., in the morning)?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-n	Have you felt that it is not fair that other people are thinner, leaner, and/or more muscular than you?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-o	Have you been worried about your flesh being dimply?	1: Always 2: Usually 3: Often 4: Sometimes 5: Rarely 6: Never
BSQ-p	Has worry about your shape made you feel you ought to exercise?	1: Always 2: Usually 3: Often 4: Sometimes

		5: Rarely 6: Never

SECTION F: Anxiety

	Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.	
A-a	I was aware of dryness in my mouth	0: Never 1: Sometimes 2: Often 3: Almost Always
A-b	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0: Never 1: Sometimes 2: Often 3: Almost Always
A-c	I experienced trembling (e.g., in the hands)	0: Never 1: Sometimes 2: Often 3: Almost Always
A-d	I was worried about situations in which I might panic and make a fool of myself	0: Never 1: Sometimes 2: Often 3: Almost Always
A-e	I felt I was close to panic	0: Never 1: Sometimes 2: Often 3: Almost Always
A-f	I was aware of the action of my heart in the absence of physicalexertion (e.g., sense of heart rate increase, heart missing a beat)	0: Never 1: Sometimes 2: Often 3: Almost Always
A-g	I felt scared without any good reason	0: Never 1: Sometimes 2: Often 3: Almost Always

SECTION G: Eating Behaviours

On how many of the past 7 days	
Have you been deliberately trying to limit the amount of food you eat to influence your weight or shape (whether or not you have succeeded)?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days

Have you gone for long periods of time (e.g., 8 or more waking hours) without eating anything at all in order to influence your weight or shape?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (such as working, following a conversation or reading)?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Has thinking about your weight or shape made it very difficult to concentrate on things you are interested in (such as working, following a conversation or reading)?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Have you had a definite fear that you might gain weight?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Have you had a strong desire to lose weight?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Have you tried to control your weight or shape by making yourself sick (vomit) or taking laxatives?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Have you exercised in a driven or compulsive way as a means of controlling your weight, shape or body fat, or to burn off calories?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Have you had a sense of having lost control over your eating (at the time that you were eating)?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
On how many of these days *(e.g., days on which you had a sense of having lost control over your eating*) did you eat what other people would regard as an unusually large amount of food in one go?	0: 0 days 1: 1-2 days 2: 3-5 days 3: 6-7 days
Over the past 7 days	
Has your weight or shape influenced how you think about (judge) yourself as a person?	0: Not at all 1: Slightly 2: Moderately 3: Markedly
How dissatisfied have you been with your weight or shape?	0: Not at all 1: Slightly 2: Moderately 3: Markedly

SECTION H: Meditation Training

Participants from both the experimental and control group partook in the intervention for three weeks. Contemporary research on mindfulness training has shown that brief periods of meditation can be effectual (Albertson et al., 2014; Glück & Maercker 2011; Tang et al., 2007). Participants were contacted via email and text message with the link for the 20-minute self-compassion meditation training, with the instructions: *"Please try to listen to it every day for the next week"*. At the start of each week, participants received a different podcast. The three self-compassion meditation podcasts included, the compassionate body scan, affectionate breathing, and loving-kindness meditation as taught in the Mindful Self-Compassion program (Neff & Germer, 2013). These podcasts are available at www.selfcompassion.org.

For the first week, participants were instructed to listen to the body compassionate scan. This type of meditation was designed for the listener to be in touch with their body's sensations and bring a sense of gratitude, compassion, and peace to their body. The listener is required to be in a comfortable position, where they are told to put their hand over their heart as a reminder to be compassionate to themselves. The listener is then instructed to notice the sensations of numerous body parts, starting with the feet, and moving towards the head. Participants are instructed to be kind to themselves, and if any intrusive thoughts or judgements arise, they are to place their hand on their heart, breathe deeply, and continue to be in touch with the sensations.

For the second week, participants were instructed to listen to the affectionate breathing podcast. Similarly, with the body compassionate scan, the listener is instructed to get in touch with their body by doing a short scan of the body and paying attention to any sensations and whether they are pleasant, unpleasant, or neutral. The listener is then instructed to take three deep breaths to release any lingering tensions and then to allow breathing to return to normal. The listener is then encouraged to see if they can notice where they feel their breath most strongly. The listener is then asked to adopt a little half-smile with their mouth closed and is asked to observe how they feel when their body adapts feelings of contentment, peace, and happiness with the present moment. The listener is encouraged to let their breath be infused with affection and kindness for themselves and others. If the listener's mind wonders, they are encouraged to judge, to appreciate each breath, and rest in the feelings of kindness they are generating.

