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Examining the dysfunctional body change behaviours model in male and female weight lifters.

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Examining the Dysfunctional Body Change Behaviours Model in Male and Female Weight Lifters

By

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ABSTRACT

Cafri et al. (2005) advanced the Dysfunctional Body Change Behaviours Model to guide future studies on the psychological and behavioural characteristics involved in the pursuit of a more muscular physique. The current study evaluated a modified version of the model including biological factors, body dissatisfaction, involvement in other physical activity, psychological functioning, and the resulting health risk behaviours in a weight lifting population. Participants included 263 (males, $n = 102$; females, $n = 161$) weight lifters who completed questionnaires including demographic data such as weight training habits, participation in other physical activity and BMI, the Drive for Muscularity Scale-Revised attitude (Gammage, Munroe-Chandler, & Hall, 2005), the Social Physique Anxiety Scale (Hart, Leary, & Rejeski, 1989), and the Body Building Dependency Scale (Smith, Hale, & Collins, 1998). Structural Equation Modeling provided support for the overall model. Upon investigation of the path coefficients, three of the relationships were non-significant, while the remaining three were significant. Recommendations for future studies employing the Dysfunctional Body Change Behaviours Model are provided as well as further discussion of the results.

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"Our worst fear is not that we are inadequate. Our deepest fear is that we are powerful beyond measure. It is our light, not our darkness that most frightens us. We ask ourselves, who am I to be brilliant, gorgeous, talented and fabulous? Actually, who are you not to be?" ~ Marianne Williamson

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Introduction

Although research has demonstrated that a sustained and adequate exercise program plays an important role in weight loss and healthy weight maintenance (Bouchard, Depres, & Tremblay, 1993), obesity levels in Canadians continue to rise (Statistics Canada, 2005). Despite this health crisis, which has been referred to as an epidemic (World Health Organization, 2003), many individuals in today's Western world strive to attain the ideal physique due to the value placed on health, fitness and appearance. One way in which to attain the ideal physique is through exercise. However, not all individuals who exercise reap the numerous benefits of a regular exercise program. Contrary to the review study by Folkins and Sime (1981) that suggested the influence of exercise on various mental states was almost all positive, some individuals take their exercising to pathological limits, consequently sacrificing their physical and mental health. One aspect of mental health that can be impacted by taking exercise behaviours to extremes is body image.

Body image is one aspect of every individual's psyche and is defined as a multidimensional construct that is a demonstration of how we see our own body, think, feel, and act toward it (Lox, Martin, & Petruzello, 2003). Body dissatisfaction occurs when there is a discrepancy between one's actual body and their ideal body (Myers & Biocca, 1992), and may ultimately lead to unhealthy behaviours such as eating disorders (Cash & Deagle, 1997) and exercise dependence (Davis & Cowles, 1991). Body image disturbance has been identified as the most important global measure of distress because it identifies one's overall and subjective evaluation of themselves (Thompson, Heinberg, Altable, & Tantleef-Dunn, 1999). One population of exercisers that has been shown to

display unique and often troubling body dissatisfaction and associated resultant behaviours is weight lifters (Choi, Pope, & Olivardia, 2002).

There have been numerous theories proposed with respect to issues of body image (Altabe & Thompson, 1996; Fallon, 1990; Garner, 1997; Heinberg, 1996; Langlois, 1986). However, until recently, the proposed theories have not focused on those who wish to become more muscular (e.g., Lantz, Rhea, & Mayhew, 2001; McCreary & Sasse, 2000; Olivardia, Pope, & Hudson, 2000). An overwhelmingly large portion of body image research has focused primarily on women and the commonly held desire to obtain a thin physique, which is perpetuated through the media (Thompson et al., 1999). Additionally, there has been increasing evidence that there is an alternative ideal body type for women that includes some muscularity, or tone (Daniels 1992; Furnham, Titman, & Sleeman, 1994; Ryckman, Robbins, Kaczor, & Gold, 1989). Relative to the plethora of research on women's body image, fewer studies have assessed men's body image, and more specifically the risk factors related to body image dissatisfaction (e.g., Arbour & Martin Ginis, 2006; Cafri & Thompson, 2004; Carlson Jones & Crawford, 2005). Unlike the research on women's body image, it has been established that the desire for a thinner physique is relatively rare in men (Olivardia, Pope, Mangweth, & Hudson, 1995), and that, alternatively, men desire a physique that emphasizes muscularity (Pope, Phillips, & Olivardia, 2000).

Body building has been employed as a technique to increase muscularity in both men (Klein, 1992; Ridgeway & Tylka, 2005) and women (Guthrie, Ferguson, & Grimmett, 1994; Lowe, 1998). The debate over whether body building is beneficial for body image has been ongoing. It has been suggested that for women, body building can

be empowering through challenging normative sex roles and the ideology that women are weak (Bartky, 1990; Bolin, 1992; Guthrie et al.). However, other authors (e.g., Bordo, 1990; Yesalis & Cowart, 1998) view female body building as having a negative role in body image, likening the female body builder to anorexic individuals because of the need for a lean, fat-free physique (Bordo). In addition to the investigations into the social aspects of body building, research has also considered the psychological variables that are often impacted by body building; however, findings have been equivocal. For men, it has been indicated that body building results in higher satisfaction on a global measure of body image and higher ideal and actual upper torso size rating, when compared to a group of aerobic athletes (Boroughs & Thompson, 2002). Similarly, an investigation into the effects of a 16 week weight training program found that the self-concept of weight lifters improved significantly more over the control group (Tucker, 1982). Some of the negative outcomes for both men and women are the health risk behaviours body builders display in order to achieve their ideal, such as steroid use (Gruber & Pope, 2000; Yesalis & Cowart), exercise dependence (Hausenblas & Symons-Downs, 2002; Smith, Hale, & Collins, 1998), and psychiatric disorders such as muscle dysmorphia (Olivardia et al., 2000). Overall, these conflicting findings may be attributed to differences in the populations tested and measures used in the various studies.

Through the pursuit of the ideal muscular body, several psychological, social, and physical behavioural factors are often involved; however, researchers have not developed a specific, empirically based model of these factors for individuals driven to attain increased muscularity. Cafri and colleagues (2005) developed the Dysfunctional Body Change Behaviours Model (see Figure 1) as a means of guiding the research and

identifying the relationships among the variables that contribute to the development of dysfunctional body change behaviours. Included in the model are biological factors, societal factors, social body comparison, body image problems, sporting participation, and psychological functioning, which all interact to influence various health risk behaviours. Although the model is empirically based as it is developed from a previously confirmed model, the Tripartite Model (see Figure 2) and from literature findings, some of these findings are mixed, and the scales employed to assess the constructs are newly developed; thus the model requires further investigation as do some of the scales employed in the current study.

The factors from the Dysfunctional Body Change Behaviours Model that will be highlighted in the current study will include biological, body image dissatisfaction, sport participation, psychological functioning, and the resulting health risk behaviours. Cafri and colleagues (2005) identified Body Mass Index (BMI) as a biological factor that impacts societal pressures to attain a certain physique and with implications for body image dissatisfaction. Research has established BMI as a risk factor for body dissatisfaction and dieting behaviours associated with weight loss (Cole, Smith, Halford, & Wagstaff, 2003; Presnell & Stice, 2003). However, the relationship between BMI and muscularity-related behaviours and cognitions has not been adequately explored. Research has indicated that young males in the underweight range of BMI were found to be at a higher risk for taking steroids or other supplements (Neumark-Sztainer, Story, Falkner, Beuhring, & Resnick, 1999). Additionally, it is important to consider that those men who begin a weight training program are more likely to be underweight (Mishkind, Rodin, Silberstein, & Striegel-Moore, 1986). Together, this suggests that lower BMI

results in increased muscularity body dissatisfaction. Contrastingly, another study indicated that those men with higher BMI and a weight training history desired even further increases in muscularity when compared to men with lower BMI (Pickett, Lewis, & Cash, 2005).

A second factor in the Dysfunctional Body Change Behaviours Model is participation in sports and other physical activity (Cafri et al., 2005). Sport has been shown to be associated with healthy body image development (Richards, Casper, & Larson, 1990). Contrary to this finding, however, it has been established in a review paper including athletes in a large range of sports that elite athletes often display characteristics of having increased weight concerns and disordered eating (Hausenblas & Carron, 1999). Additionally, those individuals involved in sports where muscularity is considered an asset have been shown to be more likely to use steroids (Buckley et al., 1988). Despite these findings that suggest sport type does impact health risk behaviours, a meta-analysis that compared athletes to non-athletes in terms of body image, produced no significant differences (Hausenblas & Symons Downs, 2001). Therefore, further clarification with respect to the relationship between sport involvement, body image, and health risk behaviours is necessary.

A third component in the Dysfunctional Body Change Behaviours Model is societal factors and social body comparison as a mediator leading to health risk behaviours. Although this component is not being investigated in the current study, its impact on body image and health risk behaviours is nonetheless important to note. The Sociocultural Theory (e.g., Botta, 1999) purports that the mass media has a large impact on the development of body image problems. Many studies investigating the impact of

media on body image have found that exposure to ultra-thin models increases body dissatisfaction in women (Groesz, Levine, & Murnen, 2002). However, young men indicated that exposure to thin male models did not impact their body image negatively (Ogden & Mundray, 1996). This may be due to the fact that achieving thinness was not included in the men's ideal body type, given the more recent suggestion that men desire increases in muscle mass (Pope et al., 2000). Contrastingly, studies that have exposed men to media displaying the male muscular ideal indicated a profound negative impact on body image (Leit, Gray, & Pope, 2001; Lorenzen, Greive, & Thomas, 2004). Therefore it can be assumed that images of the ideal physique, whether it be directed towards men or women do impact each individual's interpretation and attitude towards their own bodies.

The Dysfunctional Body Change Behaviours Model also identifies psychological functioning as a risk factor for the development of health risk behaviours and social physique anxiety is a variable often explored in exercising populations. Social anxiety is an affective consequence that may be experienced when people doubt their ability to make desired impressions on others (Leary, 1983; Schlenker & Leary, 1982). Therefore, social physique anxiety is the anxiety one experiences when they fear the body is being evaluated by others (Hart, Leary, & Rejeski, 1989). In terms of a weight training population, studies have been equivocal in their findings due to differences between studies in measurement tools and the sample that was assessed. For example, one study indicated that a group of participants who underwent a weight training program experienced decreases in social physique anxiety which were associated with increases in perceived strength and muscularity (Martin Ginis, Eng, Arbour, Hartman, & Phillips,

2005). Alternatively, it has been found that those individuals who were motivated to lift weights for appearance and weight management reasons had significantly poorer body image scores, including those of social physique anxiety (Williams & Cash, 2001). Interestingly, experienced weight lifters have been shown to display lower social physique anxiety compared to inexperienced weight lifters (e.g., Hurst, Hale, Smith, & Collins, 2000). These findings are supported by previous anecdotal evidence that suggested men begin body building in order to reduce feelings of poor body image (Brewer, Van Raalte, & Linder, 1993). This may be due to the experienced body builders feeling more comfortable with their bodies after seeing the desired results. Thus is it clear that not all aspects of muscular dissatisfaction and the desire for higher levels of muscularity are positively related to social physique anxiety. These findings make intuitive sense because being anxious about having one's physique evaluated is a small aspect of body image.

Central to the study of body image and the Dysfunctional Body Change Behaviours Model, body image dissatisfaction with respect to muscularity is suggested to be a mediator to the development of health risk behaviours (Cafri et al., 2005). The drive for muscularity was a term coined in order to represent an individual's motivation to become more muscular (McCreary & Sasse, 2000). The Drive for Muscularity Scale (DMS) was developed to assess one's attitudes and behaviours towards increased muscularity (McCreary & Sasse). Despite its validity and reliability with males, the two factor structure was not supported in females (McCreary, Sasse, Saucier, & Dorsch, 2004). In order to ensure the appropriateness of the measure with both a male and female population, Gammage, Munroe-Chandler, and Hall (2005) revised the DMS to include

three subscales: attitudinal, behavioural, and dietary to result in the Drive for Muscularity-Revised (DSM-2). The behavioural subscale of the DMS-2 taps into the individual's weight training behaviours and scheduling of training sessions, while the dietary subscale assesses the control of diet for the purpose of muscle gain, and the attitudinal subscale assesses one's attitude towards their muscularity (Gammage et al.).

Research employing the DMS has shown that individuals higher in the drive for muscularity have more pride in their appearance, but also possess a lower level of physical appearance self-esteem (Morrison, Morrison, & Hopkins, 2003). Although these results appear contradictory, separate explanations are needed for clarity. Males that are striving to achieve the muscular ideal are less satisfied with their appearance, and those individuals who are working to improve their bodies are more likely to be comfortable with objectifying themselves (Morrison et al.). It has been suggested that those individuals who solely, or mainly, participate in weight lifting will be more focused on their muscularity for appearance reasons and will score higher on the DMS-attitude subscale. This relationship is supported by studies that have indicated competitive body builders display higher levels of body dissatisfaction (e.g., Blouin & Goldfield, 1995; Hurst et al., 2000; Pickett et al., 2005). Moreover, involvement in power sports has been shown to be related to the development of health risk behaviours such as a higher incidence of anabolic steroids use (Cafri et al., 2005). Contrastingly, involvement in sport has been associated with higher levels of self-esteem (Holland & Andre, 1994) due to the fact that the attitudinal subscale of the DMS-2 assesses body dissatisfaction and has been employed in research into the effects of exposure of muscular and hypermuscular male images on men's body satisfaction.

Dissatisfaction with the amount of muscularity one possesses is related to an increase in weight lifting to build muscle mass (McCreary et al., 2004) and extreme dissatisfaction and value placed on weight lifting can ultimately lead to the development of body building dependency (Lantz et al., 2001). Body building dependency is a specific type of exercise dependence whereby an individual is reliant on body building. Exercise dependency is a maladaptive behaviour, leading to clinically significant impairment or distress (Veale, 1995). Based on the dependence criteria for addiction, Hausenblas and Symons Downs (2002) suggested that exercise dependence is defined by several criteria that relate to other addictions such as tolerance, withdrawal symptoms, and loss of control. Until recently, much of the research has assessed exercise dependency in aerobic activities, thus spurring Smith et al. (1998) to develop the Body Building Dependency Scale (BDS). The three subscales of the BDS have been shown to be psychometrically sound and include the need to be in body building for the rewards reaped from the social environment, the need to engage in weight training for the physical benefits, and lastly the need to exert control over training schedules otherwise known as mastery (Hurst et al., 2000; Smith et al.; Smith & Hale, 2000). Thus, the health risk behaviours assessed in the current study include the number of hours spent weight training per week, the frequency of weight training, the number of years weight training, and the three subscales of the BDS.

Overall, body image research is growing, yet the specific study of muscularity in men and women is lacking clarity. There have been equivocal findings with male body image due to improper measurement. More specifically, assessing the desire for a thinner physique in men has lead to non-significant findings because many men desire increased

muscularity. Recently, the study of muscularity with more appropriate measures has indicated that males are dissatisfied with their physiques (Pope et al., 2000; Yelland & Tiggemann, 2003) and due to the infancy of this body of research in muscular dissatisfaction further exploration is required. In addition to the need for more research on men's dissatisfaction with muscularity, it is important to assess attitudes about muscularity in women. An accepted alternative to the thin ideal physique is one that includes muscularity and tone (Ryckman et al., 1989). However, lack of measurement of female muscularity, in particular studies employing psychometrically sound subscales that apply to both genders is a current limitation (e.g., McCreary et al., 2004). Therefore, assessing the drive for muscularity in a male and female population with the three subscales suggested by Gammage et al. (2005) will be important for the understanding of the drive for muscularity. Finally, previous body image research with those individuals attempting to attain a more muscular physique has not been guided by a theoretically based model.

Therefore, the primary purpose of the current study was to assess the relationships between the variables outlined in the modified Dysfunctional Body Change Behaviours Model (see Figure 3; Cafri et al., 2005). Exploration and testing of the model will provide a better understanding of the consequences and behavioural outcomes of male and female weight lifters' pursuit of a more muscular physique.

Based on previous findings, it is hypothesized that BMI will be related to the development of a poorer attitude towards muscularity (Mishkind et al., 1986; Neumark-Sztainer et al., 1999; Pickett et al., 2005). It is also hypothesized that higher involvement in other physical activity (e.g., cardiovascular exercise, sport) will be negatively related

to body image. That is, more involvement in other physical activity in addition to weight lifting will result in lower levels of body image dissatisfaction with respect to muscularity and display less health risk behaviours. It is also hypothesized there will be a relationship between social physique anxiety and its impact on health risk behaviours. Again, with respect to the previous findings of social physique anxiety in weight lifters, contrasting evidence exists about this relationship (e.g., Hurst et al., 2000; Martin Ginis et al., 2005; Williams & Cash, 2001). Lastly, it is hypothesized that body dissatisfaction will be related to increased development of health risk behaviours: the number of year weight training, the frequency and amount of time per week spent weight training, and becoming dependent on body building for mastery, training, and social reasons (Hausenblas & Symons Downs, 2002; Hurst et al.; Smith & Hale, 2000; Smith et al., 1998).

Methods

Participants

Two hundred and sixty-three participants (males $n = 102$; females $n = 161$) were recruited from several gym facility locations in British Columbia and Ontario ($N = 3$). Participants were 18 years old or older, as an adult population is of interest, and currently involved in a weight lifting regime. The average age of the participants was 24.70 years ($SD = 8.76$).

Measures

Demographic data. Participants completed demographic information including age, weight, height, the number of years weight training, weight training frequency, number of hours spent weight training per week, and type and frequency of other physical activity.

