

The effect of body dissatisfaction on eating disorder symptomatology: Mediating effects of depression and low self-esteem

A partial test of the Dual-Pathway Model

Ida Cecilie Jonstang



Master of Philosophy in Psychology

Department of Psychology

UNIVERSITETET I OSLO

May 2009

Acknowledgements

The present study is part of a project conducted by Inge Brechan for the department of psychology at the University in Oslo. The project is an investigation of the relationship between body image, emotions and eating behaviours among adolescents, and the current study tested independent research questions relevant to this.

The project was approved by the Regional komité for medisinsk og helsefaglig forskningsetikk Sør-Øst (REK Sør-Øst, reference number 375-08596c, 2008/14680) and by Personvernombudet for forskning ved Norsk samfunnsvitenskapelig datatjeneste (reference number 20105).

I have enjoyed writing this master thesis. It has been an interesting and instructive task, which has given me an initial insight into the process of conducting research. I have benefited from the support of a number of people. I should like to thank the schools, which agreed to participate. In particular, I thank the junior high-school pupils who volunteered in this study. Special thanks go to my supervisor Inge Brechan, who contacted the schools and who provided me with a complete questionnaire, of which I used selected parts for the purpose of this study. I should like to thank Inge for his guidance throughout this process, especially in terms of constructive critique and inspiration while writing my paper. I should also like to thank Pat Kinnear, who helped me think and write more clearly.

Ida Cecilie Jonstang

May 2009

Table of Contents

Acknowledgements	i
Table of Contents	ii
Abstract	1
Introduction	2
Eating Disorders: Definitions	2
<i>Bulimia nervosa and anorexia nervosa.</i>	2
<i>The spectrum hypothesis and the transdiagnostic theory.</i>	3
Eating Disorders: Incidence and Prevalence	4
Eating Disorders: Risk Factors	4
The Dual-Pathway Model (Stice, 2001)	5
Body Dissatisfaction	5
<i>Definition of body dissatisfaction.</i>	6
<i>The relationship between body dissatisfaction and eating disorders.</i>	6
<i>The relationship between body dissatisfaction and eating disorders among genders.</i>	7
Sociocultural Factors	8
<i>The media as a source of body dissatisfaction through ideal body internalisation.</i>	8
<i>The role of peer and family influences in developing body dissatisfaction.</i>	9
Dieting	10
Negative Affect	11
<i>The relationship between negative affect and body dissatisfaction.</i>	11
<i>The relationship between negative affect, body dissatisfaction and bulimic symptoms.</i> ..	11
<i>The relationship between negative affect, emotional eating and eating disorders.</i>	12
<i>The relationship between negative affect and anorexic symptomatology.</i>	14
<i>Depression as an indicator of negative affect.</i>	15
<i>Low self-esteem as an indicator of negative affect.</i>	16
Objective and Conceptual Model	17
Methodology	18
Participants	18
Design	19
Materials	19
<i>Body dissatisfaction.</i>	19
<i>Self-esteem.</i>	20
<i>Depression.</i>	20
<i>General eating disorder symptoms.</i>	21
<i>Bulimic symptoms.</i>	22
<i>Demographic variables.</i>	22
Procedure	23
Results	24
Preliminary Analyses	24
<i>Statistical power.</i>	24
<i>Assessing normality.</i>	25
<i>Checking for outliers.</i>	26
<i>Descriptive statistics.</i>	26
Relationship between Variables	28
<i>Pearson correlation coefficients.</i>	28
<i>Comparing correlation coefficients for boys and girls.</i>	30
Predicting Eating Disorder Symptomatology using Multiple Regression Analyses	31