For the final week, participants were instructed to listen to the loving-kindness meditation. This mediation is focused on generating goodwill and kindness both for others and for oneself. Firstly, the listener is encouraged to let out three deep breaths to alleviate any tension from their day. They are then instructed to call to mind an image of someone who has been unconditionally kind to them, who has supported them over the years – someone who has very uncomplicated feelings. They are encouraged to imagine this person in front of them and to send them goodwill and kindness and the wish for their well-being by repeating the following phrases silently: *"May you be safe. May you be peaceful. May you be healthy, and may you live with ease and well-being"*. The listener is then instructed place their gently hand on their heart if they are having trouble getting in touch with their feelings by silently repeating the following phrase to themselves: *"May I be safe. May I be peaceful. May I be healthy—mind and body, and may I live with ease"*.

Appendix O

Ethics Approval: Study 3

Dear DR WARWICK HOSKING,

Your ethics application has been formally reviewed and finalised.

» Application ID: HRE21-028
» Chief Investigator: DR WARWICK HOSKING
» Other Investigators:
» Application Title: Mind, Body, and Well-being in Young Men and Women: Exploring the Efficacy of a Brief Meditation Intervention
» Form Version: 13-07

The application has been accepted and deemed to meet the requirements of the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007)' by the Victoria University Human Research Ethics Committee. Approval has been granted for two (2) years from the approval date; 17/08/2021.

Continued approval of this research project by the Victoria University Human Research Ethics Committee (VUHREC) is conditional upon the provision of a report within 12 months of the above approval date or upon the completion of the project (if earlier). A report proforma may be downloaded from the Office for Research website at: http://research.vu.edu.au/hrec.php.

Please note that the Human Research Ethics Committee must be informed of the following: any changes to the approved research protocol, project timelines, any serious events or adverse and/or unforeseen events that may affect continued ethical acceptability of the project. In these unlikely events, researchers must immediately cease all data collection until the Committee has approved the changes. Researchers are also reminded of the need to notify the approving HREC of changes to personnel in research projects via a request for a minor amendment. It should also be noted that it is the Chief Investigators' responsibility to ensure the research project is conducted in line with the recommendations outlined in the National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research (2007).'

On behalf of the Committee, I wish you all the best for the conduct of the project.

Secretary, Human Research Ethics Committee
Phone: 9919 4781 or 9919 4461
Email: researchethics@vu.edu.au

This is an automated email from an unattended email address. Do not reply to this address.

Appendix P

Australian New Zealand Clinical Trials Registry

Dear Warwick Hosking,

Re: Mind, Body, and Well-being in Young Men and Women: Exploring the Efficacy of a Brief Meditation Intervention

Thank you for submitting the above trial for inclusion in the Australian New Zealand Clinical Trials Registry (ANZCTR).

Your trial has now been successfully registered and allocated the ACTRN: ACTRN12621001028897p

Web address of your trial: https://www.anzctr.org.au/ACTRN12621001028897p.aspx
Date submitted: 1/07/2021 1:24:49 PM
Date registered: 5/08/2021 3:05:34 PM
Registered by: Warwick Hosking
Principal Investigator: Warwick Hosking

If you have already obtained Ethics approval for your trial, please send a copy of at least one Ethics Committee approval letter to info@actr.org.au or by fax to (+61 2) 9565 1863, attention to ANZCTR.

Note that updates should be made to the registration record as soon as any trial information changes or new information becomes available. Updates can be made at any time and the quality and accuracy of the information provided is the responsibility of the trial's primary sponsor or their representative (the registrant). For instructions on how to update please see https://www.anzctr.org.au/Support/HowToUpdate.aspx.

Please also note that the original data lodged at the time of trial registration and the tracked history of any changes made as updates will remain publicly available on the ANZCTR website.

The ANZCTR is recognised as an ICMJE acceptable registry (http://www.icmje.org/about-icmje/faqs/clinical-trials-registration/) and a Primary Registry in the WHO registry network (https://www.who.int/ictrp/network/primary/en/index.html).

If you have any enquiries please send a message to info@actr.org.au or telephone +61 2 9562 5333.

Kind regards,
ANZCTR Staff
T: +61 2 9562 5333
F: +61 2 9565 1863
E: info@actr.org.au
W: www.ANZCTR.org.au

Appendix Q

Participant Information Form: Study 3

You are invited to participate

You are invited to participate in a research project entitled: Mind, Body, and Well-being in Young Men and Women: Exploring the Efficacy of a Brief Meditation Intervention

This project is being conducted by a student researcher Joshua Marmara as part of a requirement of the degree of Doctor of Philosophy at Victoria University under the supervision of Dr Warwick Hosking and Dr Peter Baldwin from the Institute of Health and Sport.