Attitude towards muscularity. The DMS-2 attitude (Gammage et al., 2005) is a 10-item questionnaire that assesses the attitude towards muscularity. The DMS-2, modified from the original version of McCreary and Sasse's (2000) DMS questionnaire, is comprised of three subscales including attitude, diet and behaviour (Gammage et al.). However, for the purpose of the current study, only the DMS-2 attitude subscale was employed as it is a measure of body dissatisfaction in weight lifters. The attitudinal component of the drive for muscularity has been used independently in previous research examining body dissatisfaction with respect to muscularity (Arbour & Martin Ginis, 2006). An example item of the attitude subscale is, "I think I would feel more confident if I had more muscle mass" (see Appendix A). The attitude subscales has shown adequate reliability with Cronbach's alpha levels for both males and females in a combined analysis (α= 0.83; Gammage et al.). Items on the attitude subscale are assessed on a 6-point Likert scale ranging from 1= *never*, to 6 = *always* with higher scores indicating a higher level of the drive for muscularity. The attitude subscale has undergone several changes from the initial version (DMS; McCreary & Sasse, 2000) in order to make the scale better suited for testing in a female population (Gammage et al.). Some modifications in the wording of the questions were made, such as changing wanting to gain "10 lb in bulk" to wanting to gain "10 lb in muscle mass" (Gammage et al.).

Social physique anxiety. The nine item Social Physique Anxiety Scale (SPAS; Martin et al., 1997) assesses the anxiety associated with other's evaluation of one's body (see Appendix B). It is rated on a 5-point Likert scale ranging from 1= *not at all characteristic of me*, to 5= *extremely characteristic of me*. Items five and eight are reverse coded since they are positively worded; therefore, higher scores on the SPAS

equal higher level of social physique anxiety. An example item is "It would make me uncomfortable to know others were evaluating my physique/figure". The SPAS as a unidimensional construct has shown adequate internal consistency ($\alpha = 0.89$; Martin at al.).

Bodybuilding dependency. Body building dependency was measured using the Bodybuilding Dependency Scale (BDS; Smith et al., 1998). The BDS is a nine item measure on which participants rate their dependency to weight lift on a 7-point Likert scale with 1= *strongly disagree* and 7= *strongly agree* (see Appendix C). Higher scores on the BDS indicate higher levels of dependency. The scale is comprised of three subscales: mastery over training schedules, training dependency, and social dependency. The mastery over training schedules assesses the need for the individual to be in control over training schedules. An example item is, "I often weight train when I have a cold or flu". Training dependency measures the participants' dependency on the actual weight training. An example item is, "I feel guilty if I miss a weight training workout". Lastly, the social dependency subscale focuses on the need to be in the weight lifting environment. An example item is, "Bodybuilding has totally changed my lifestyle". The three subscales of the BDS have shown adequate internal consistency, mastery ($\alpha = 0.78$), social dependency ($\alpha = 0.76$), and training dependency ($\alpha = 0.75$) (Smith et al.).

Procedure

After obtaining ethical clearance from the Research Ethics Board, permission from fitness facility managers to recruit participants was sought from the Forge Fitness Centre at the University of Windsor, Lifestyles Family Fitness in Windsor, Ontario and Fitness Unlimited in Langley, British Columbia. Fitness facility managers were contacted

via email or in person (see Appendix D for recruitment letter). Once permission was granted from the facility managers, club members were approached as they were leaving the facility and asked if they would be willing to be involved in the study. They were able to freely decline to participate. If participants agreed, they completed informed consent forms (see Appendix E), letters of information (see Appendix F), and questionnaires (i.e., demographics, DMS-2 attitude, SPAS, BDS). Total completion time was approximately 10 minutes.

Data Analyses

Structural Equation Modeling (SEM) was the main analysis employed since it allows for the testing of relationships among the variables included in the modified version of the Dysfunctional Body Change Behaviours Model suggested by Cafri et al. (2005; see Figure 3). SEM is a confirmatory approach to data analysis in which the expected set of relationships among variables can be modeled simultaneously. For SEM, a large sample size is recommended due to the analysis being based on the covariance matrix (Tabachnick & Fidell, 2001). Additionally, Boomsma (1983) suggests that a sample size of about 200 is adequate for running SEM on small to medium models such as the one being evaluated in the current study. Additionally, others (e.g., Kline, 1998) have suggested that 10-20 participants should be included in the sample per estimated parameter, again, proposing a sample of 200 at the upper level for the current study. In addition to a sample size slightly larger than 200 ensuring adequate power, it also allows for incomplete data to be deleted for optimal analysis (Hoyle, 1995). Post data collection, the adequacy of the sample size was assessed by Hoelter's critical N, which estimates the necessary sample size that would yield an adequate model fit, with values indicating the

number of participants that would be needed to accept the hypothesis that the default model is correct and any more participants than this number would lead to rejecting the default model (Jackson, Dezee, Douglas, & Shimeall, 2005).

Data were entered into SPSS and initially screened for outliers, missing data, normality, and multicollinearity. Most statistics used in SEM assume there is multivariate normality and violating this assumption can be problematic. This is because the results based on non-normal distributed data may incorrectly suggest that the model is a good fit or that the model is a poor fit, depending on the degree and type of the problem (Weston & Gore, 2006). To ensure normality is sufficient in the data set, outliers were screened for and the distribution was assessed. In order to test for univariate outliers frequencies were run, multivariate outliers were screened on the y-axis through standardized residuals, with values over 3 indicating outliers, on the x-axis through standardized DFFIT's, with values exceeding 1 or below -1 indicating outliers. Finally, influential outliers were screened through Mahalanobis Distance, with values beyond 3 standard deviations indicating outliers.

The hypothesized variables in the modified Dysfunctional Body Change Behaviours Model were tested using AMOS 7.0 (Arbuckle, 2006). AMOS 7.0 employs the covariance matrix as input and the parameters were obtained using the maximum likelihood estimation which is accurate relative to other estimation techniques when the data depart from normality (Chou & Bentler, 1995). Once data were assessed to be missing at random, the missing values were dealt with in AMOS 7.0 using full information maximum likelihood (FIML) estimates. Previous research comparing several methods of estimating missing data found that FIML estimation was superior across all

conditions of the design and yielded near optimal type one errors (Enders & Bandalos, 2001). Under ignorable missing data conditions (missing completely at random and missing at random), FIML estimates were unbiased and more efficient than the other methods (Enders & Bandalos). Following this initial screening, summary statistics were run, including group means and standard deviations, and internal consistencies. A two step modeling approach (Anderson & Gerbing, 1988; Weston & Gore, 2006) was employed in the current study by first running a confirmatory factor analysis (CFA) to test for the construct validity of the latent variables. This demonstrates how well the observed measures combine to identify the underlying hypothesized constructs. Once the factor structure was supported, the second step was to test the relationships hypothesized in the theoretical model.

The model's fit to the data was then evaluated. A Comparative Fit Index (CFI), which indicates the proportion of the observed covariance explained by the model covariance, with values closer to one indicating a better fit, and above 0.9 being considered well fitting (Jackson et al., 2005), was run. In addition to the CFI, the Root Mean Square Error of Approximation (RMSEA) was assessed which is the standardized summary of the average covariance residuals, with a perfect fit being indicated by a value of 0, and values lower than 0.05 indicate a good fitting model and values lower than 0.08 indicate acceptable fitting models (Browne & Cudeck, 1993). In the current study an adequate fitting model would be indicated by RMSEA values less than 0.08 and CFI values over 0.90 as utilized in similar studies (Hagger et al., 2007; Keery, van den Berg, & Thompson, 2004; Raedeke & Smith, 2004).

Results

Preliminary results. The initial data set ($N = 288$) was screened for any patterns in the data that was missing. Twenty five cases were deleted as a result of indicating zero hours of weight training per week. Data missing at random are important to ensure the most appropriate use of SEM is employed since inappropriate methods for handling missing data can lead to biases in a number of statistics assessed with SEM (Allison, 2003). Therefore, the data set after screening for missing data was 263 (males $n = 102$; females $n = 161$). The final data set had a percentage of missing items of 0.05% and these missing values were run in cross tabulation with principal variables such as the demographic data and key outcome variables. Upon investigation of the frequencies, no noticeable patterns were detected. Therefore the missing data were considered ignorable and the SEM analysis could then utilize the full information maximum likelihood estimation method without risking biases in the resulting model fit.

When frequencies were run and outliers were visually screened for, several data entry corrections were made. No multivariate outliers were detected with the standardized residuals, standardized DFFIT's, or the Mahalanobis Distance values. The distribution of the data was assessed for normality through the screening of skewness and kurtosis statistics. For larger samples, Tabachnick and Fidell (2001) indicate the absolute values of the skewness statistics are more important than the significance. Skewness and kurtosis values for both the total scores of the subscales as well as the individual items were inspected and were deemed to be acceptable (see Table 1). Additionally, the reliability analysis revealed sufficient reliability coefficients (Cronbach's alpha's) for the

DMS-2 attitude ($\alpha = 0.87$), SPAS ($\alpha = 0.71$), BDS-mastery ($\alpha = 0.81$), BDS-training ($\alpha = 0.70$), and BDS-social ($\alpha = 0.77$).

Finally the assumption of multicollinearity was assessed through bivariate correlations. Values were well below the cut off of 0.85 indicating that measures were not too highly correlated to be considered unique measurements in the model (Tabachnick & Fidell, 2001). Therefore, the assumptions of SEM were met: normality, data missing at random, and multicollinearity. Table 2 presents means, standard deviations, and bivariate correlations among the variables. The mean BMI indicated a healthy weight in the population ($M = 24.30$, $SD = 3.75$). Six participants had BMI scores below 18.5, which is considered underweight, 147 participants had BMI scores between 18.5 – 24.9, which is considered normal and healthy, 83 participants had BMI scores between 25.0 – 29.9 which is considered overweight, and finally 21 participants had BMI scores over 30, which is considered obese (CDC, 2006). On average, participants had been weight lifting for one to five years and worked out 3.44 times per week ($SD = 1.25$), and spent 4.30 hours ($SD = 2.93$) per week weight lifting. The mean score of the DMS-2 attitude subscale was 3.31 ($SD = 1.03$). For the three subscales of the BDS, the mean scores were; social subscale 2.52 ($SD = 1.22$), training subscale 3.30 ($SD = 1.34$), and mastery subscale 2.88 ($SD = 1.54$). Finally, the mean score for the SPAS was 2.69 ($SD = 0.63$).

In addition to weight lifting, participants engaged in 6.61 hours per week of other physical activity ($SD = 5.24$) and the number of times per week that these individuals did these activities was 4.51 ($SD = 2.21$). The most often participated type of physical activity was running (56%), followed by swimming (29%), walking (21%),

cardiovascular training (21%), biking (20%), basketball (19%), hockey (17%), aerobics classes (15%), volleyball (10%), and soccer (8%) (see Table 3 for a complete list).

Primary results. A common factor analysis (principal axis factoring) was conducted on all six indicators of health risk behaviours, which were the number of years weight lifting, hours per week weight lifting, times per week weight lifting, and the three subscales of the BDS, training, mastery, and social. One factor emerged with an Eigenvalue greater than 1 (2.89) accounting for 48.15% of the variance. Furthermore, examination of the scree plot shows an evident elbow after the first factor supporting the one factor solution (see Figure 4). The Kaiser-Meyer-Olkins Measure of Sampling Adequacy was above 0.6 ($KMO = 0.75$) which indicated that there were sufficient correlations among the variables that estimated health risk behaviours. Additionally, Bartlett's Test of Sphericity was significant [$\chi^2 (15, N = 253) = 449.02, p = 0.001$], which also suggests that the six indicators of health risk behaviours were sufficiently correlated to be considered components of the latent variable of health risk behaviours in the current population. All six indicators loaded onto one factor, with factor loadings above 0.32 which is used as a criterion for meaningful correlation to identify factors (see Table 4; Tabachnick & Fidell, 2001). Once the data were assessed in AMOS 7.0 (Arbuckle, 2006), further evidence for the measurement variables of health risk behaviours being indicators of the latent variable was provided by the existence of critical ratios above the cut off of two (see Table 4). Critical Ratios above 2 indicated that the covariance between the indicator and health risk behaviours variable was significantly different from zero.

The hypothesized model adequately accounted for covariance matrices of the data from the sample in the current study with root mean square error of approximation

(RMSEA) = 0.076 and comparative fit indexes (CFI) = 0.931. The chi-square statistic was significant which reflects a lack of satisfactory fit of the data to the model, however, the chi-square statistic values are known to be sensitive to minor departures of the observed variance-covariance matrix from the expected matrix and often yield significant values that suggest the rejection of models which are in fact adequate (Hoyle, 1995). Therefore, the chi-square statistic value [χ^2 (27, N = 263) = 68.00, p < 0.001] is reported for informational purposes but were not used for model acceptance decisions (Hoyle, 1995). As illustrated in Figure 5, which presents the standardized path coefficients, BMI predicted DMS-2 attitude scores (β = 0.21, p < 0.001). Moreover, the DMS-2 attitude predicted health risk behaviours (β = 0.594, p < 0.001). Additionally, the two moderators of the model were non-significant, which were the influence of involvement in other physical activity on body dissatisfaction (β = -0.05, p = 0.406), as well the influence of involvement in other physical activity on health risk behaviours (β = 0.092, p = 0.107). Lastly, SPAS was not a significant predictor of health risk behaviours (β = 0.083, p = 0.150).

Discussion

Physical activity is widely known to be important for the development and maintenance of long-term health and psychosocial well-being (e.g., Miller, Balady, & Fletcher, 1997; Penninx et al., 2002). However, there is evidence that some individuals take physical activity too far and certain characteristics and resulting behaviours of these individuals are maladaptive (e.g., Hausenblas & Fallon, 2001; Lantz et al., 2001). The characteristics and behaviours that are of particular interest to the current study are those involved in the pursuit of the muscular ideal. Therefore, this study investigated the

Dysfunctional Body Change Behaviours Model which outlines the potential relationships among factors that lead to body change strategies in the pursuit of muscularity (Cafri et al., 2005). Based on SEM, the current study offered partial support for the model.

The fit statistics from the SEM indicated that the model was an adequate to a good fit. Support for this model provides the initial foundation required for the development of future studies aimed at attaining a better fitting model in order to explain more of the relationships involved in the pursuit of a muscular ideal. Due to the infancy of the model and the fact that it has not been tested previously, the choice of the measurements included in the current study were based on both confirmed and hypothesized relationships found in the body image dissatisfaction (with one's muscularity) literature.

One of the many advantages of weight lifting is generally known to be the increase in lean muscle mass (e.g., Chilibeck, Calder, Sale, & Webber, 1996; 2004; Nissen & Sharp, 2003). However, there are those who confuse this increase in lean muscle mass with extra weight, and consequently with being overweight (Thompson et al., 1999). Unfortunately the way in which BMI is calculated (weight (kg) / [height (m)]^2) does not account for increases in lean muscle mass. As such, someone who has a large amount of lean muscle mass may be considered overweight or obese based on BMI calculations (Spitzer, Henderson, & Zivian, 1999). Despite their involvement in a weight training program, the majority of participants in the current study reported BMIs within the normal range, between 18.5 – 20. While a large portion of others were in the overweight and obese categories of BMI, which may have reflected a higher amount of lean muscle mass, although this is impossible to determine unless more objective

measures of body composition are employed. However, since BMI remains the easiest and most economical means of collecting data on biological factors perhaps the overall fit of the model may have improved by dichotomizing BMI in order to specify low and high classifications. Research has shown that higher levels of the drive for muscularity are associated with higher BMIs (e.g., Gammage et al., 2005; McCreary & Sasse, 2000; Smolak & Stein, 2006).

Both the factor analysis and critical ratios from the SEM procedure supported the factor structure of health risk behaviours, which was identified as the latent variable in the model. This step was necessary in order to consider the six indicators hypothesized to be the underlying construct of health risk behaviours (i.e., number of years weight lifting, times per week weight lifting, hours per week weight lifting, three subscales of the BDS-mastery, training, and social). However, the variance that was accounted for in health risk behaviours by the aforementioned indicators was slightly less than 50%, suggesting that other types of health risk behaviours should be included in the model. Cafri et al. (2005) indicated in the original model that steroid and supplement use as well as dietary behaviours were also types of health risk behaviours that can develop in individuals striving for a muscular physique. Additionally, other studies have indicated the importance of dietary manipulations. Due to women's normative discontent with their physiques, dieting behaviours to lose weight is widely known to be a health risk (e.g., Brehm, Seeley, Daniels, & Alessio, 2003; Field et al., 1999; French, Story, Downes, & Resnick, 1995). However, we know that men who are high in the drive for muscularity diet to gain muscle mass (e.g., Carlson Jones & Crawford, 2005; Pope, Gruber, Choi, Olivardia, & Phillips, 1997; Ricciardelli & McCabe, 2004). Additionally, steroid and

supplement use is another health risk behaviour displayed in individuals striving for a more muscular physique (e.g., Cafri et al.; Cole et al., 2003). Interestingly, some individuals who do score high on the drive for muscularity also score high on the drive for thinness, due to the desire for lean muscle mass (Oliviardia, 2001). This suggests that perhaps there may be many similarities between men and women and their dietary manipulations, particularly for those involved in weight lifting.