<i>The effect of depression and low self-esteem on eating disorder symptomatology when body dissatisfaction is controlled.</i>	32
<i>The direct effect of body dissatisfaction on various eating disorder symptoms when the mediator variable is controlled.</i>	33
<i>Calculation of the total effect.</i>	35
Sobel Tests for Mediation	36
Gender Differences: Effects of Mediation by Depression and Self-esteem for Boys and Girls in Predicting Eating Disorder Symptoms	37
<i>Depression as the mediator variable.</i>	37
<i>Self-esteem as the mediator variable.</i>	38
Discussion	39
Summary of Results	39
<i>The relationship between body dissatisfaction and eating disorder symptoms between genders.</i>	39
<i>Mediating effects of depression and low self esteem.</i>	40
<i>Mediating effects of depression between genders.</i>	40
<i>Mediating effects of low self-esteem between genders.</i>	41
Interpretation of Findings in Relation to Previous Research	41
<i>Eating disorders.</i>	41
<i>Eating disorders and gender differences.</i>	41
<i>Risk factors: body dissatisfaction.</i>	42
<i>Risk factors: mediating effect of depression.</i>	43
<i>Risk factors: mediating effect of low self-esteem.</i>	44
Limitations of the Study	45
Implications for Treatment and Prevention	46
Implications for Future Research	47
References	51
Appendix A	58
Appendix B	59
Appendix C	62
Appendix D	63
Appendix E	64

Abstract

Aim. The present study is based on the dual-pathway model (Stice, 2001), specifically testing the negative affect pathway of this model. This study examined whether depression and low self-esteem separately mediate the relationship between body dissatisfaction and general eating disorder symptomatology, focusing primarily on restraint eating and bulimic symptoms.

Method. A sample of 113 junior high-school boys and girls completed measures of body dissatisfaction, self-esteem, depression, general eating disorder symptoms, including those of restraint eating and bulimic symptoms.

Results. Mediating effects of depression and self-esteem were found in predicting general eating disorder symptoms, including restraint eating. It was found that depression mediates the relationship between body dissatisfaction and bulimic symptoms, whereas self-esteem did not significantly mediate this relationship.

Discussion. Findings indicate that the mediating effect of depression has a greater influence in predicting eating disorder symptoms than the mediating effect of self-esteem. The effects of mediation by depression and self-esteem have a greater influence on the prediction of eating disorder symptoms among boys than among girls. Findings support selected parts of the dual-pathway model and have implications for treatment and prevention programs in this field.

Introduction

Eating disorders (ED) have received growing attention in the past few decades (Polivy & Herman, 2002). They are considered some of the most prevalent and problematic disturbances within psychopathology, especially in Western societies (Shroff & Thompson, 2006; Stice, 2002; Stice & Shaw, 2002). Eating disorders are defined in the Diagnostic and Statistical Manual (DSM) (American Psychiatric Association [APA], 2000, p. 583) as “mental disorders that are characterised by severe disturbances in eating behaviour”, and which are further marked by incidents of relapse (Stice & Shaw, 2002). Disordered eating has been linked to other co-morbidities, such as depression, which substantiate the complexity of the problem (Burton, Stice, Bearman, & Rohde, 2007; Stice, Burton, & Shaw, 2004). Attention should be given to eating disorders as they represent a substantial threat to public health in modern societies. For instance, eating disorders have high rates of treatment seeking, inpatient hospitalisation, mortality and attempted suicide (Newman et al., 1996; Wilson, Heffernan, & Black, 1996, both cited in Stice & Shaw, 2002). In order to attain a healthier society it will be necessary to study those factors that predict and maintain eating disturbances. These factors evolve from biological, cognitive, social and psychological perspectives and may work together in multifactorial models (Polivy & Herman, 2002). Despite extensive research in the field, the etiology of ED is still indefinite (Tyrka, Waldron, Graber, & Brooks-Gunn, 2002).

The aim of the present study is to examine possible risk factors to pathology, and the relationship between them. The study is based on the dual-pathway model, specifically testing selected features of this model. The study investigates one of the two pathways to eating pathology, which is negative affect. In particular, the effect of body dissatisfaction on eating disorder symptomatology is examined, and mediating effects of depression and self-esteem are explored. The current paper will begin with defining important concepts and mechanisms relevant to the research question, and give a critical review of existing research in the field.

Eating Disorders: Definitions

Bulimia nervosa and anorexia nervosa. This study will outline two types of eating disorders in relation to potential risk and maintenance factors. These are Bulimia Nervosa (BN) and Anorexia Nervosa (AN). BN is characterised by “repeated episodes of binge eating followed by inappropriate compensatory behaviours to avoid weight gain at least twice a

week for 3 months” (APA, 2000, p. 589). Two subtypes of BN are identified in the DSM. The non-purging type represents individuals who engage in behaviours such as fasting and excessive exercise. The purging type describes individuals who engage in alternative compensatory behaviours including self-induced vomiting or the misuse of laxatives, diuretics, or enemas to compensate for bingeing.