Project explanation

The primary aim of this research is to investigate whether daily listening to self-compassion audio meditations over a three-week period influences how people feel about their bodies. The findings of this project will yield valuable information about the relationship between the mind and body, which could help with designing future interventions.

What will I be asked to do?

Upon indicating your consent to participate by checking the box at the bottom of this page, you will be asked to provide your email address and mobile number. You will then receive a link to an online screening survey. In this survey you will be asked a series of questions about any current diagnoses of an anxiety disorder or eating disorder, and any anxiety or eating disorder symptoms you may or may not be experiencing. Individuals with current anxiety or eating disorder diagnoses or who report experiencing high levels of anxiety and/or eating disorder symptoms will not be eligible to participate.

If you are eligible to participate, you will receive a date to complete questions related to self-compassion, your body, and your well-being. At this time, you will also be given a starting date for the three-week meditation period. Over three weeks, we will ask you to listen to a self-compassion meditation once every day. The exact meditation we will ask you to listen to will change at the beginning of each new week when we will also send you a notification and reminder. We will provide the links to all the meditations. At the conclusion of the three weeks, we will ask you to compete another survey containing questions related to self-compassion, your body, and your well-being.

Due to the number of people in the study, your meditation period may be in October or November, so please consider this when registering. Once you have completed your registration for this study, we will let you know when your assigned meditation period is.

Your participation in this study is completely voluntary, and all responses you provide will be anonymous and confidential.

What will I gain from participating?

There are monetary incentives for completing the survey. All participants will go into a draw to have a chance to win one of 5 $125AUD GiftPay gift cards for starting and completing the study. Although there are no psychological benefits for participating, results of this study may identify factors that could be used in future interventions tailored to young adults. These interventions will deliver the necessary steps required for young adults to enhance their mental well-being.

How will the information I give be used?

Responses will be collated and analysed at the group level. The findings will be reported in the student investigator's thesis and may be written up in journal articles and presented at academic conferences.

What are the potential risks of participating in this project?
As some questions in the survey are of a personal nature, you may feel uncomfortable answering them. You are free to skip any questions that you do not want to answer, and as your participation is completely voluntary, you are free to withdraw at any time without submitting your responses. As meditations draw attention to bodily sensations such as heart rate, breathing, etc., this can trigger anxiety in participants who have a history of experiencing anxiety or panic. Those with anxiety disorders or who experience panic attacks or severe anxiety are ineligible to participate. Likewise, those with an eating disorder or symptoms of disordered eating will be ineligible to participate. The initial survey you complete will screen for these problems and following this you will be informed whether you are eligible to participate.

If you experience any discomfort or distress, whether during the initial screening survey, when completing the main surveys, or at any time during the meditation period, you are encouraged to contact the following services which will provide a free, confidential, and anonymous telephone counselling service:

a. Lifeline on 13 11 14. Lifeline is a national charity providing all Australians experiencing emotional distress with access to 24-hour crisis support and suicide prevention services.

b. Beyond Blue on 1300 224 636. Beyond Blue provides free telephone counselling by trained mental health professionals to anybody experiencing difficulties or challenges in their lives, and/or experiencing symptoms of depression or anxiety.

c. The Butterfly Foundation on 1800 334 673. Butterfly operates a National Helpline that includes support over the phone, via email and online, reaching 20,000 people each year. The Helpline is staffed by trained counsellors experienced in assisting with eating disorders and body image issues.

How will this project be conducted?

The project will be conducted using an online survey which includes questions about self-compassion, your body, and well-being. The survey should take no longer than 10 minutes to complete. Additionally, there are three meditation exercises, which are approximately 20 minutes long. Participants will be asked to listen to the first meditation once every day for the first week, the second meditation once every day for the second week, and the third meditation every day for the final week. All survey responses will be completely anonymous and confidential, and results will be collated and statistically analysed.

Who is conducting the study?

Joshua Marmara (Student researcher)
Joshua.marmara@live.vu.edu.au

Dr Warwick Hosking (Chief investigator)
warwick.hosking@vu.edu.au
(03) 9919 2620

Dr Peter Baldwin (Associate investigator)
p.baldwin@blackdog.org.au

Any queries about your participation in this project may be directed to the Chief Investigator listed above.
If you have any queries or complaints about the way you have been treated, you may contact the Ethics Secretary, Victoria University Human Research Ethics Committee, Office for Research, Victoria University, PO Box 14428, Melbourne, VIC, 8001, email researchethics@vu.edu.au or phone (03) 9919 4781 or 4461.

STATEMENT BY PERSON AGREEING TO PARTICIPATE IN THIS STUDY

I have read this informed consent document and the material contained in it has been explained to me. I understand each part of the document, all my questions have been answered, and I freely and voluntarily choose to participate in this study.