The six indicators of the latent variable all contributed significantly to the estimation of the health risk behaviours variable. Support for one factor amongst the measures indicating health risk behaviours is conceptually sound since they were assessing body building dependency and the resulting frequency of weight lifting. Social dependency was the strongest predictor of health risk behaviours (see Figure 5 for path estimates). Perhaps this was because BDS-social has been found to be highest in competitive body builders due to their strong attachment to the body building subculture (Hurst et al., 2000). Furthermore, it is often found that these individuals who score high on the social dependency subscale display maladaptive strategies to attain a more muscular physique (e.g., Cole et al., 2003; Lantz, Rhea, & Cornelius, 2002). Thus, it may be that those high in social dependency are more characteristic of a competitive body builder and display more health risk behaviours. In contrast, the weight training habits, such as frequency of weight training and the number of hours spent weight training, were the weakest indicators of health risk behaviours. This may be due to the fact that individuals can engage in a number of training behaviours, but not necessarily possess a maladaptive attitude towards their muscularity or resulting maladaptive behaviours. For example, elite level athletes would certainly record very high amounts of training;

however this may be a result of their need to train extensively in order to attain their athletic goals, rather than a result of dissatisfaction with their muscularity.

The weakest indicator of health risk behaviours was the number of years involved in weight training. This is related to previous research indicating that poor body image and resulting maladaptive behaviours can be found in individuals who have different amounts of experience in exercise. For example it has been found that adolescent girls reported significantly worse body image satisfaction and eating problems before a one year exercise intervention (Gehrman, Hovell, Sallis, & Keating, 2006). Additionally, those individuals who have been exercising for a number of years also report poor body image scores (Philips & Drummond, 2001), in particular those who exercise for weight control and appearance reasons (Smith, Handley, & Eldredge, 1998). For example, those weight lifters diagnosed with Muscle Dysmorphia show poor body esteem and many health risk behaviours in attempts to gain more muscularity (Lantz et al., 2001). In one study, the majority of female fitness instructors indicated that the ideal body was one that was thinner than their current body and these individuals displayed many characteristics of exercise dependence (Nardini, 1998). Other studies have indicated that in the case of exercise dependent individuals, body image problems are manifested (Skully, Kremer, Meade, Graham, & Dudgeon, 1998) and it was found that female participants who exhibited features of exercise dependence also displayed symptoms of an eating disorder (Bamber, Cockerill, & Carroll, 2000). These results seem to suggest that the number of years weight training is not necessarily a predictor of the development of health risk behaviours since body image problems can be found in individuals who have just begun an exercise program as well as experienced exercisers.

The training subscale of the BDS showed the highest mean scores. Given that the participants in the current study were self-classified recreational weight lifters, this finding is consistent with previous research that compared scores on the BDS amongst recreational weight lifters, experienced weight lifters, inexperienced body builders, and experienced body builders (Hurst et al., 2000). It was found that the recreational weight lifters scored highest on the training dependency subscale followed by the social and mastery subscales. In contrast, both body building groups (experienced and inexperienced) scored highest on the social dependency subscale (Hurst et al.). Given recreational weight lifters were targeted for the current study rather than a body building population, higher scores on the training dependency subscale were to be expected. Overall, the scores on the BDS are similar to previous studies that also assessed a recreational weight lifting population (Hurst et al.)

The current study had several hypotheses: 1) more involvement in other physical activity would be negatively related to body image and health risk behaviours; 2) BMI would be related to the development of a poor attitude towards muscularity; 3) there would be a relationship between social physique anxiety and its impact on health risk behaviours; 4) body dissatisfaction would be related to increased development of health risk behaviours. Upon examination of the standardized path coefficients of the final model (see Figure 5), two of the relationships in the hypothesized model (see Figure 3) were supported, the relationship between BMI and DMS-2 attitude and between DMS-2 attitude and health risk behaviours, and three of the relationships in the hypothesized model (see Figure 3) were non-significant, the relationship between other physical activity participation and DMS-2 attitude, between other physical activity participation

and health risk behaviours, and between SPAS and health risk behaviours. Despite only having partial support for the model, the current study's findings remain important because Cafri et al. (2005) designed the model to be a guide for future research, and as such, the findings from the current study can be used as a basis to direct future research in this area.

The relationship between BMI and poor attitude towards one's muscularity was significant. This finding is in support of previous research examining dieters who are trying to lose weight, in which it has been consistently shown that those with poor body image often have higher initial BMIs (e.g., Abraham, 2003; Paxton et al., 2005; Presnell & Stice, 2003). The findings from the current study, however, expand on the previous body image literature in that a relationship has been found between BMI and muscularity. Because most of the participants had BMIs within the normal range, and another group had BMIs in the overweight and obese category, it remains unknown whether extreme high or low BMI is related to the development of body dissatisfaction with respect to muscularity. One study investigating the drive for muscularity in men and its relationship to anthropometric measurements revealed that BMI was not a predictor of muscular dissatisfaction (McCreary, Karvinen, & Davis, 2006). However, in the current study, BMI was a significant component of the model. Consequently, the inclusion of health risk behaviours is an important variable in the relationship between BMI and body dissatisfaction. In order to further the knowledge about this relationship, future studies may use more objective measurements of body composition such as a dual energy x-ray absortiometry (DEXA) scan or fat free mass index (FFMI), which are more accurate indicators of lean muscle mass.

The mean DMS-2 attitude scores are similar to those found in previous research assessing a broad population (McCreary et al., 2004). The strongest relationship in the model was DMS-2 attitude in its prediction of health risk behaviours. This finding is supported by the general psychology literature, which suggests that attitudes ultimately lead to behaviours (Bentler & Speckart, 1981). From this perspective, the relationship between the drive for muscularity and health risk behaviours can be supported, as other studies have indicated that the drive (the attitude) is linked with more frequent weight lifting as well as dieting to gain muscle mass (the behaviours) (e.g., McCreary & Sasse, 2000). Additionally, the drive has also been related to other health risk behaviours not investigated in the current study, such as Muscle Dysmorphia (Maida & Armstrong, 2005), which is a preoccupation with muscularity and a fear that one is small (Pope et al., 2000). Furthermore, the link between the three subscales of the BDS as indicators of health risk behaviours and body image dissatisfaction provides a new avenue of research to define which characteristics influence individuals who are high in the drive to develop a body building dependency.

Two non-significant relationships in the testing of the model were the effect of involvement in other physical activity on both body dissatisfaction and health risk behaviours. As it was hypothesized that individuals' involvement in other physical activity would be related to a decrease in body dissatisfaction and health risk behaviours, these relationships were not supported. One possible explanation for this lack of significance may be due to the way in which the type of physical activity was assessed. More sufficient detail on both the type and level of involvement as well as on the motive for involvement may have provided support for these relationships. Given that previous

research has shown that some sports prefer a more muscular physique while others prefer a thinner physique (e.g., Hausenblas & Symons Downs, 2001), the type of sport in which these individuals are involved is crucial to the development of body image issues with respect to muscularity. For example, if an individual participates in long distance running, both in terms of time and level of competition, the ideal physique is thin and lithe (e.g., Huddy & Cash, 1997; Nudelman, Rosen, & Leitenberg, 1988). Contrastingly, those involved in power sports prefer a more muscular physique and consequently may display higher levels of the drive for muscularity (e.g., Lantz et al., 2002; Peters & Phelps, 2001). Perhaps if the participants had self-classified their physical activity as power sport or other sport, a relationship may have been evident. Additionally, the model may have been further supported if the physical activity type was distinguished by the degree of muscularity preferred since those involved in power sport are more likely to display unhealthy methods of gaining muscle mass, such as steroid use (e.g., Buckley et al., 1988; Cafri et al., 2005; Markland & Hardy, 1993; Wichstrom & Pedersen, 2001) and thus the relationship between health risk behaviours, sport involvement, and body dissatisfaction may have been apparent.

Further, the participants' level of play (competitive vs. recreational) and amount of involvement in other physical activity is important to investigate as such information may be important in determining how influential their participation in other physical activities may be on their body image and health related behaviours. Future studies may benefit from asking participants to rank order the activities in order of those in which they participate most frequently. For example, it has been found that elite level athletes often display characteristics of having increased weight concerns and disordered eating

(Hausenblas & Carron, 1999) and the choice of activity is often shaped by the individual's underlying motives for participation, namely physique changes (Loze & Collins, 1998). This contrast of individuals involved in different activities and different levels of play was not captured in the current study, and may have accounted for not supporting the prediction of poor body image and health risk behaviours with involvement in other physical activities.

The current sample seemed to be highly active. In addition to weight training, the participants engaged in a variety of other physical activity, most of which place a large emphasis on cardiovascular fitness. As such, it seems that the current sample did not lift weights exclusively as a means of physical fitness. Future research investigating the drive for muscularity may benefit from comparing a population who weight trains exclusively and a population who engages in both weight training and other physical activity, as their drive for muscularity and subsequent health risk behaviours may differ.

The third relationship that did not receive statistical support in the model was between SPAS and the development of health risk behaviours. Previous research has indicated a gender difference in social physique anxiety, with females consistently scoring higher than males (e.g., Haase, Prappevessis, & Owens, 2002). Based on that finding, one might conclude that the male and female SPAS scores from the current study cancelled one another out. However, upon further investigation the standard deviation from the mean SPAS score in the population (both genders) was very small, indicating that there was little variability in their social physique anxiety. Alternatively, this relationship may not have been supported because the individuals in the current study did not exhibit high levels of social physique anxiety (M = 2.69 on a five point Likert scale).

This mean score on the SPAS is similar to previous research assessing a healthy, active population (e.g., Krane, Waldron, Stiles-Shipley, & Michalenok, 2001; Schwerin et al., 1996). It is known that experienced exercisers display lower levels of social physique anxiety when compared to inexperienced exercisers (Hart & Gill, 1993). Therefore, it could be argued that the current population was experienced in weight lifting, as the average number of years involved in weight lifting was 1–3 years. Additionally, research has also found that those who exercise for appearance reasons are more likely to have higher SPAS (Eklund & Crawford, 1994). It is possible that the individuals involved in the current study were weight lifting for health and performance reasons rather for appearance related reasons. Moreover, the Dysfunctional Body Change Behaviours Model proposes a relationship between psychological functioning and health risk behaviours. Given that social physique anxiety taps into only one aspect of psychological functioning, perhaps other variables such as depression and self-esteem could exhibit a relationship. In fact, depression has been shown to be related to poor body image (e.g., Cargill, Clark, Pera, Niaura, & Abrams, 1999) and self-esteem is lower in those individuals willing to sacrifice their health for body change strategies (Cohane & Pope, 2001). Furthermore, increased depression has been associated with higher levels of the drive for muscularity (McCreary & Sasse, 2000). In addition to depression, personality correlates have been associated with the drive for muscularity (Davis, Karvinen, & McCreary, 2005). It was revealed that perfectionism, neuroticism, and fitness orientation were related to higher scores on the drive (Davis et al.), thus future studies may consider these relationships in the Cafri et al. model (2005). Additionally, previous research has indicated that BMI moderated the relationship between social physique anxiety and

disturbed eating attitudes (Haase et al., 2002), which is a health risk behaviour with individuals high in the drive for thinness. Therefore, perhaps future assessment of the model should incorporate BMI as a moderator between psychological functioning and health risk behaviours.

Additionally, the low scores on the SPAS suggest that other assessments in healthy active populations may be beneficial. For example, since these individuals indicated that they were not anxious about the current physiques being evaluated, perhaps several questions asking how they would feel about their physiques if they could no longer exercise would lead to stronger results. If these individuals could not maintain their current exercise regime, perhaps they would begin to feel anxiety or other negative emotions.

Cafri et al. (2005) designed the Dysfunctional Body Change Behaviours Model to be a guide for future research, and as such the current study was more exploratory in terms of describing the fit of the data to the model based on the questionnaires chosen to evaluate the components of the model. One limitation of the current study is the lack of a competing model to measure and contrast against. If competing models were designed in the future, a comparison should be made to the current model. Additionally, due to some of the relationships in the hypothesized model not being fully supported, future recommendations for improving the fit of the model are necessary. Moreover, the population assessed in the current study were healthy and highly active, in both weight lifting and other physical activity. Perhaps due to the population being active and healthy there was a low mean score on the psychological variable, SPAS, as well as lower scores on the body building dependency subscales. Therefore, further studies need to be

conducted with individuals who display more maladaptive attitudes and behaviours towards weight lifting in order to support the model. As well, future studies may be able to benefit from capturing more detail on the level of play and involvement in participants' main physical activities and comparing those who only participate in weight lifting to those who participate in a variety of activities. Future testing of the model could also include other assessments of the constructs outlined by Cafri et al. (2005) such as societal factors. Furthermore, the constructs that were assessed in the current study could be added to and modified as this study was only a beginning to the establishment of the Dysfunctional Body Change Behaviours Model. For example, future studies may increase the amount of variance accounted for in the health risk behaviours variable by assessing other indicators such as steroid use or dietary manipulation.

The broad implications from this study are that individuals higher in the drive for muscularity are in greater jeopardy for increased health risk behaviours. Exercisers and exercise professionals can use this information to prevent/treat potential risky body change strategies. Since we know that body dissatisfaction is the root of the development of body building dependency, strategies can be implemented to improve body image of weight lifters at gyms. Additionally, practitioners treating those with serious body image problems can be aware of the risk of developing unhealthy strategies to increase muscularity. Although the path coefficients for the relationship between SPAS and health risk behaviours and the influence of participating in other physical activity were non-significant, the overall model fit was supported. These moderators are still influential on the relationship between body dissatisfaction and health risk behaviours and should still be considered when dealing with exercisers and body image treatments. As indicated

previously, it may be that other types of psychological variables need to be assessed as well as assessing physical activity in more detail. For example, if a weight lifter is showing signs of body building dependency, specific strategies could be applied to improve psychological functioning, perhaps by increasing self-esteem, and the individual could be encouraged to participate in physical activities other than weight lifting. As the information accrued from the current study is only a beginning in establishing the model, further testing of the Dysfunctional Body Change Behaviours Model should be conducted before any programs and treatments are developed.

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Table 1.

Skewness and Kurtosis Values

Variable	Individual items - Skewness (G_1)	Individual items - Kurtosis (G_2)	Total scores - Skewness (G_1)	Total scores - Kurtosis (G_2)
DMS-2 attitude	-0.54 - 1.20	-1.2 - 1.3	0.54	-0.16
SPAS	0.13 - -0.40	-0.95 - -0.36	0.27	-0.05
BDS-mastery	0.62 - 0.98	-0.54 - 0.30	0.78	0.03
BDS-training	0.06 - 0.95	-1.04 - 0.03	0.29	-0.53
BDS-social	0.42 - 2.12	-0.85 - 4.90	1.10	1.10

Table 2.

Descriptive Statistics and Pearson Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	24.70	8.76	1.00												
2. Gender (% female)	61.22 %	-	0.01	1.00											
3. Years WL	1-5 yrs		0.15**	-0.09	1.00										
4. Hours WL/week	4.30	2.93	0.01	-0.02	0.14**	1.00									
5. Times/week WL	3.44	1.25	0.10*	-0.09	0.28**	0.13**	1.00								
6. Hours spent other PA	6.61	5.24	-0.05	0.00	0.05	0.04	0.00	1.00							
7. Times/week PA	4.51	2.21	-0.05	0.14**	0.06	-0.05	0.04	0.53**	1.00						
8. BMI	24.31	3.75	-0.02	0.04	0.05	0.02	0.11*	0.12*	0.06	1.00					
9. DMS-2 Attitude	3.31	1.03	0.02	-0.10*	0.08	0.10	0.34**	-0.08	-0.09	0.13**	1.00				
10. BDS- Social	2.52	1.22	0.11*	0.01	0.26**	0.10*	0.40**	-0.01	0.08	-0.03	0.51**	1.00			
11. BDS- Training	3.30	1.34	-0.03	0.02	0.17**	0.15**	0.38**	0.06	0.18**	0.14**	0.47**	0.60**	1.00		
12. BDS- Mastery	2.88	1.54	-0.08	0.05	0.33**	0.12*	0.30**	0.13*	0.19**	0.15**	0.34**	0.48**	0.55**	1.00	
13. SPAS	2.69	0.63	-0.12	0.16*	0.01	0.00	0.04	-0.08	0.03	-0.03	0.26**	0.18**	0.20**	0.24**	1.00

Note. BMI = Body Mass Index; DMS-2 Attitude = Revised Drive for Muscularity Scale; BDS = Body Building Dependency Scale; SPAS = Social Physique Anxiety Scale.

* $p < 0.05$

** $p < 0.01$

Table 3.

Other Physical Activity Participation

Sport/Activity	Number of Participants	Percentage
Run	146	55.51%
Swim	76	28.90%
Walking	55	20.91%
Cardio	55	20.91%
Bike	52	19.77%
Basketball	51	19.39%
Hockey	46	17.49%
Aerobics class	39	14.83%
Volleyball	26	9.89%
Soccer	20	7.98%
Yoga/stretching	14	7.60%
Working	11	5.32%
Rollerblading	10	4.18%
Football	8	3.80%
Boxing	8	3.04%
Tennis	6	3.04%
Sports	6	2.28%
Baseball	5	2.28%
Rock climbing	5	1.90%
Karate	4	1.90%

Wrestling	3	1.52%
Horseback riding	3	1.14%
Figure skating	3	1.14%
Core stability	3	1.14%
Bowling	3	1.14%
Ping pong	3	1.14%
Golf	2	1.14%
Skiing	2	0.76%
Hike	2	0.76%
Gymnastics	1	0.76%
Track and field	1	0.38%
Plyometrics	1	0.38%
Water polo	1	0.38%
Badminton	1	0.38%
Gardening	1	0.38%
Push ups/sit ups	1	0.38%
Rowing	1	0.38%
Rugby	1	0.38%
Snowboarding	1	0.38%

Table 4.