Diagnostic features of AN include “the refusal by individuals to maintain a minimal normal body weight, for example, that the individual weighs less than 85 % of the weight that is considered normal for a person’s age and height” (APA, 2000, p. 583). According to the DSM (APA, 2000) clinical features involve the misperception of body weight and shape, and a substantial fear of weight gain. Those who are diagnosed tend to be amenorrheic due to extremely low body weight (Polivy & Herman, 2002), although amenorrhea itself is not verified as a criterion of AN (Grave, Calugi, & Marchesini, 2008). The DSM identifies two subtypes of AN. The restricting type is characterised by weight loss through dieting, fasting or excessive exercise. Binge eating and purging represent another subtype that is characterised by weekly incidents of binge eating and purging. This type differs from BN in that individuals are extremely underweight according to the diagnostic criteria often resulting in amenorrhea (Polivy & Herman, 2002). Some individuals who are diagnosed with AN at baseline may eventually gain weight, but continue to binge and purge, consequently developing BN, causing a change in ED diagnosis (APA, 2000; Fairburn, Cooper, & Shafran, 2003).

The spectrum hypothesis and the transdiagnostic theory. The *spectrum hypothesis* proposes that eating disorders represent one syndrome that is expressed in different ways (Van Der Ham, Meulman, Van Strien, & Van Engeland, 1997). Fairburn, Cooper et al. (2003) have conducted research in support of the spectrum hypothesis, suggesting that eating disorders need to be considered as an entirety to which individuals may move between different diagnostic criteria. They presented a *transdiagnostic theory* implying that anorexia nervosa and bulimia nervosa are characterised by common, yet distinctive, clinical features (Fairburn, Cooper et al., 2003). This view has been supported by recent research in the field (Haines & Neumark-Sztainer, 2006; Neumark-Sztainer et al., 2007).

Contrary to these findings, Stice (2002) criticises research for lacking specificity about the factors unique to the different eating disorders. However, research concerning specificity is incomplete and inconsistent (Bardone-Cone, Abramson, Vohs, Heatherton, & Joiner Jr., 2006;

Joiner, Katz, & Heatherton, 2000, cited in Ricciardelli & McCabe, 2004; Shaw, Stice, & Springer, 2004; Tyrka et al., 2002; Vohs, Bardone, Joiner, Abramson, & Heatherton, 1999; Vohs et al., 2001). The current study is based on the spectrum hypothesis and will follow the line of argument by the transdiagnostic theory. Most research is concerned with symptoms of BN (Bardone-Cone et al., 2006; Chen & le Grange, 2007; Fairburn, Stice et al., 2003), because BN seems to be more prevalent among the diagnosed population (Hoek, 2006; Nasjonalt Kunnskapssenter for Helsetjenesten [NKH], 2004). Yet, AN is a serious health-threatening problem in need of extensive research (Wilson, 2005).

Eating Disorders: Incidence and Prevalence

Eating disorders represent an increasing problem in modern societies (APA, 2000), which affects both males and females in different age groups (Polivy & Herman, 2002). However, eating disorders seem to be gendered with more than 90% of diagnoses occurring in females (APA, 2000, p. 587). Approximately 2 % of the female population are diagnosed with either AN or BN, of this 0.2-0.5 % constitutes AN and 1.5 % constitutes BN (Hoek, 2006; NKH, 2004). According to the DSM (APA, 2000, p. 587) eating disorders typically begin in adolescence (age 14-18 years), and females in the ages 15-45 represent the most vulnerable group. From a feminine view, this gender difference may be explained by the *objectification theory*, proposing that females are more susceptible to eating disorders than males because of sexual objectification and the implications that follow from this (Fredrickson & Roberts, 1997). However, Ricciardelli and McCabe (2004) stress that when partial syndrome eating disorders are accounted for this increases the prevalence of both AN and BN in males, a similar trend to that identified in females (The McKnight Investigators, 2003). It should be noted that dysfunctional eating not always fulfil the DSM diagnostic criteria, which is referred to as sub-clinical illness by The McKnight Investigators (2003). Hence, the number of individuals with eating problems may be underrepresented and further disguise the prevalence of the problem.