Factor Loadings For Indicators of Health Risk Behaviours in the Hypothesized Model

Indicator	Factor Loading	Critical Ratios
Hours spent WL per week	0.673	8.06
Times per week spent WL	0.772	-
Number of years WL	0.415	3.61
BDS- mastery	0.711	4.80
BDS- training	0.764	5.33
BDS- social	0.761	5.59

Note. BDS = Body Building Dependency Scale. Factor Loadings above 0.32 is the criterion for meaningful correlation to identify factors. Critical Ratios above 2 indicates that the covariance between the indicator and health risk behaviours variable is significantly different from zero

Figure Captions

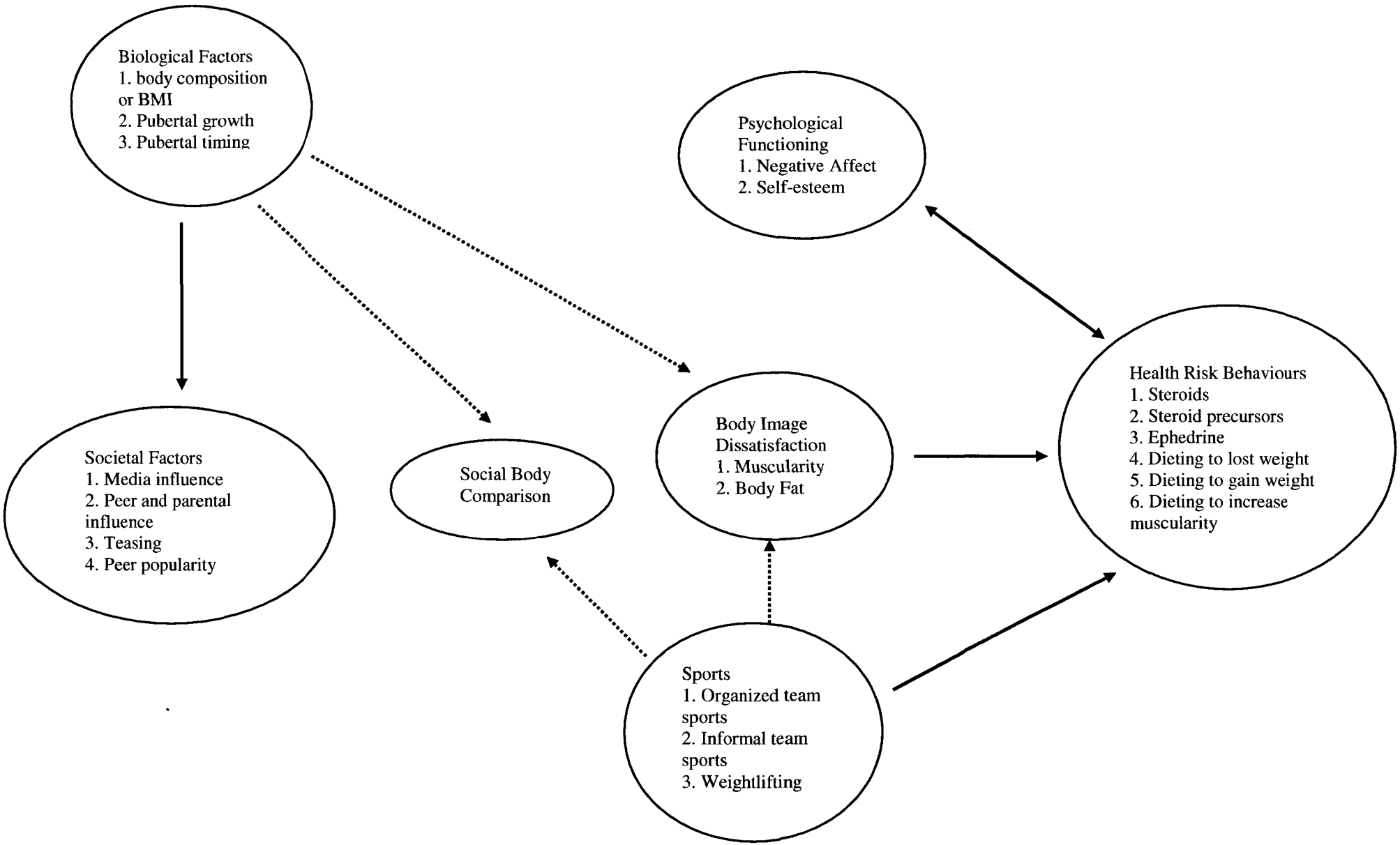
Figure 1. Dysfunctional Body Change Behaviours Model (Cafri et al., 2005). A model that is based on literature that indicated the potential relations among factors that lead to body change strategies. The solid arrows represent relationships that have more support, while the dashed arrows represent relationships with conflicting or limited findings, and the double headed arrow represents a bidirectional relationship.

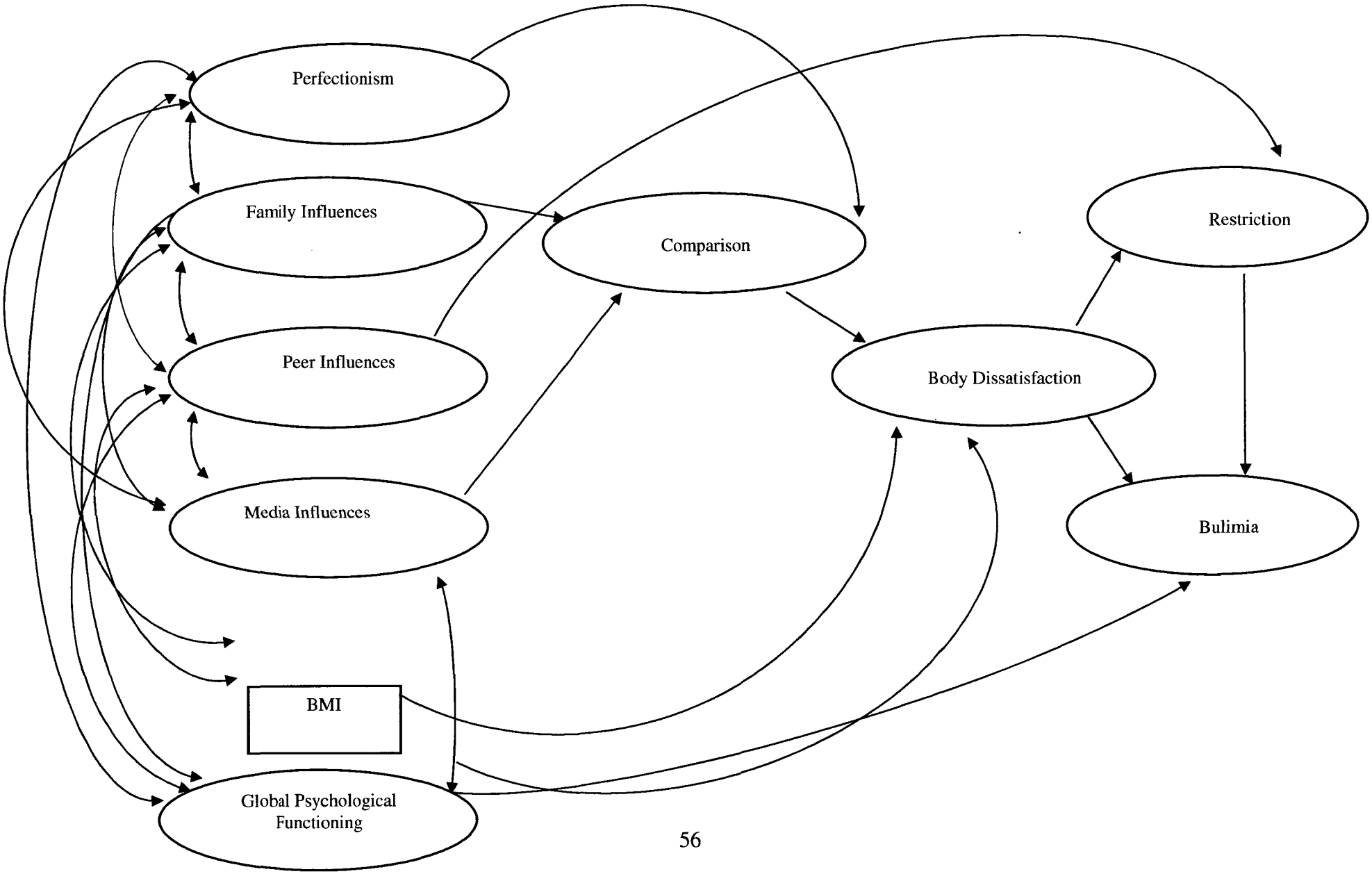
Figure 2. The Tripartite Influence Model of Body Image and Eating Disturbance (van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002).

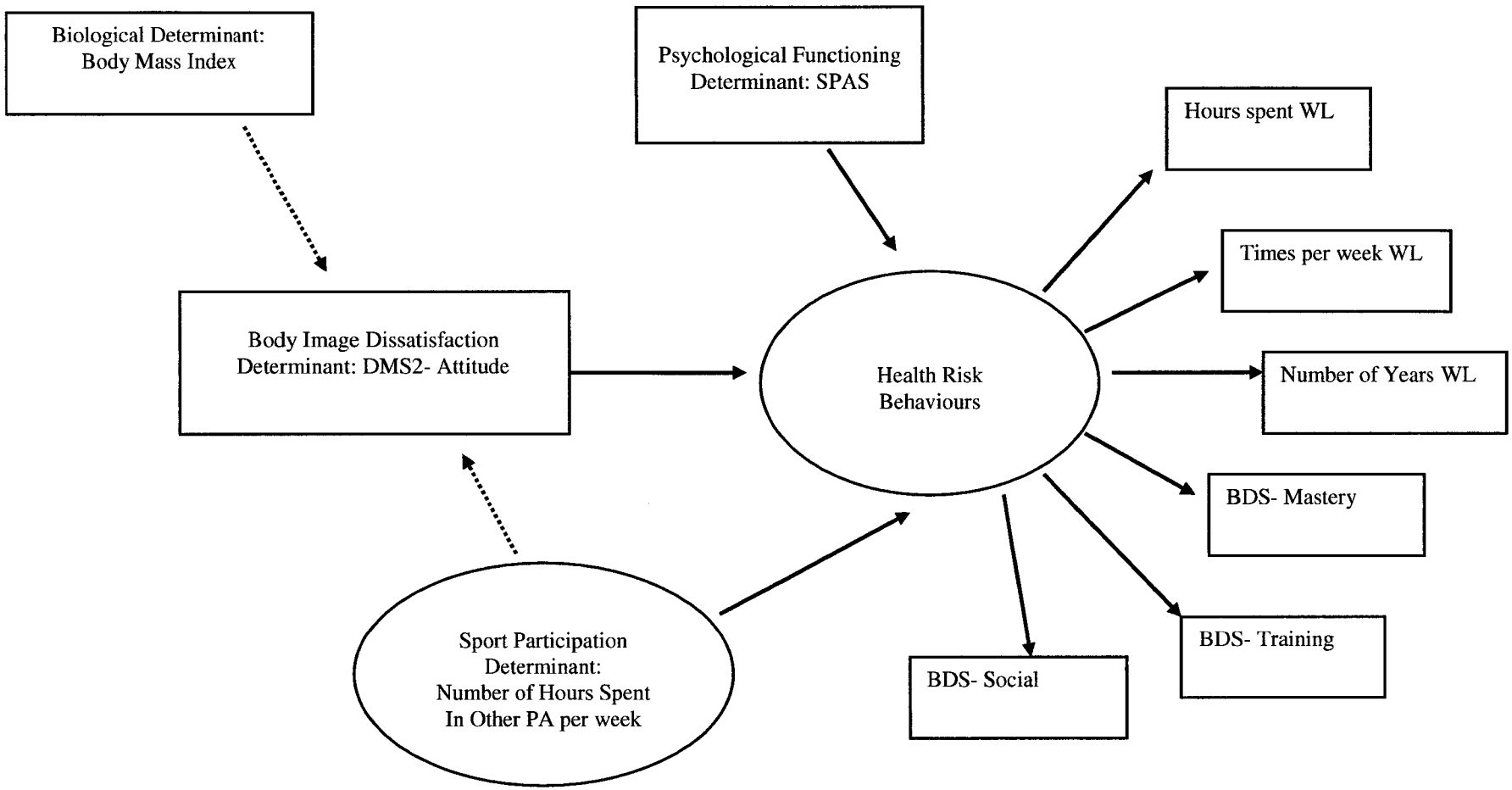
Figure 3. Modified Version of the Dysfunctional Body Change Behaviours Model (Cafri et al., 2005). The modified version of the Dysfunctional Body Change Behaviours Model. The solid arrows represent relationships that have more support, while the dashed arrows represent relationships with conflicting or limited findings, and the double headed arrow represents a bidirectional relationship. Squares represent observed variables while circles are represent latent variables.

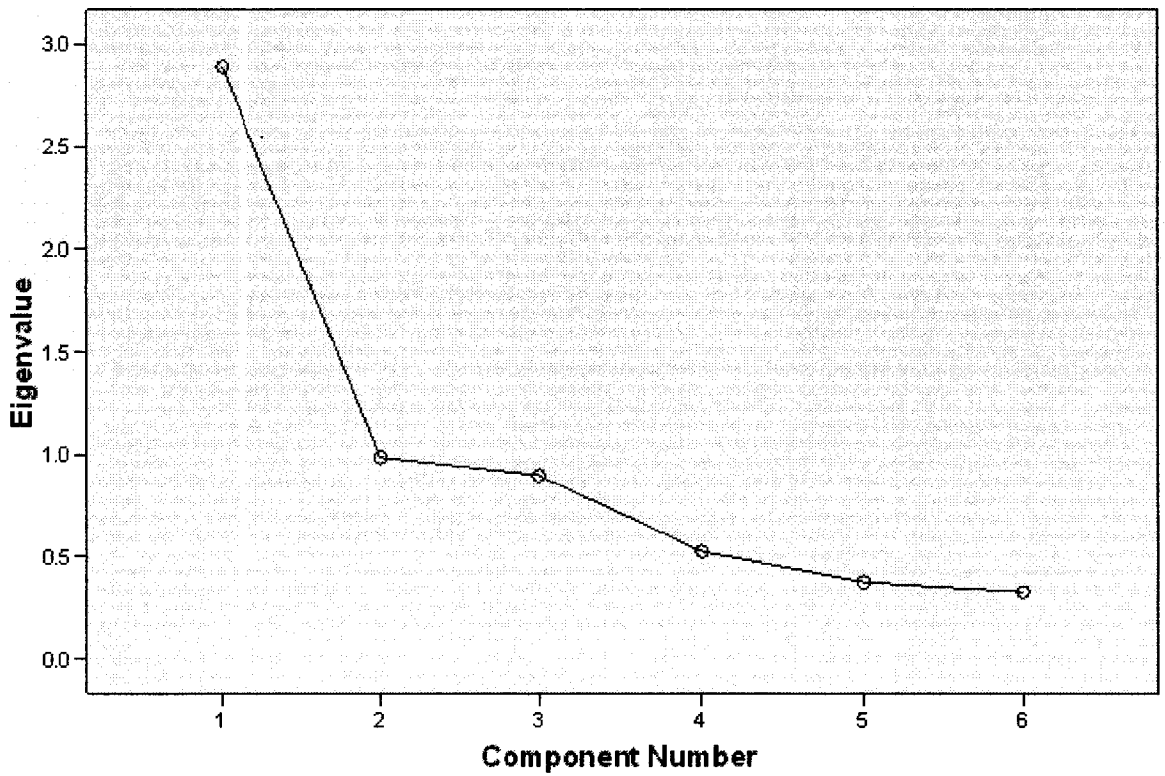
Figure 4. Scree Plot for Factor Analysis.

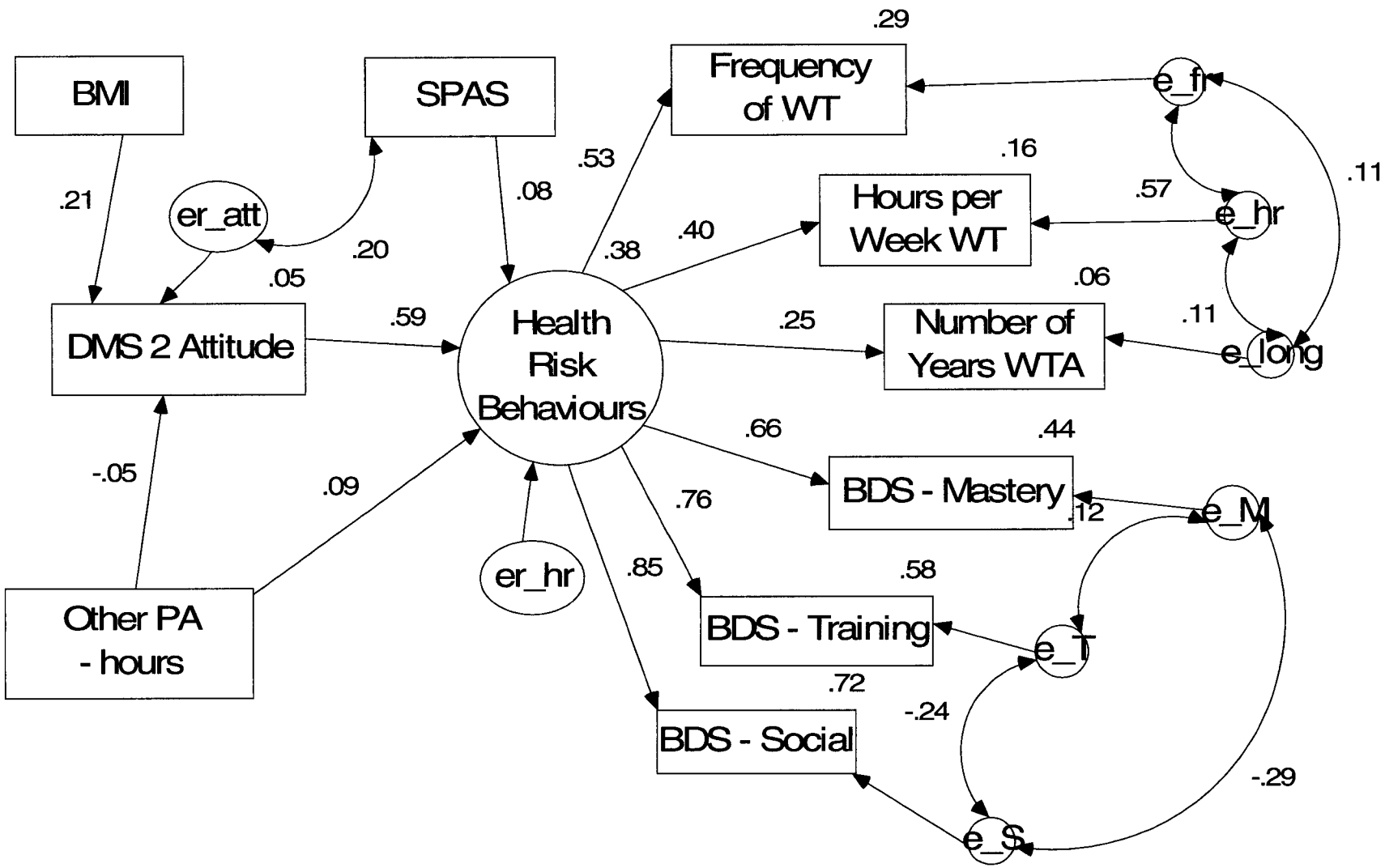
Figure 5. Final Model with Standardized Path Coefficient











Appendix A

Drive for Muscularity Scale-2 Attitude

(DMS-2 attitude; Gammage, Munroe-Chandler, & Hall, 2005)

Please read each item carefully then, for each statement, circle the number that best applies to you. 6-point Likert scale ranging from 1= *never*, to 6 = *always.*

1) I wish that I were more muscular.

2) I think that my legs are not muscular enough.

3) I feel guilty if I miss a weight training session.

4) I think I would feel more confident if I had more muscle mass.

5) I think that I would look better if I gained 10 pounds in muscle mass.

6) I think that I would feel stronger if I gained a little more muscle mass.

7) I think that my arms are not muscular enough.

8) I think that my chest is not muscular enough.

9) I think my back is not muscular enough.

10) I think my abs are not defined enough.

Appendix B

Social Physique Anxiety Scale

(SPAS; Hart, Leary, & Rejeski, 1989)

Using the following scale, indicate the extent to which you agree or disagree with each time by circling the appropriate number. On a 5-point Likert Scale ranging from 1= *not at all characteristic of me*, to 5= *extremely characteristic of me*.

1) I wish I wasn't so uptight about my physique/figure.

2) There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively

3) Unattractive features of my physique/figure make me nervous in certain social settings.

4) In the presence of others, I feel apprehensive about my physique/figure.

5) I am comfortable with how fit my body appears to others.

6) It would make me uncomfortable to know others were evaluating my physique/figure.

7) When it comes to displaying my physique/figure to others, I am a shy person.

8) I usually feel relaxed when it is obvious that others are looking at my physique/figure.

9) When in a bathing suit, I often feel nervous about the shape of my body.

Appendix C

Body Building Dependency Scale

(BDS; Smith, Hale, & Collins, 1998)

Using the following scale, indicate the extent to which you agree or disagree with each time by circling the appropriate number. On a 7-point Likert scale with 1= *strongly disagree* and 7= *strongly agree.*

1) I often weight train when I have a cold or flu.
2) I continue to weight train when I am injured.
3) I will not miss a scheduled weight training workout even if I do not feel like training.
4) I feel guilty if I miss a training workout.
5) If I miss a weight training workout, I feel as though my muscle mass has shrunk.
6) My family and/or friends have complained about the amount of time I spend in weight training.
7) Weight training has totally changed my lifestyle.
8) I plan my other daily activities around my weight training.
9) In the event of a conflict of interest between my weight training and my job, my training would always come first.

Appendix D

Recruitment Letter

UNIVERSITY OF
WINDSOR

Faculty of Human Kinetics
University of Windsor
Windsor, ON
N9B 3P4

To Fitness Facility Managers,

I am a graduate student at the University of Windsor working towards completion of my Masters degree in Human Kinetics, specializing in Sport Psychology. I am working under the guidance of Dr. Krista Chandler. I am writing this letter to ask for your assistance in conducting a research study on body image in male and female weight lifters. I am looking to recruit weight lifters from your facility, and to receive permission from you in order to approach members. Subjects will be asked to complete a short questionnaire that will only take approximately 10 minutes to complete. The purpose of this study is to examine body image variables and how they relate to different health risk behaviours associated with weight lifting, such as over training.

Weight lifters will be asked to volunteer as participants in the study. Permission and consent will be obtained from the individuals and confidentiality will be assured. There are no anticipated risks associated with participation in this study. I will approach members as they are leaving the facility, so as to not disturb their work outs.

If you have any questions or concerns about this study, please do not hesitate to contact myself or Dr. Chandler at the phone numbers or email addresses listed below. If you do agree to allow me to collect data in your facility, I ask that you complete the Fitness Facility Agreement and return it to me by fax at your earliest convenience. Thank you again for your time.

Thank you for your time and consideration,

Sincerely,

Courtney Robert, MHK Candidate
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Appendix E

Consent Form

UNIVERSITY OF
WINDSOR

CONSENT TO PARTICIPATE IN RESEARCH

An Investigation into body change behaviours in male and female weight lifters

You are asked to participate in a research study conducted by Courtney Robert at the University of Windsor, a graduate student at the University of Windsor who is working under the supervision of Dr. Krista Chandler. The completion of this project will contribute to Courtney's master's thesis in Human Kinetics.

If you have any questions or concerns about the research, please feel to contact Courtney Robert at 519-253-3000 ext. 4058 or via email at robertl@uwindsor.ca.

PURPOSE OF THE STUDY

The purpose of this study is to assess the relationship between several body image measures in male and female weightlifters.

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

To fill out the questionnaires provided to the best of your ability. There are a total of three short questionnaires to be completed and will take approximately 10 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

Some of the information that is requested in the questionnaires is of a personal and sensitive nature, but the identity of the participant will not be known, and the results are kept completely confidential.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

At any time after the study is completed, participants can request information on the findings from the study. On a broader scale, the results of this study will provide information that can help negative behavioural characteristics and consequences of individuals in the pursuit of muscularity.

PAYMENT FOR PARTICIPATION

There will be no monetary reward, however, participants will have an opportunity to enter their name in a draw to win an mp3 player.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.

The results obtained from the questionnaires will be used in the report for the primary investigator's thesis dissertation, as well as in a similar study being completed at Brock University with Dr. Kim Gammage.

The questionnaires that are gathered in this study will be kept in a locked cabinet that is accessible only by the investigator. Once the study is completed, the results will be shredded a year later.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

If subjects would like to receive feedback from the study, they can contact Courtney Robert at robertl@windsor.ca or visit the REB website at the University of Windsor: http://www.uwindsor.ca/reb.

SUBSEQUENT USE OF DATA

This data will be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; telephone: 519-253-3000, ext. 3916; e-mail: lbunn@uwindsor.ca.

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Subject

_____ _____
Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____
Signature of Investigator Date

Appendix F

Letter of Information

UNIVERSITY OF
WINDSOR

LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

An Investigation into body change behaviours in male and female weight lifters

You are asked to participate in a research study conducted by Courtney Robert at the University of Windsor, a graduate student at the University of Windsor who is working under the supervision of Dr. Krista Chandler. The completion of this project will contribute to Courtney's master's thesis in Human Kinetics.

If you have any questions or concerns about the research, please feel to contact Courtney Robert at 519-253-3000 ext. 4058 or via email at robertl@uwindsor.ca or visit the REB website at the University of Windsor: http://www.uwindsor.ca/reb.

PURPOSE OF THE STUDY

The purpose of this study is to assess the relationship between several body image measures in male and female weightlifters.

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

To fill out the questionnaires provided to the best of your ability. There are a total of six short questionnaires to be completed and will take approximately 15-20 minutes to complete.

QUESTIONNAIRES

You will be asked to complete three short questionnaires. The first questionnaire will gather demographic information such as your age, gender weight, height, and training regime. The second questionnaire will assess social anxiety . The third questionnaire will assess your body building behaviours. Lastly, your concern for muscle size and symmetry will be assessed. Filling out the questionnaires will take approximately 10 minutes.

POTENTIAL RISKS AND DISCOMFORTS

There are no known or anticipated risks from completing the questionnaires.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

At any time after the study is completed, participants can request information on the findings from the study. On a broader scale, the results of this study will provide information that can help negative behavioural characteristics and consequences of individuals in the pursuit of muscularity.

PAYMENT FOR PARTICIPATION

Your name will be entered into a draw for an mp3 player after completion of the study.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.

The results obtained from the questionnaires will be used in the report for the primary investigator's thesis dissertation, as well as in a similar study being completed at Brock University with Dr. Kim Gammage.

The questionnaires that are gathered in this study will be kept in a locked cabinet that is accessible only by the investigator. Once the study is completed, the results will be shredded a year later.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

If subjects would like to receive feedback from the study, they can contact Courtney Robert at robertl@windsor.ca or visit the REB website at the University of Windsor.

SUBSEQUENT USE OF DATA

This data will not be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; telephone: 519-253-3000, ext. 3916; e-mail: lbunn@uwindsor.ca.

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____

Signature of Investigator Date

Introduction

As a result of the value placed on health, fitness and appearance, many individuals in today's Western world strive to attain the ideal physique. One way in which to attain the ideal physique is through exercise. Despite research that has demonstrated that a sustained and adequate exercise program plays an important role in weight loss and healthy weight maintenance (Bouchard, Depres, & Tremblay, 1993), not all individuals who exercise reap the numerous benefits. Contrary to the review study by Folkins and Sime (1981) that suggested the influence of exercise on various affects were almost all positive, some individuals take their exercising to pathological limits, consequently sacrificing their physical and mental health. One aspect of mental health that can be impacted by taking exercise behaviours to extremes is body image. Body image is defined as an individual's self-schema, or the mental construction of oneself (Myers & Biocca, 1992). Furthermore, body image dissatisfaction results when one's actual body does not match their ideal body and is expressed as unhappiness with specific parts, or the totality of one's body shape (Slade, 1994) and may ultimately lead to pathological behaviours in striving for an ideal body shape (Furnham, Titman, & Sleeman, 1994; Myers & Biocca).

Historically, body image research has focused primarily on women and the commonly held desire to obtain a thin physique, which is perpetuated through media (Thompson, Heinberg, Altabe, & Tautleff-Dunn, 1999). The drive for thinness is a subscale of the Eating Disorders Inventory (EDI; Garner, Olmstead, & Polivy, 1983) and measures the desire for weight loss and how this desire impacts the development of eating disorders. The drive for thinness has been found to be related to body

dissatisfaction (Solenberger, 2001), depression (Wiederman & Pryor, 2000), and eating disorders (Harrison & Cantor, 1997). Relative to the plethora of research on women's body image, fewer studies have assessed men's body image, and more specifically the risk factors related to body image dissatisfaction however, it is a field of study that is growing (e.g., Arbour et al., 2004; Carlson Jones & Crawford, 2005). Unlike the research on women's body image, it has been established that the drive for thinness is relatively rare in men (Olivardia, Pope, Mangweth, & Hudson, 1995), and that, alternatively, men desire a physique that emphasizes muscularity (Pope, Phillips, & Olivardia, 2000). Additionally, there has been increasing evidence that there is an alternative ideal body type for a woman that includes some muscularity, or tone as it is more commonly referred to when describing the female physique (Daniels 1992; Furnham et al., 1994; Ryckman, Robbins, Kaczor, & Gold, 1989).

In striving for an ideal body shape (e.g., more muscular or toned), the exercising population can develop an unhealthy concern for their physique. The drive for muscularity has been defined as the desire to achieve a muscular ideal (Morrison, Morrison, Hopkins, & Rowan, 2004). This drive for muscularity has been positively correlated with depression and higher levels of body dissatisfaction (McCreary & Sasse, 2000). Another health risk behaviour that could exist in an individual who is striving for a more muscular physique is body building dependency. Body building dependency is defined as being compelled to lift weight excessively, even when there is physical pain and there are psychological symptoms once the exercise is withdrawn (Smith, Hale, & Collins, 1998).

One model applicable for understanding the strategies used in attaining the ideal body shape is the Dysfunctional Body Change Behaviours Model (Cafri et al., 2005). Although the model was initially developed for males, current research examining women and the drive for muscularity (Grogan, Evans, Wright, & Hunter, 2004; Lenart, Goldberg, Bailey, Dallal, & Koff, 1995) would tend to suggest the model may be applicable to both genders. The model describes the potential relations among factors that lead to body change strategies in the pursuit of muscularity. The model outlines how biological factors, such as body composition or body mass index (BMI), influence body image dissatisfaction an ultimately health risk behaviours. The model also indicates that involvement in sports and weight lifting mediates the response of body image dissatisfaction and the outcome of health risk behaviours such as taking illegal supplements or extreme exercise practices. Finally, the model outlines psychological factors, which have been shown to display a reciprocal relationship with health risk behaviours (see Figure 1 for the full Dysfunctional Body Change Behaviours Model). The current study will investigate several variables and key features of the dysfunctional body change behaviours model in both male and female weight lifters.

Calculations of the BMI, weight training habits, participation in other physical activity, the Social Physique Anxiety Scale (SPAS; Hart, Leary, & Rejeski, 1989), and the attitudinal subscale of Drive for Muscularity Scale Revised (DMS-2 attitude; Gammage, Munroe-Chandler, & Hall, 2005) will be measured in order to test some but not all aspects of the model. In addition, the health risk behaviours that will be examined include the Body Building Dependency Scale (BDS; Smith et al., 1998), the number of years weight training, hours per week spent weight training, and frequency of weight

training. Together, these measurements will allow for testing of the modified version of the Dysfunctional Body Change Behaviours Model (see Figure 2).

The purpose of the current study is to investigate the extent to which biological factors (i.e., BMI) and sports (i.e., weight lifting) could predict body image dissatisfaction (i.e., DMS-2 attitude) and how social physique anxiety along with body image dissatisfaction could predict various health risk behaviours (i.e., manipulation of diet for the purpose of muscle gain, training behaviours, scheduling of training sessions, and body building dependency).

Literature Review

Body Image

Body image is central to the self-concept, influencing behaviour and psychological functioning (Cash & Pruzinsky, 2002). Schilder (1935) first defined body image as "the picture of our body which we form in our mind, that is to say the way in which our body appears to ourselves" (p. 17). For much of his writing, Schilder employed the term body image and used it interchangeably to apply to physical perception of the body as well as psychological attitudes. Currently, body image is defined as a multidimensional construct that is a demonstration of how we see our own body, think, feel, and act toward it (Lox, Martin, & Petruzzello, 2003). Therefore, body image can be defined in terms of four dimensions – perceptual, cognitive, affective, and behavioural. All four dimensions contribute to the development of either a healthy body image, or body image disturbance, which is a negative self-evaluation of one's body shape, or negative feelings about one's body (Lox et al.). Cash (1994) suggests that body image attitudes include an evaluative component and an investment component. The

evaluative component refers to the concept of self-ideal discrepancies, which is a discrepancy between one's actual body and one's ideal body (Myers & Biocca, 1992), and often results in body dissatisfaction. The evaluative component is the importance placed on appearance, otherwise referred to as cognitive-behavioural salience (Cash, 1994). Body dissatisfaction occurs when there is a discrepancy between one's actual body and their ideal body (Myers & Biocca), and may ultimately lead to unhealthy behaviours such as eating disorders (Cash & Deagle, 1997) and exercise dependence (Davis & Cowles, 1991). Body image disturbance has been identified as the most important global measure of distress because it identifies one's overall, subjective, evaluation (Thompson, Heinberg et al., 1999). Over the years, researchers have contributed to our understanding of our bodies and our often distorted perceptions of it.

Body Image Theories/Models

Several theories have been proposed to explain the development of body image and maladaptive attitudes towards one's body. The theories are based on different branches or perspectives of psychology and include the Sociocultural Theory (Fallon, 1990; Heinberg, 1996), Social Expectancy Theory (Langlois, 1986; Snyder, Tanke, & Berscheid, 1977), Appearance Related Feedback Model (Garner, 1977), and the Cognitive Information-Processing Model (Altabe & Thompson, 1996; Higgins, 1981; Markus, Hamill, & Sentis, 1987; Strauman & Higgins, 1987; Williamson, White, York-Crowne, & Stewart, 2004).