Eating Disorders: Risk Factors

There are multiple potential causes of eating disorders, some with stronger contributory value than others (Polivy & Herman, 2002). Some risk factors are studied separately (univariate approach), whereas other factors are assembled in multivariate models. The consensus of

literature ascertains that the causes of eating disorders are composite (Interesseorganisasjonen for Kvinner med Spiseforstyrrelser, Retrieved December 3, 2008, from <http://www.iks.no>), indicating interrelations among various risk and maintenance factors. These interactions between factors make EDs difficult to understand because of the multiple pathways to pathology (Stice & Shaw, 2002).

The Dual-Pathway Model (Stice, 2001)

The *dual-pathway model* is a multivariate etiological approach towards bulimic symptomatology among girls (Stice, 2001). The model is outlined in Figure 1. The model proposes that sociocultural factors, specifically the social pressure to be thin and thin-ideal internalisation (Stice, 1994), promote body dissatisfaction. Body dissatisfaction, in turn, predicts bulimic symptoms via two mediator variables: dieting, negative affect or both. For example, Grilo (2004) found that the combination of dieting and negative affect indicates greater body dissatisfaction and more eating related symptoms than dieting alone. Extensive research shows that pressure to be thin, thin-ideal internalisation, body dissatisfaction, dieting and negative affect separately predict bulimic behaviour (see overview in Stice, 2001). Furthermore, Stice (2001) recognised the need to study the relation between these factors in predicting pathology. The theoretical components of the dual-pathway model are discussed next.

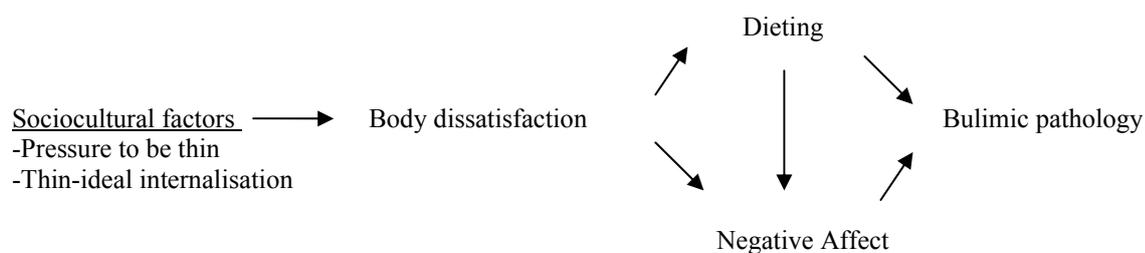


Figure 1
Theoretical Components of the Dual-Pathway Model (Stice, 2001)

Body Dissatisfaction

One possible predictor of eating disturbances is body image. Body image is a multidimensional phenomenon whereby the main focus is on body appearance in modern societies (Cash & Pruzinsky, 2002). Negative body image consists of two components: one evaluative (body dissatisfaction) and one investment (importance) (Cash, 1994; 2002a; 2002b,

all cited in Cash, Melnyk, & Hrabosky, 2004). Cash, Melnyk et al. (2004) found that body dissatisfaction and body importance contributed significantly to the development of eating disorders. However, it is important to differentiate between the two concepts (Allen, Byrne, McLean, & Davis, 2008; Stice & Shaw, 2002). High body image importance is the overconcern of body appearance (Stice & Shaw, 2002), whereas body dissatisfaction refers to negative subjective perceptions and attitudes about one's body (Cash & Pruzinsky, 2002). Polivy and Herman (2002) further highlight the distinction between body dissatisfaction and body misperception (overestimation of body size), whereby body distortions are typical for those diagnosed with AN (APA, 2000). Current research will focus on the role of body dissatisfaction as one of the leading risk and maintenance factors of eating disorders (Thompson, 2000).