The Sociocultural Theory acknowledges the powerful effect of societal influence on the development and maintenance of body image problems in Western societies (Fallon, 1990; Heinberg, 1996). The main premise of the Sociocultural Theoretical Model

is the pressure to attain the current societal standards for beauty, in particular, especially for women, those that stress thinness (Tiggemann & Pickering, 1996) and for men, other difficult standards such as muscularity (Halliwell & Dittmar, 2006). The Sociocultural Theory states that the mass media has an indirect impact on forming the unrealistic ideal body standards for men and women, and a direct impact on body image disturbances (Botta, 1999; Fallon). The pressures from the mass media to attain an unrealistic ideal body type are internalised by some individuals who then adopt unhealthy behaviours in order to achieve this ideal (Cafri et al., 2005; Thompson & Heinberg, 1999). It has been suggested that the ideal body types are internalised through social comparison whereby an individual compares their body to the unattainable ideal body types displayed in the popular media (Stice, Shupak-Neuberg, Shaw, & Stein, 1994; Thompson, Coovert, & Stormer, 1999). Although pressures to achieve the current societal standards for thinness and muscularity range from parents to peers to various sport types, it has been suggested that the mass media are the most potent and pervasive communicators of ideal body types (Fallon; Heinberg). The mass media is perpetuated through various formats including print, TV, cinematic, and electronic and these mass media ultimately can have a toxic impact on individual's body image (Thompson & Heinberg, 1999).

Related to the Sociocultural Theory is the Social Expectancy Theory, which proposes that cultural values influence an individual's self-perception which in turn will impact and influence how another individual will perceive that person (Langlois, 1986; Snyder et al., 1977). Essentially, this sequence of events can be likened to the self-fulfilling prophesy (Lee, 1986), where if an individual feels unattractive, then others will perceive them this way. This theory also constitutes that there is a consensual agreement

within cultures about standards of attractiveness and beauty, and of course these standards vary between cultures. These standards of attractiveness are what guide people's attitudes towards each other, thus people behave differently towards attractive and unattractive others.

Another approach to the study of body image is through appearance related feedback (i.e., Appearance Related Feedback Model), which suggests that what others say can have a profound effect on one's feelings. In a large scale survey, Garner (1997) indicated that 4,000 men and women associated appearance related feedback directly to their current body image. Almost half (44%) of the women, and slightly less (35%) of the men admitted that they were teased about their body and it was a contributing factor to their body image. Another study with college aged females indicated that 72% of the women had experienced teasing about their physical appearance, for an average of 5 years (Cash, 1995). Anecdotal evidence such as "being teased when I was a child made me feel bad about my body for years and years" (Garner, p. 42) and "no matter how thin I become, I always feel like the fat kid everyone made fun of" (Garner, p. 42) characterize the appearance related feedback approach to body image since this theory is very much dependent on personal experience. Beyond simply experiencing teasing about one's body, it has been shown to impact body dissatisfaction and resultant behavioural and cognitive outcomes. In a sample of 10-15 year old female adolescents it was indicated that teasing frequency and the effect experienced resulted in higher levels of body dissatisfaction, eating disturbances, depression, and lower self-esteem (Fabian & Thompson, 1989; Thompson & Psaltis, 1988). By and large, the appearance related

feedback approach to body image shows a clear relationship to the development of body dissatisfaction.

The Cognitive Information-Processing Model for body image suggests that body image is one part of the self-schema which is interpreted by the individual with a cognitive bias (Altabe & Thompson, 1996). The self-schema is one's memory of who they think they are and characteristics that define them. This self-schema is presumed to draw the person's attention to body and food-related stimuli and to bias interpretation of self-relevant events in favour of the individual's biased view of themselves (e.g., fatness or muscularity interpretations) (Altabe & Thompson). The model hypothesizes that certain types of stimuli are more likely to influence cognitive bias in those individuals who are more susceptible and hold a negative self-schema about their body (Altabe & Thompson). In the case of those individuals with severe body image disturbance, body-related themes tend to dominate one's cognition. That is, body image schema is not physically separate from other areas of cognition; on the contrary, other large cognitive structures such as self can be overridden with negative body image schema. The Cognitive Information-Processing Model has been shown to provide numerous benefits in treatment such as traditional cognitive therapy techniques that incorporate challenging the beliefs and testing the assumptions of the patient (Thompson, Coovert et al., 1999).

Female Body Image

Idealisation of the female body in art as the "fair sex" has been prevalent throughout history (Stanbury, 1997), and the ideal female shape varies throughout the ages. In Roman times the goddess of love, Venus, represents a more curvaceous, heavier ideal (Thompson, Heinberg et al., 1999). Similarly, in Renaissance times a more

curvaceous ideal existed, with a higher waist to hip ratio that indicated child bearing capabilities. However, in modern times, it has been shown that the trend is for an increasingly thin body type (Silverstein, Perdue, Peterson, & Kelly, 1986). For example, it was displayed that 60% of Miss America contestants and 69% of Playboy centerfolds had body weights 15% or more below the expected weights for women of their height (Wiseman, Gray, Mosimann, & Ahrens, 1992). As such, much of the research into female's body image has been based on the employment of the drive for thinness subscale of the EDI developed by Garner and colleagues (1983). The EDI is a 64 item self-report questionnaire that contains eight subscales: drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, and maturity fears (Garner et al., 1983). As mentioned earlier, the drive for thinness has been employed extensively to assess the need for decreases in body weight. The EDI was originally developed as a screening tool for eating disorder, but has also been valid as an outcome measure.

In a study investigating the psychological variables and the prediction of body image problems, it was indicated that depression and bulimia were significant predictors of body dissatisfaction (Wiederman & Pryor, 2000). However, when the drive for thinness was included in the regression equations, drive for thinness was a unique predictor of body dissatisfaction whereas bulimia was not. These findings suggest that the drive for thinness mediates the relationship between body dissatisfaction, bulimia, and depression among women (Wiederman & Pryor). Additionally, a correlational study involving adolescent girls indicated that the self-reported influence of magazine advertisements accounted for a significant amount of the variance in weight management,

disordered eating, and the drive for thinness (Levine, Smoklak, & Hayden, 1994). Similarly, in a clinical sample of eating disordered patients, the amount of aerobic exercise participation was significantly related to the drive for thinness and body dissatisfaction (Solenberger, 2001).

Despite research that supports the ideal female physique being overly thin, research does substantiate an athletic and muscular female physique being both positively perceived (Ryckman et al., 1989), and considered ideal (Lenart et al., 1995). Further support for a more muscular female physique as an alternative ideal body type was also found by Furnham et al. (1994) in their investigation on whether body satisfaction in female athletes stems from adherence to norms reflecting the muscular ideals of their sporting pursuits. It was found that females participating in traditionally male sports (e.g., basketball, rowing, and body building) did find more muscular female shapes socially attractive over the thinner female shapes. The authors suggested that perhaps the exercising groups of females set less rigid definitions for what is acceptable and desirable in women (Furnham et al.).

Additionally, Lenart and colleagues (1995) also indicated the shift in women's ideal body type from thin to one that is more muscular. Female athletic team members and also nonexercising women completed a newly modified 30-figure version of the Athletic Image Scale which was developed in order to explore more muscular physiques indicative of athletic participation (Goldberg, Bailey, Lenart, & Koff, 1996). The findings suggested that the majority of participants selected an ideal figure that was more athletic, with a more muscular upper body, regardless of exercise status (Lenart et al.). The authors suggested that muscularity should be considered when assessing men and women

for body image and body-shape assessment regardless of whether the target populations are athletes.

Female body building. Similar to those athletes and others who value a more muscular physique in women, female body builders have clearly chosen a more muscular physique as their ideal body type, and strive for definition and bulk as the premise of their activity (Lowe, 1998). Women's body building is a relatively new cultural phenomenon but has been gaining popularity since the 1980's when Ms Olympia competitions started in the United States and the United Kingdom (Grogan et al., 2004). Some feminist authors view female body building as a transformative process that empowers women through challenging sex roles and the idealology that women are weak (Bartky, 1990; Bolin, 1992; Guthrie, Ferguson, & Grimmett, 1994). However, others view female body building as having a negative role in body image, likening the female body builder to the anorexic because of the need to lack soft fleshiness (Bordo, 1990). In addition to the debate over the social value of body building, psychologically, the results are also varied.

One study indicated that female body builders did discuss body building as a means of control and mastery over their body, as well as negotiating a non-traditional feminine identity (Grogan et al., 2004). Additionally, the reactions to their muscularity by others only mattered if they were from the body building community; thus body building did raise their self-esteem and enabled them to feel physically and mentally strong (Grogan et al.). This finding is supported by in-depth interviews carried out with elite female body builders where it was confirmed that they did not wish to fit the ectomorphic (i.e., tall and slender) female ideal (Guthrie & Castelnuovo, 1992). Similarly, an

investigation into the outcome of a strength training program for females revealed that there were no actual body improvements, with an average of 0.9% increase in percent body fat and a gain of 1 lb in body mass (Ahmed, Milton, & Pituch, 2002). However, the benefits of the weight training program came in terms of *body image* improvement, which was measured by a general 10 item questionnaire that the authors developed (Ahmed et al.). Thus, there is support for body building being associated with a positive body image.

Interestingly, Klein (1992) indicated that female body builders did not differ from males in their motivation for working out (i.e., achieving muscle mass). However, the average exerciser probably does have different motivations for lifting weights. For example, Loze and Collins (1998) found that female weight lifters rated appearance as a motive for their participation while male weight lifters rated muscular development as their motive. Daniels (1992) suggested that the female body builders were attempting to redefine what was feminine by rejecting the thin, emaciated image. Female body builders have indicated through interviews that they feel more positive about their bodies compared with before they began body building (Grogan et al., 2004). Overall, it was concluded that body building was a 'balancing act' whereby individuals were trying to attain a more muscular physique while maintaining some aspects of traditional "feminine" appearance (Grogan et al.). These data support the notion that men and women use similar strategies to gain muscle when their goals are similar.

Although body building as a behaviour is somewhat different than recreational weightlifting (as is the sample in this study), many of the benefits are similar. Studies have shown that women who resistance train (i.e., weight lift) have resulting

improvements in strength and body image (Ahmed et al., 2002), positive perceptions of their bodies (Grogan et al., 2004), and feelings of empowerment (Guthrie et al., 1994). Women who participated in a weight training intervention indicated the greatest benefit in general well being when they showed greater improvements in muscular strength and decreases in skinfold measures (Tucker & Maxwell, 1992). Another study investigated the effects of a weight training program in both male and female participants and found significant improvements in body image and recommended weight training as an adjunct to psychosocial treatments of body dissatisfaction (Williams & Cash, 2001). However, despite positive benefits that individuals may reap from lifting weights, Gruber and Pope (2000) indicated that female weight lifters are at a heightened risk for using anabolic steroids, or other dangerous performance enhancers. In fact, 33% of women report current or past anabolic steroid (AAS) use (Gruber & Pope). This sample, however, is not indicative of the general population as they were competitive body builders. Additionally, there is some research indicating steroid use is not limited to the adult population. Faigenbaum, Zaichkowsky, Gardner, and Micheli (1998) revealed that children as young as middle school aged (9 – 13 years old) were using steroids, with males and females reporting similar percentages (male = 2.6%, females = 2.8%). Another study sampled a large percentage of Canadian students and reported similar percentages with Canadians students in the sixth grade and above (2.8% of the respondents; Melia, Pipe, & Greenberg, 1996). Therefore, despite the overwhelming pressure for females to be thin and toned, there are some females who desire increased muscularity that goes beyond the current ideal.

Male Body Image

Although much of the previous research into body image has been focused on females (e.g., McCabe & Monteath, 1997; Thompson, Coovert, Richards, Johnson, & Cattarin, 1995), male body image research is currently gaining momentum. This surge in male body image research may be due to fact that researchers have only recently recognized that male body satisfaction is different from female body satisfaction. Previous research on male body image had employed incorrect measures aimed at assessing one's desire to be thin. For example, Fallon and Rozin (1985) found that the men did not differ significantly in their ideal to current physique, while the women did. This finding could be due to the fact that the figure scale employed to measure body dissatisfaction (Stunkard, Sorensen, & Schulsinger, 1983) varies only on the degree of fatness, therefore not accounting for male's concern for muscularity. Similarly, when assessing body dissatisfaction with respect to the desire for weight loss and comparing boys and girls, it has been found that boys are more satisfied (Paxton et al., 2005). These non-significant findings for male's body dissatisfaction are due to improper assessment as it has been shown that, in fact, men are dissatisfied with their physique. Men desire to add to their size, weight, and muscle mass (Drewnowski & Yee, 1987; Jacobi & Cash, 1994).

Despite the lack of previous research, the idealisation of the male body is not a new concept. Male bodies represented in the art of the Roman Empire epitomised the current standards of physical male attractiveness with the slim, muscular warrior image (Grogan, 1999). The naked muscular male body dominated Renaissance painters until the mid-1800s when the female body became the focus of erotic art (Grogan). It was not until

the 1980s that idealised images of the naked, or semi-naked, male body started to become common in mainstream Western media (Grogan). Currently the use of images of young male bodies in fashion magazines and in marketing a variety of products is on the rise (Leit, Gray, & Pope, 2001).

In a study with first year college students, males were equally divided between wanting to lose weight (40%) and those who wished to gain weight (45%) (Drewnowski & Yee, 1987). This divide was also reflected in a study assessing the potential pathways into body dissatisfaction in youth (Carlson Jones & Crawford, 2005). It was found that the participants with a higher BMI displayed more concern for weight and dieting, while those with lower BMIs displayed more muscularity concerns (Carlson Jones & Crawford). Muscularity concerns were influenced by grade level, whereby older boys (grade 11) were more likely to converse about muscle building and endorse higher levels of muscularity concerns than younger boys (grade 8). Overall the study provided implications for the development of body image concerns among young males and the different paths leading to body dissatisfaction. Similarly, the Dysfunctional Body Change Behaviours Model (Cafri et al., 2005) employed for the current study addresses both muscularity and body fat concerns in body image and the resulting health risk behaviours of either dieting to lose weight, or dieting to gain weight. However, for the purpose of the current study, the concern for muscularity will be the focus.

Media representations of men have been shown to be increasing in muscularity. Playgirl centrefolds have grown considerably more muscular over the years, especially during the 1990's, supporting the ideal male body being increasingly muscular (Leit et al., 2001). Additionally, action figures have increased in muscular definition compared

with the same figure that was produced 25 years ago (Pope, Olivardia, Gruber, & Borowiecki, 1999). A range of action figures were shown to be significantly larger at the neck, chest, forearm, arm, thigh, and calf than the same figure that was produced 25 years earlier (Baghurst, Hollander, Nardella, & Haff, 2006). Clearly, there is sufficient and concrete evidence indicating that the ideal male physique has become increasingly muscular over recent years, yet the impact of this ideal is less clear.

Additionally, Ridgeway and Tylka (2005) found male participants from a mid-western American university reported that their body satisfaction was based on overall muscle, leanness and height with definition and leanness in the abdominal region and buttocks, and largeness and definition of the shoulders and neck, calves, arms, chest back, and upper legs. They also reported weight lifting as the main strategy to improve their body composition and detailed specific types of anaerobic exercises (e.g., weight lifting), cardiovascular exercises (e.g., running), and recreational sports (e.g., soccer). Employing exercise to achieve their goals for physique improvement was not considered feminine and participants pursued these activities. These results seem to indicate an increased awareness and concern for the male body and the pressure to attain a muscular physique.

As mentioned previously, early research had supported the finding that men were satisfied with their bodies due to in appropriate measurement of male body image. A meta-analysis of 222 body image studies dating from 1953 to 1996 (Feingold & Mazella, 1998) indicated that males were more satisfied with their bodies than females and considered themselves to be more attractive overall. However, a major limitation with previous body image studies was the measurement tools employed. The use of the drive for thinness as a measurement of body image in males has been shown to not be suitable

for most sporting populations and the general population (Olivardia et al., 1995). Additionally, the studies used in the meta-analysis failed to take into consideration the literature that measures muscular satisfaction (Feingold & Mazella). More recent research has attempted to overcome these limitations through the use of more complex and diverse measurements of body image. The newly developed constructs that apply to male body image include, but are not limited to, the drive for muscularity (McCreary & Sasse, 2000) and the somatomorphic matrix (Gruber, Pope, Borowiecki, & Cohane, 1999). The latter assesses an individual's body image satisfaction and perceptual accuracy with respect to muscularity *and* body fat. In fact, new measures of muscularity satisfaction have indicated that males desire the gain of lean muscle mass because these individuals score highly on drive for muscularity and drive for thinness measures (Olivardia, 2001). Therefore, new considerations are being made for the differences between the genders with respect to body type ideals and the methods of research applied that allow for the identification of male body image problems and characteristics of those individuals.

Male body building. Male body building first developed with the rise of industrialism, as more people settled in urban areas the need for physical activity became apparent (Klein, 1993). Additionally, the first YMCA was created as a response from the Judeo-Christian community, who viewed the body as a source of weakness, and as such idle activities were undesirable. Thus, physical conditioning grew and the image of robust muscularity became a symbol of purity and discipline (Klein). Eventually, the body building subculture developed outside of religion, and originated at big gyms such as Gold's Gym in Venice Beach, California, where members subordinate all other life concerns to body building- training, dieting, and talking "iron" (Klein). However,

amateur and recreational weight lifters are not as highly involved in the body building subculture, which is reserved for those extreme individuals that centre their lives around lifting weights.

The debate over whether body building is beneficial for body image has been ongoing. One study examining the effects of body image on exercising status and sexual orientation found that the body builders were more satisfied on a global measure of body image and had a higher ideal and actual upper torso size rating than the running groups (Boroughs & Thompson, 2002). Similarly, an investigation into the effects of a 16 week weight training program found that the self-concept of the lifters improved significantly more over the control group (Tucker, 1982). Early research into the mediators of improvements in self-concept by physical fitness indicated that introverted individuals benefited significantly more in terms of self-concept over extroverted individuals (McGlenn, 1976). Tucker investigated the effects of a weight training program and indicated that it significantly enhanced the self and body concepts of college males (Tucker, 1983).

Beyond the simple effects on self-concept, Tucker also investigated the individual differences in those who improved on self-concept measures (Tucker, 1983). It was found that self-concept improvements were associated with increases in muscle girth and the individual's perception of being mesomorphic (Tucker, 1983). Also found in this study was that males who entered the weight training program with poor body attitudes, resulted in relatively high body satisfaction scores at the end of the program (Tucker, 1983). This finding is supported by the suggestion from Lantz and colleagues that individuals with lower self-esteem gravitate towards body building as a means to improve

self-esteem by achieving personal and social standards of physical attractiveness (Lantz, Rhea, & Mayhew, 2001). Alternatively, large improvements in self-esteem through body building could be interpreted as the ceiling effect, with individuals that begin weight lifting with higher levels of self-esteem not having as much opportunity for improvements.

As with the women body builders, men experience negative outcomes when the goal of increasing muscular definition through weight lifting becomes overwhelming, leading to unhealthy behaviours. These behaviours that some weight lifters display include the use of steroids. Statistics from the United States indicate lifetime prevalence among male users reaching approximately one million (Yesalis & Cowart, 1998). Some of the health risks that are associated with steroid use include musculoskeletal injuries, cardiovascular disease, kidney failure, drug addiction, eating disorders, and some types of cancer (Dawes & Mankin, 2004). One could assert that taking illegal and harmful steroids for the purpose of gaining muscularity is the most extreme strategy used to attain the muscular ideal. In addition to steroid use, the risk of exercise dependence, which is characterized by increased tolerance, withdrawal symptoms, and loss of control (Hausenblas & Symons-Downs, 2002), is a risk factor for body builders. Further to taking steroids or becoming exercise dependent, an underlying psychiatric disorder could develop such as the development of muscle dysmorphia. Muscle dysmorphia is the preoccupation that one is not sufficiently lean and muscular enough and can result in several negative outcomes including steroid use, exercise dependence, and physique protection (Olivardia, Pope, & Hudson, 2000).

Dysfunctional Body Change Behaviours Model

Due to the complexity of body image, as it can be said that "body image is everything" (Thompson, Heinberg et al., 1999), and the resulting phenomenon such as the desire for increased muscularity, a model guiding the current research was necessary. Since much of the research has been conflicting and measures are constantly being adapted for different populations, a comprehensive review formulating a model for dysfunctional body change behaviours was deemed necessary. Cafri and colleagues (2005) developed the Dysfunctional Body Change Behaviours Model as a means of guiding the research and identifying the relationship among the variables that contributes to the development of dysfunctional body change behaviours. The model is empirically based in that it is consistent with the findings established in the literature and was developed based on a previously confirmed model, the Tripartite Influence Model (van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002). This previous model was used to explain body image and eating disturbances developed in females and outlines how perfectionism, family influences, media influences, and comparison impact body dissatisfaction and the development of eating disorders (see Figure 3; van den Berg et al.). The Tripartite Influence Model indicated that appearance comparison mediated the effects of family and media influences on body dissatisfaction, which in turn influenced the restrictive and bulimic behaviours (van den Berg et al.). Clearly, the pathways identified in the Tripartite Influence Model are targeted for those desiring decreases in weight, and the pathways leading to dysfunctional body change behaviours in those who desire increases in muscularity cannot be identified through this model. Therefore, Cafri and colleagues (2005) developed a Dysfunctional Body Change Behaviours Model

designed to identify the relationships among variables involved in the pursuit of body changes, such as increases in muscularity. The benefit of using the Dysfunctional Body Change Behaviours Model is that it includes the possibility of drawing discrete predictive inferences, in that each component of the model can be assessed specifically and its relation to other components of the model. The components of the Dysfunctional Body Change Behaviours Model include biological factors, body image problems, sporting participation, and psychological functioning, which all interact to result in various health risk behaviours (Cafri et al.). The findings in the literature that spurred the development of this model are not established due to newly developed measurements and mixed findings. Therefore, the model is meant to be used as a heuristic framework that is to be employed as a guiding tool in research of body image variables involved in the striving for muscularity. As such, the current study is appropriate in operationalising components of the model and testing these components to either confirm or refute the modified version of the Dysfunctional Body Change Behaviours Model (see Figure 2 for the modified model). Each of the components of the model will now be discussed.

Biological factors. Cafri and colleagues (2005) identified BMI as a biological factor that impacts societal pressures and with implications for body image dissatisfaction. BMI has been established as a risk factor for body dissatisfaction and dieting behaviours (Presnell & Stice, 2003). However, the relationship between BMI and muscularity-related behaviours and cognitions has not been adequately explored. BMI is the individual's height in meters squared divided by weight in kilograms. A higher BMI (over 25) is considered overweight, while the normal range of BMI values is considered 20-25. However, BMI does not account for the amount of muscularity that an individual

possess, which is one's fat free muscle mass. Hence, an individual could possess a high degree of muscle mass and would display a high BMI and that would be interpreted as being obese or overweight and this is problematic.

Although BMI does not account for the amount of muscularity an individual possesses, it is the most easily obtained measure that has been employed in several studies regarding the pursuit of muscularity. Ideally, the measurement of one's body composition and the amount of fat free muscle mass they possess can be accomplished through skin callipers or hydrostatic weight, for example. Despite their appeal, these methods are time consuming, require a significant degree of expertise to administer, and are costly (Mcardle, Katch, & Katch, 1996). Therefore, the most practical method of assessing biological factors in weight lifters is BMI.

Pope and colleagues (2000) conducted a study that compared body image perception of men from different countries. The instrumentation of the study involved the measure of BMI and the selection of ideal body types through the somatomorphic matrix that the authors had developed. The matrix varied on levels of both muscularity and fatness. The results indicated that both American and European men desired to be at least 27 pounds more muscular than their current weight. As expected, women desired an ideal male body type that the participants currently possessed. Over the years, support for these results regarding differing interpretations of ideal male body shape have been found (e.g., Lynch & Zellner, 1999; Olivardia, Pope, Borowiecki, & Cohane, 2004; Kaplan, Busner, & Pollack, 1988; McCreary & Sadava, 2001; Raudenbush & Zellner, 1997). One possible explanation for the widening gap between the body that males possess and the muscular ideal that they are trying to attain compared with the ideal that females prefer is the

content of the cultural messages. Men are constantly exposed to male bodies that are far more muscular than an average man in television, movies, magazines, and even action figures (Pope, Olivardia, Gruber, & Borowiecki, 1999). One study indicated that males are in fact exposed to hypermuscular men in magazines geared towards men, while the images of men in female oriented magazines are less muscular (Frederick, Fessler, & Haselton, 2005). Taken together, these findings suggest that male participants desire a much more muscular physique than they currently have and than their female counterparts expect of them.

Beyond simply measuring the desired amount of muscularity and comparing it to the individual's current BMI, researchers also indicate BMI as a correlate and predictor of health risk behaviours in weight modification (Cole, Smith, Halford, & Wagstaff, 2003). As mentioned previously, much of the body image literature has focused on the desire for decreases in weight, and as such, researchers have found that there is a correlation between BMI, dieting, and disordered eating (Neumark-Sztainer & Hannan, 2000). Researchers found a strong and direct association between BMI and both dieting and disordered eating behaviours in girls (grades 5-12), whereas for boys, BMI was related only to dieting (Neumark-Sztainer & Hannan). Alternatively, assessing a broader range of outcome behaviours, such as weight gain strategies, found that BMI was positively associated with dieting and exercise and inversely associated with weight gain behaviours (Neumark-Sztainer, Story, Falkner, Beuhring, & Resnick, 1999). In particular, those boys in the underweight range of BMI were at a higher risk for taking steroids or other supplements (Neumark-Sztainer et al.). On the other hand, adult populations that use steroids are heavier than non-steroid users (Cole et al., 2003). However, it is

important to consider that those adults who begin a weight training program are more likely to be underweight (Mishkind, Rodin, Silberstein, & Striegel-Moore, 1986).

Alternatively, it has been indicated that a higher BMI is correlated with a higher incident of using supplements or steroids. Raudenbush and Meyer (2003) found that soccer and lacrosse players who did employ some form of supplement for the purpose of weight gain were more likely to possess a higher BMI (although this was not significant). In another study, competitive body builders possessed a higher BMI and also indicated the desire for more weight gain when compared to recreational weight lifters and athletic controls (Pickett, Lewis, & Cash, 2005). Together these findings suggest that men who currently possess a large amount of muscle mass are the type of individuals that are striving towards further muscular development. This relationship is moderated by the sport type in which the individual is involved, as identified in the Dysfunctional Body Change Behaviours Model (Cafri et al., 2005).

One study found non-significant findings with respect to the impact of several anthropometric including BMI on the drive for muscularity (McCreary, Karvinen, & Davis, 2006). The only significant predictor of muscular dissatisfaction was flexed bicep circumference. However, the authors recommend further research with BMI and the individual perception of muscularity perceptions (McCreary et al., 2006).

Sports and other physical activity. In the Dysfunctional Body Change Behaviours Model, participation in sports and other physical activity is identified as a predictor of health risk behaviours both directly and indirectly through body image dissatisfaction (Cafri et al., 2005). Sport has been shown to be associated with healthy body image development (Richards, Casper, & Larson, 1990) through the enhancement of self-esteem

(Holland & Andre, 1994), social status and peer popularity (White, Duda, & Keller, 1998). Contrary to this finding however, it was established that elite athletes often display characteristics of having increased weight concerns and disordered eating (Hausenblas & Carron, 1999). Additionally, eating disorder symptomology has been shown to be higher in aesthetic-sport athletes such as dance and gymnastics than non-aesthetic sport athletes (Hausenblas & Carron).

In addition to being aesthetically driven to attain a particular physique, sport type has an influence on the pursuit of a more muscular physique. Involvement in power sports has been shown to be associated with higher incidence of anabolic steroids use (Cafri et al., 2005). Buckley et al. (1988) conducted the first investigation into steroid use in high school students and found that 6.6% of male high school seniors reported using steroids, in particular, those who participated in football and wrestling were more likely to use steroids. Two other power sports that have been indicated to have more steroid users amongst its participants are field events and weightlifting (Wichstrom & Pedersen, 2001). In a study that administered several questionnaires in order to establish the construct validity of a newly developed scale, the Exercise Motivations Inventory (Markland & Hardy, 1993), it was suggested that an individual's choice of exercise is likely to be shaped by their underlying motives for participation (Loze & Collins, 1998). Therefore, male resistance trainers rated muscular development the highest over female resistance trainers and aerobic trainers (Loze & Collins). Interestingly, the female resistance training group held a higher value of appearance than the female aerobic training group. These findings suggest that those women who identify with the ideal athletic female physique associated with resistance training feel stronger about their

aspirations than those women who desire reduced body fat that is associated with aerobic training (Loze & Collins).

Hausenblas and Symons Downs (2001) identified that research into body image disturbance between athletes and nonathletes is equivocal and no comprehensive synthesis of the findings has been identified. The authors completed a meta-analytic review in order to clarify whether athletes do possess a healthy body image and in particular, to identify the moderating effects of competition level and sport type on body image disturbances. It was found that athletes reported a more positive body image than the control groups thus suggesting that perhaps the fact that the athletes were highly physically active and thus resembled the current aesthetic ideal of possessing a thin, lean, and fit physique (Brownell, 1991). Additionally, the positive body image that the athletes possessed in the review could be due to the psychological benefits of an active lifestyle such as increased self-esteem and decreased mood disturbances (Fox, 2000). Interestingly, however, the findings from the meta-analysis indicated no significant difference in body image with respect to sport type. This is perhaps due to limited research being done with power sports and weight lifting. Finally, the meta-analysis was able to identify that only 19.2% of the comparisons of body image were made with male athletes (Hausenblas & Symons Downs). Both limited research of the body image of power sports athletes and the limited number of studies that target male athletes, point towards a gap in the literature that needs to be addressed.

Societal factors and social body comparison. Cafri and colleagues (2005) also identified societal factors and social body comparison as a mediator leading to health risk behaviours. The social influences on body image identified in the Dysfunctional Body

Change Behaviours Model include messages from the media, parents, and peers (Cafri et al.). As mentioned in Sociocultural Theory, the mass media has a large impact on the development of body image problems (Botta, 1999). Many studies investigating the impact of media on body image have found that exposure to ultra-thin models increases body dissatisfaction in women (Groesz, Levine, & Murnen, 2002). However, young men indicated that exposure to thin male models did not impact their body image negatively (Ogden & Mundray, 1996). This may be due to the fact that achieving thinness was not these men's ideal body type given they want to increase muscle mass (Pope et al., 2000). However, studies that have exposed men to media displaying the male muscular ideal have been found to have profound negative impact on body image (Leit et al., 2001; Lorenzen et al., 2004). Recently Arbour and Martin Ginis (2006) found that exposure to media displaying hypermuscular physiques did not result in greater body dissatisfaction than media displaying toned and athletics physiques. One reason why the authors suggest the images of hypermuscular men did not trigger body image problems was that the ideal male body type is lean and muscular, however, not hypermuscular. Therefore, those images did not lead to social comparison that has been shown to trigger body dissatisfaction (Arbour & Martin Ginis). Additionally, it was found that greater baseline muscular dissatisfaction as measured by the attitudinal subscale of the DMS (McCreary et al., 2004) was associated with greater post-image viewing body dissatisfaction, but only among men who viewed the muscular images. These results highlight the importance of pre-existing muscularity concerns in shaping men's reactions to muscular physique images. Finally, the findings suggest that exposure to the media ideal of

muscularity, and not muscularity per se, elicits body dissatisfaction in men with pre-existing muscularity concerns.

Additionally, a similar result was found in a female population when exposed to ultra-thin models (Halliwell & Dittmar, 2006). This study assessed whether there was greater body-focused anxiety after viewing thin models, average sized models, or no models in advertisements. Results indicated there was greater body-focused anxiety after viewing the thin models, but only in those women that internalized the messages of the advertisement. Internalization of the media messages was measured through the awareness and internalization subscales of the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ; Heinberg, Thompson, & Stormer, 1995). The thin models do not elicit anxiety or feelings of inadequacy, but that the average sized models provide a relief for the women viewing them (Halliwell & Dittmar, 2006; Halliwell, Dittmar, & Howe, 2005; Halliwell & Howard, 2004). This is thought to be because the average sized model is more attainable for most of the population, and therefore does not create anxiety (Halliwell et al.). Thus, it may be that extreme representations of ideal body types, such as the ultra-thin females and hypermuscular males, do not have as negative an impact on body dissatisfaction of its viewers as originally thought.

Contrary to those findings, it has been established that women overestimate the degree of female thinness that is desired by men (Jacobi & Cash, 1994), and that men overestimate the degree of male muscularity that women desire (Frederick & Haselton, 2003). As such, participants' responses to different degrees of male muscularity and female thinness were investigated in magazines targeted for men versus women (Frederick et al., 2005). It was found that the men displayed in the magazines targeted at

men were more muscular than those men displayed in the magazines targeted at women. In turn, the men in the fitness and body building magazines were the most muscular (Frederick et al.). This sex difference was replicated when male and female undergraduate students rated attractiveness on male silhouettes (Salusso-Deonier, Markee, & Pedersen, 1993). The men in the study emphasized medium and large muscular bulk types while the women emphasized medium frame and average/balanced type (Salusso-Deonier et al.). Thus it appears that the social comparison both men and women make with images that represent unattainable standards is indeed perpetuated through magazines, and that these standards are most extreme for those magazines targeted for individuals that are of the same sex as the images. Although sociocultural factors are considered a mediator for the development of body image problems in the Dysfunctional Body Change Behaviours Model (Cafri et al., 2005), this factor will not be assessed in the current study.

Psychological functioning. The Dysfunctional Body Change Behaviours Model also identifies psychological functioning as a risk factor, with a reciprocal relationship to the development of health risk behaviours (Cafri et al., 2005). For the purpose of the current study involving weight lifters, social physique anxiety will be the psychological variable that will be assessed. Social anxiety is an affective consequence that may be experienced when people doubt their ability to make desired impressions on others (Leary, 1983; Schlenker & Leary, 1982). Hart et al. (1989) advanced the construct of social physique anxiety as social anxiety specific to the physique. The Social Physique Anxiety Scale (SPAS) was developed as a 12-item trait measure used to assess the

anxiety an individual experiences when they perceive their physique is being evaluated by others (Hart et al.).

Hart and colleagues (1989) examined the factor structure of the SPAS through a principal components analysis and found that all items loaded on one factor. However, the validity of the unidimensional scale has been criticized due to the small sample size that was employed (Eklund, Mack, & Hart, 1996). Accordingly, Eklund et al. provided support for a factor structure involving the 12-items. The factor structure was examined through an exploratory factor analysis employing a reasonably large sample of university students which revealed that a two-factor model existed (Eklund et al.). The model included two first-order factors, "physique presentation comfort" (PC) and "expectations of negative physique evaluation" (NE). Additionally, these two first-order factors were subordinate to one second-order factor (Eklund et al.).

Following the studies that argued for a multidimensional measure of the SPAS, still further arguments were put forth for the SPAS maintaining its unidimensional structure (Martin, Rejeski, Leary, McAuley, & Bain, 1997). Furthermore, Martin et al. contested that the SPAS could be more parsimonious by consisting of 9-items that displayed adequate internal consistency ($\alpha = 0.89$). It was suggested that the total score maintains that the conceptual content of social physique anxiety by including both the fear of negative social evaluation and physique related concerns, therefore, should not be separated into different subscales. The correlation between the original 12-item SPAS and the 9-item version was $r = 0.98$ (Martin et al.). Therefore, for the purpose of the current study this 9-item version of the SPAS will be employed and the total score will indicate the level of social physique anxiety displayed by participants.