Definition of body dissatisfaction. Body dissatisfaction has been defined as the discrepancy between the actual and ideal body weight and shape (Polivy & Herman, 2002). However, this definition is inaccurate considering that some who are close to the ideal may not be satisfied with their bodies and vice versa (Cash & Pruzinsky, 2002; Polivy & Herman, 2002). Polivy and Herman (2002) argue that appropriate methods to measure body dissatisfaction involve strategies to which people report specifically what body part is causing dissatisfaction. For example, Stice and Shaw (2002, p. 985) define body dissatisfaction as referring to “negative subjective evaluations of one's physical body, such as figure, weight, stomach and hips”.

The relationship between body dissatisfaction and eating disorders. Extensive research has investigated body dissatisfaction in relation to body change attitudes and behaviours (e.g., McCabe & Ricciardelli, 2004; Ricciardelli & McCabe, 2003). Body dissatisfaction has been identified as a prominent factor in the development of clinical eating disorders (Patton, Johnson-Sabine, Wood, Mann, & Wakeling, 1990, cited in Cooley & Toray, 2001b) and in sub-clinical problematic eating (Thompson, Covert, Richards, Johnson, & Cattarin, 1995, cited in Cooley & Toray, 2001b). Noteworthy too, is that changes in body satisfaction may depend on type of ED diagnosis. For instance, bulimic patients showed improvements in body satisfaction during inpatient psychosomatic treatment, whereas body dissatisfaction remained stable in anorexic patients (Benninghoven et al., 2006). These findings demonstrate that body dissatisfaction is implicated in both AN and BN.

The relationship between body dissatisfaction and eating disorders among genders.

Body dissatisfaction has been correlated to eating disorders among adolescent girls (e.g., Johnson & Wardle, 2005; Stice, 2001; Stice, Presnell, & Spangler, 2002; Wertheim, Koerner, & Paxton, 2001), among college women (Cooley & Toray, 2001a; 2001b) and among middle-aged women (Tiggemann, 2004). Research has recently emphasised body dissatisfaction in relation to the development of eating disorders and health-threatening behaviours among boys (e.g., Cafri, van den Berg, & Thompson, 2006; Ricciardelli & McCabe, 2004; Smolak, Murnen, & Thompson, 2005) and men (McCabe & Ricciardelli, 2004).

Body dissatisfaction among males has been linked to a number of health-threatening behaviours related to increased muscle tone, such as steroid use and food supplements (Cafri et al., 2006; Cafri, Thompson et al., 2005; Smolak et al., 2005), exercise dependence and eating disorders (Cafri et al., 2006; Cafri, Thompson et al., 2005; Ricciardelli & McCabe, 2004). In extreme cases males may develop muscle dysmorphia, which is related to body dissatisfaction and eating disorders (Cafri, Thompson et al., 2005; Ricciardelli & McCabe, 2004). Ricciardelli and McCabe (2004) found that similar factors are involved with muscularity and disordered eating among adolescent boys. On the contrary, Cafri, Thompson et al. (2005) argue that alternative eating behaviours, such as cyclical ketogenic diets, describe the pursuit of the muscular ideal. For example, males may adapt to strict food regimes, such as dieting to gain weight and in combination with dieting to lose weight (Cafri, Thompson et al., 2005). Interestingly, individuals adapting to such systematic eating behaviours are at increased risk of developing AN and BN (Goldfield, Blouin, & Harper, 1998, cited in Cafri, Thompson et al., 2005).

Previous research holds that body dissatisfaction is a greater risk factor in developing disordered eating among females than among males (Ricciardelli & McCabe, 2004). However, this finding might be due to an artefact because of the use of inappropriate measurement apparatus for males (Tiggemann, 2004). Body dissatisfaction becomes difficult to measure among boys because some may want to change their body weight, but not the shape of their body and vice versa (Tiggemann, 2004). It becomes important, therefore, to clarify the meaning of body dissatisfaction when it is measured. For instance, appropriate measures for body dissatisfaction in boys should differentiate between measures of muscularity, such as weight gain (body muscle) and weight reduction (body fat) (Tiggemann, 2004).

Overall, body dissatisfaction seems to have a considerable role in causing disordered eating across gender. It becomes important, therefore, to examine the potential factors and circumstances leading to body dissatisfaction.