Many studies investigating social physique anxiety have been undertaken in the exercise domain; however, fewer studies have been completed in a weight training environment. A more generalized finding concerning all exercisers was that inexperienced exercisers reported greater social physique anxiety in social exercise settings than did experienced exercisers (Hart & Gill, 1993). Additionally, social physique anxiety has been found to vary across different body types, with women who were significantly heavier, taller, and higher in percentage of body fat scoring higher on the social physique anxiety than those with a smaller physique (Hart et al., 1989). Also, it was indicated that those individuals that exercise for self-presentational concerns, that is motives related to the development and maintenance of observable physical qualities such as body tone, physical attractiveness and weight control, also indicated higher SPAS scores (Eklund & Crawford, 1994).

More specific to muscularity, several studies have been completed that investigated the relationship between social physique anxiety and muscularity concerns. It was found that both aerobics and "stretch and strength" classes decreased social physique anxiety due to subjective and objective changes in physical functioning (McAuley, Marquez, Jerome, Blissmer, & Katula, 2002). However, these decreases in social physique anxiety were unrelated to changes in body composition (McAuley et al.). This finding prompted Martin Ginis, Eng, Arbour, Hartman, and Phillips (2005) to investigate the subjective and objective physical changes relative to body image change due to strength training in particular. The study employed a 12-week weight-training program and investigated the outcome of several body image measures, including the SPAS (Martin Ginis et al.). Results from their study indicated that the weight-training

program had positive effects on body image through the improvement of perceived strength and muscularity. More specifically, decreases in social physique anxiety were associated with increases in perceived strength and muscularity. The evidence does point towards man's concern about others' evaluations of his own body being based on the perception of muscularity and strength. However, one surprising result from the Martin Ginis and colleagues' study was the little agreement between the measures of muscularity, therefore, further investigation into the relationship between the SPAS and measures of muscularity and the associated health risk outcomes is necessary.

In a study investigating the effects of a circuit weight-training program on the body images of college students, Williams and Cash (2001) indicated that there was significant body image improvements compared with non-weight training controls as measured by the 9-item SPAS and several other body image measurements. The authors also ruled out the positive effects of aerobic exercise in the weight-training participants by accounting for residual gains in pre-test measures. Additionally, as in other studies, it was found that those individuals who were motivated to lift weights for appearance and weight management reasons had significantly poorer initial body image scores including the SPAS score (Williams & Cash).

Pickett et al. (2005) examined body builders, weight lifters, and athletically active controls in several body image and psychosocial adjustment variables. This comparison between the different target groups was of interest since previous research has indicated that body builders are at a heightened risk for the development of body image problems due to body building requiring such intense training to obtain a lean muscle mass (Blouin & Goldfield, 1995). The results indicated that both competitive body builders and regular

weight lifters held more favourable overall views of their physical appearance than athletically active controls (Pickett et al.). The active controls did score the highest in the SPAS, perhaps because the other two groups were used to having their physiques on display and invested more time and effort into perfecting their physiques. Women were found to have higher social physique anxiety in exercise settings that emphasize the physique with revealing clothing (Crawford & Eklund, 1994).

Similar to the previous study, an exploratory investigation into the social physique anxiety and body dissatisfaction measures among steroid using and non-steroid using body builders, weight lifters, athletically active controls, and non-athletes was completed (Schwerin et al., 1996). This study included a self-reported measure on steroid use in order to split the body building group into two groups for comparisons. Furthermore, several other measures were employed to investigate the differences in body image. The findings indicated that self-reported steroid users had greater body esteem, particularly with upper body strength, and also reported lower SPA than non-using body builders. The authors suggested that the combination of lower physique anxiety and higher satisfaction with upper body indicated that steroid use is different from other substance use whereby steroid users place large emphasis on appearance of health, strength, and sex appeal (Schwerin et al.). However, this study is also important in revealing that possessing body satisfaction does not necessarily mean that an individual possesses a truly healthy esteem due to the numerous risks associated with the use of steroids. If the authors had also employed a general measure of self-esteem perhaps it might have revealed that those individuals that employed steroids also had lower self-esteem since they placed such importance on gaining muscle mass as to risk using steroids.

During the development of a measure assessing muscular satisfaction (Mayville, Williamson, White, Netemeyer, & Drab, 2002), several psychological and body image measures were assessed in order to test for concurrent and face validity. One of the measures included in the study assessed body building dependency with the Body Building Dependency Scale (BDS; Smith et al., 1998). The second questionnaire used for the purpose of validating the Muscle Appearance Satisfaction Scale (MASS) was the SPAS (Hart et al., 1989). The findings revealed that the amount that one was dissatisfied with their muscle mass was positively associated with experiencing a higher level of social physique anxiety. Interestingly, it was also found that the amount one experiences anxiety about their physique being evaluated by others (social physique anxiety) was not related to the extent of one's willingness to try performance-enhancing substances such as steroids or the extent to which one is willing to engage in other risky weight lifting behaviours such as training through an injury.

Thus it is clear that not all aspects of muscular dissatisfaction and the desire for higher levels of muscularity are positively related to social physique anxiety. These findings make intuitive sense because being anxious about having one's physique evaluated is a small aspect of body image and should not be expected involved in all cases of individuals employing weight lifting because they desire more muscle mass. The plethora of measurements used in conjunction with the SPAS have indicated the complexity of body image and the uniqueness of different body types with different goals in employing weight lifting.

Body image dissatisfaction. The Dysfunctional Body Change Behaviours Model identifies body image dissatisfaction with respect to both muscularity and body fat as a

mediator to health risk behaviours (Cafri et al., 2005). However, with the weight lifting population, the main focus of body image is with muscularity (Ricciardelli & McCabe, 2004). In addition to men being dissatisfied with their muscularity, women are now becoming concerned that they are not sufficiently muscular enough (e.g., Furnham et al., 1994; Grogan et al., 2004; Lenart, Goldberg, Bailey, & Dallal, 1995; Ryckman et al., 1989). The drive for muscularity was a term coined in order to represent an individual's motivation to become more muscular (McCreary & Sasse, 2000). The Drive for Muscularity Scale (DMS; McCreary & Sasse) was developed as a paper and pencil self-report questionnaire to assess attitudes and behaviours related to a muscular appearance. Two subscales in the original development of the DMS include attitudinal and behavioural aspects of the desire for increased muscularity (McCreary, Sasse, Saucier, & Dorsch, 2004). However, the DMS went through several modifications and trials before it was considered a valid and reliable tool for measuring muscularity concerns.

The DMS was developed as a means to measure an individual's motivation to become more muscular, much akin to the way the EDI measures an individual's motivation to become thinner. In developing the DMS, weight lifting enthusiasts were polled about the factors that motivate them to train and how they feel when they missed a weight-training session (McCreary & Sasse, 2000). From this information, the authors developed a 15-item measure. Face validity, convergent validity, and discriminant validity were established through the comparison of other measures of body image such as the Eating Attitudes Test and the Body Dissatisfaction subscale of the EDI (Garner et al., 1982). Internal consistency for the overall DMS score ($\alpha = 0.91$) in an adult population (McCreary et al., 2006). The original conception of the DMS was

unidimensional; however, the authors suspected an underlying factor structure but could not establish this with the sample size they obtained in this initial study (McCreary & Sasse).

A study investigating the relationship between several psychological variables that have previously been linked to the drive for thinness, found that these variables were also related to higher scores on the drive for muscularity in men (Davis, Karvinen, & McCreary, 2005). More specifically, it was found that those men who were high in anxiety, had strong perfectionistic tendencies, and were highly focussed on their physical appearance and fitness, reported higher drive for muscularity than those who did not report high drive for muscularity (Davis et al.). Additionally, those who scored higher on the DMS also participated in more weight lifting activities and consumed a diet designed to increase bulk (McCreary & Sasse, 2000). Thus it is clear that the DMS is measuring the need for a higher level of muscularity in terms of behaviour and therefore displays construct validity. In terms of psychological variables, McCreary and Sasse also found that higher levels of the drive for muscularity were associated with lower levels of self-esteem and higher levels of depression in boys, but not in girls. They suggested, based on previous research, this may be due to the fact that the ideal body type for females that is perpetuated in the media is ultra thin, and those females with high scores on the DMS are not concerned with achieving societal standards and are therefore higher in self-esteem and lower in depression (Furnham et al., 1994; Snyder & Kivlin, 1975). Contrastingly, the boys who scored high on the DMS were believed to be buying into the current ideal body type for males, and thus were displaying lower levels of self-esteem because they

felt inadequate in their pursuit of an unattainable level of muscularity (Pickett et al., 2005).

The DMS was also found to be correlated positively with a higher degree of vanity and a lower degree of physical appearance self-esteem in a male population (Morrison et al., 2003). Individuals higher in the drive for muscularity have more pride in their appearance, but also possess a lower level of physical appearance self-esteem (Morrison et al.). Although these results appear contradictory, separate explanations are needed for clarity. Males that are striving to achieve the muscular ideal are less satisfied with their appearance, and those individuals who are working to improve their bodies are more likely to be comfortable with objectifying themselves (Morrison et al.).

In a follow up study to the development of the DMS, exploratory factor analysis was undertaken in order to investigate the underlying factor structure in an adult population (McCreary et al., 2004). A separate factor analysis was conducted for each gender. Two underlying factors were evident for the male population but not for the female population. The two subscales were muscularity behaviour and muscularity-oriented attitude. The behaviour subscale assesses one's weight training behaviours, scheduling of training sessions, and the preoccupation with weight lifting, while the attitudinal subscale assesses one's attitude about their muscularity, and body image with respect to muscularity. A sample item from the behavioural subscale is "I feel guilty if I miss a weight-training session", and from the attitudinal subscale, "I think that my arms are not muscular enough". Given the two factor structure was not valid for women, gender comparisons were not possible. The authors suggested that the difference in factor structure between the genders was reflective of the idea that men and women have

different goals for their weight-training behaviour. Men typically want to gain bulk in muscle mass, where as women typically want to gain muscle tone for a lean and athletic appearance. Some of the questions may have impacted the way that females interpret and respond to the DMS differently than males such as those that employ the wording "in order to gain bulk" which could be more gender neutral with the word "muscle mass" instead of "bulk". McCreary et al. (2004) suggest that if gender comparisons are wanted, that the unidimensional score for the DMS for both men and women be employed.

Morrison et al. (2003) argued that combining both the attitudinal and behavioural scales for a unidimensional measure was problematic because researchers are failing to specify whether they are interested in measuring attitudes or behaviour. They indicated that combining both attitudinal and behavioural scales for a total score was not theoretically sound as the two constructs are clearly dissimilar. Based on this major limitation, comparing the drive for muscularity in men and women has been severely restricted.

In order to allow for gender comparison in the drive for muscularity, Gammage et al. (2005) made several changes to the DMS to allow for the same factor structure to arise for men and women. Several changes were made to the wording to make the questions more gender neutral, such as changing "building bulk" to "building muscle mass" (see Figure 1 for DMS-2 attitude). Additionally, some items were deleted and added due to problems with factor loading in previous studies and questions were added to create a dietary subscale. Lastly, two attitudinal items were added that addressed muscle concern with respect to back and abs since these two body parts were not in the original DMS. These changes resulted in a final DMS-2 with a three factor structure which is supported

in males and females, of which the attitudinal subscale will be employed in the current study to assess the component of body dissatisfaction in the Dysfunctional Body Change Behaviours Model.

Health risk behaviours. Cafri et al. (2004) identify health risk behaviours as the main outcome of the Dysfunctional Body Change Behaviours Model. In order to assess a range of health risk behaviours associated in weight lifting the characteristics of individuals training behaviour will contribute to the latent variable of health risk behaviours. The variables that will assess the individuals training behaviours will include: the length of years participating in weight lifting, the number of hours spent each week weight training, and the number of times per week spent weight training. Further to training behaviours, over training and becoming dependent on body building is also a concern. Body building dependency is a specific type of exercise dependence whereby an individual is reliant on body building. Much of the early research into exercise dependency was based on runners. Interviews were conducted with compulsive runners in order to describe the damage to mental and physical health (Sachs & Pargman, 1979; Yates, Leehey, & Shisslak, 1983). However, conducting interviews is cumbersome, and a quantitative measure was necessary. Several scales assessing exercise dependency in a running population were developed (e.g., Carmack & Martens, 1979; Chapman & DeCastro, 1990; Rudy & Estok, 1989). However, until the late 1990s all attempts at assessing exercise dependency have been focused on aerobic activities, thus prompting Smith et al. (1998) to develop the Body Building Dependency Scale (BDS).

Body building dependency can develop because individuals may rely on body building as a source of self-esteem (Brewer, Van Raalte, & Linder, 1993). As Pope and

colleagues (2000) suggested, for some, the time they spend in the gym may be the only time they feel a high degree of self-efficacy. Sam Fussell self-disclosed his lifestyle as a competitive body builder and indicated that the only thing that he felt gave his life any meaning was body building, thus supporting body building dependency having roots in the reliance on the activity for self-esteem (Smith et al., 1998). Another aspect of body building dependency is of course, the large amount of time spent on the activity. As T.C. Luoma, a body building journalist, suggested that many body builders spend most of their lives consumed with building or thinking about their muscles (Luoma, 2000).

Smith et al. (1998) developed the BDS based on previous criteria for diagnosing exercise dependence. This include self-deprecating or anxious thoughts when unable to exercise, modifying normal priorities to the degree where exercise is place above other activities, the resulting social and occupational consequences from placing such a strong importance on exercise, and the individual holds irrational expectations for the amount of exercise needed in order to achieve or maintain a certain body shape, exercising despite injury, and obsess over the effects of decreasing exercise levels (Morrow & Harvey, 1990). Smith et al. developed the 9 item BDS and tested it along with measures of athletic identity in order to assess the level of body building identity as well as a measure of physical self-esteem and lastly, whether or not steroids were taken. The measures were assessed in competitive body builders, Olympic power lifters, and recreational weight lifters. Overall, it was found that the motivation for participation in weight lifting varies across different levels of involvement, with body builders lifting weights for the purpose of competing in body building competitions, while recreational weight lifters were participating in order to improve their appearance, general fitness reasons, and social

reasons. Additionally, Olympic weight lifters weight train in order to lift as much is possible. This original study also revealed three subscales of the BDS, with one factor reflecting the need to be in body building for the social environment, another reflecting the need to engage in weight training for the physical benefits, and lastly one reflecting the need to exert control over training schedules, called mastery.

The three subscales identified in the original conception of the BDS (Smith et al., 1998) were supported in a follow up study by Hurst et al. (2000). Also, social physique anxiety and athletic identity were assessed and it was revealed that experienced body builders exhibited more exercise dependence, showed greater social support behaviour and experienced less social physique anxiety than the inexperienced body builders and the weight lifters (Hurst et al.). The social physique anxiety findings support previous anecdotal evidence suggesting that men begin body building in order to reduce feelings of poor body image (Brewer et al, 1993). This may be due to the experienced body builders feeling more comfortable with their bodies as a result of attaining the desired muscularity achieved through weight lifting. Additionally, Hurst et al. suggested that experienced body builders display higher levels of body building dependency due to their attachment to the social aspect of the body building subculture.

Despite establishing the three subscales of the BDS (social, training, mastery) as valid and reliable, a confirmatory factor analysis was necessary for the establishment of the measure as the golden standard for body building dependency. Smith and Hale (2003) carried out the confirmatory factor analysis with a sample of male and female body builders, both competitive and non-competitive. The results revealed acceptable fit indices for the three factor model as well as acceptable internal reliabilities (Smith &

Hale). In addition to confirming the factor structure of the BDS, this study aimed to establish concurrent validity through correlating it with a previously validated, exercise dependency scale, the Exercise Dependence Questionnaire (EDQ; Ogden, Veale, & Summers, 1997). The concurrent validity of the BDS was supported as the three subscales did significantly correlate with five of the EDQ subscales. The remaining three subscales of the EDQ that did not correlate with the BDS due to content. The first uncorrelated subscale assessed weight control, specifically the desire to be thinner, therefore, not being related to body building dependency is reasonable. The second uncorrelated subscale of the EDQ was exercising for health reasons, which the authors suggest can exist without being dependent on body building because it is not related to the diagnosis criteria for exercise dependency. The last uncorrelated subscale of the EDQ assessed stereotyped behaviour which, again, in the authors' opinion, people can exercise the same time and carry out the same exercise pattern each week without being exercise dependent. Overall, this study provided very strong support for the three factor model of body building dependence, as well as being valid in a female population (Smith et al.).

Model summary. Cafri et al. (2005) developed the Dysfunctional Body Change Behaviours Model in order to direct future research and provide a better understanding of the relationships between variables involved in the pursuit of muscularity. The benefit of the Dysfunctional Body Change Behaviours Model is that the relationships hypothesized in the model are based on literature findings and the model was developed from a previously confirmed model, the Tripartite Influence Model (van den Berg et al., 2002). Through the use of the Dysfunctional Body Change Behaviours Model important predictors of body dissatisfaction and resulting psychological and behavioural variables

exhibited in weight lifters can be examined. The components of the Dysfunctional Body Change Behaviours Model include biological factors, body image problems, sporting participation, and psychological functioning, which all interact to result in various health risk behaviours. Further investigation into the specific components of the model is required, due to the equivocal findings on which the model is based. Therefore, the model will be used as a guiding tool in the research of body image variables involved in the striving for increased muscularity. As such, the current study is appropriate in operationalising components of the model and testing these components to either confirm or refute the modified version of the Dysfunctional Body Change Behaviours Model (see Figure 2 for the modified model). By assessing the components of the Cafri et al. model, the current modified version may be confirmed, or alternative models may be suggested and contribute to the understanding of body image in those individuals who desire increased muscularity.

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