Sociocultural Factors

One potential source of body dissatisfaction is social influences as transmitted by family, peers and the media (Polivy & Herman, 2002; Stice, 1994). Recently, Shroff and Thompson (2006) replicated the tripartite influence model of body image and eating disturbance, originally suggested by Thompson, Covert and Stormer (1999), and empirically tested by Keery, van den Berg and Thompson (2004). The tripartite influence model represents a theoretical approach to explaining body image dissatisfaction, and holds that three influences (peers, parents and media) are vital precursors in this development. The model suggests two mediating processes that affect body dissatisfaction. These are the internalisation of societal standards of appearance and appearance comparison. The model assumes too that body dissatisfaction has a direct effect on restrictive eating and bulimic behaviours. This assumption indicates that body dissatisfaction is a causal risk factor for pathological eating, which has previously received support with adolescent and adult female populations and with boys (Keery et al., 2004; Smolak et al., 2005).

The media as a source of body dissatisfaction through ideal body internalisation.

The thin-ideal body shape for females is valued and reflected through the media (Cafri, Yamamiya, Brannick, & Thompson, 2005). In their meta-analysis of data on female participants, Cafri, Yamamiya et al. (2005) found that three particular constructs are implicated in the development of body dissatisfaction: (1) awareness of a thin ideal in the media, (2) internalisation of the thin ideal, and (3) perceived pressures to be thin. A recent study found that thin-ideal media susceptibility was related to restraint eating directly and indirectly through body dissatisfaction in female students (Anschutz, Engels, & Van Strien, 2008). The sociocultural ideal for males is lean and muscular. Boys may experience perceived social pressure to conform to the muscular ideal in similar ways as girls may feel pressured to conform to the thin-ideal (McCabe & Ricciardelli, 2005; Smolak et al., 2005). For example, boys became influenced by media images when moderated by the level of internalisation, appearance importance and social comparison (Cafri et al., 2006; Jones, 2004).

Importantly, most people who are exposed to messages about the body ideal in the media do not develop disordered eating (Polivy & Herman, 2004). Hence, the internalisation of a thin-ideal and pressures to be thin are more strongly related to body image than simple awareness (Cafri, Yamamiya et al., 2005). For instance, Striegel-Moore, Silberstein and Rodin (1986, cited in McCabe & Ricciardelli, 2006) found that women who internalise the sociocultural messages about the thin-ideal are at greater risk of developing bulimia compared to those who do not internalise these messages. However, other studies do not support these findings longitudinally. For example, ideal body internalisation did not increase body dissatisfaction among adolescent girls and boys (Bearman, Presnell, Martinez, & Stice, 2006).

The role of peer and family influences in developing body dissatisfaction. Peer and family influences may contribute to body dissatisfaction (Polivy & Herman, 2002). However, it is important to bear in mind that not all families and peer groups are preoccupied with being slim (Paxton, Schutz, Wertheim, & Muir, 1999, cited in Polivy & Herman, 2002). Peer and family influences may unfold directly, indirectly or both through displaying certain attitudes and behaviours. These attitudes and behaviours may be expressed through encouragement to stay slim, lose weight and build muscles, and through modeling and weight-related teasing (Wertheim et al., 2001). Subsequently, this can result in social comparison (Thompson et al., 1999). An individual who is comparing her body parts to thin-ideal images (Durkin, Paxton, & Sorbello, 2007) or to a fit peer (Krones, Stice, Batres, & Orjada, 2005; Wasilenko, Kulik, & Wanic, 2007) might develop dissatisfaction if a degree of deviation occurs. Similarly, family influences and especially mothers' criticism may lead to social comparison and body dissatisfaction among girls and boys (Keery et al., 2004; McCabe & Ricciardelli, 2004; Smolak et al., 2005). Modeling, on the other hand, did not predict body dissatisfaction in Stice's (2002) analysis, but it did predict bulimic pathology directly.

Research shows that there are various sociocultural risk factors involved in developing body dissatisfaction. Whichever factor is stronger remains uncertain. Some research suggests that media influences are more influential than peer and family influences in predicting body dissatisfaction (Wertheim, Paxton, Schutz, & Muir, 1997, cited in Polivy & Herman, 2002), whereas Shroff and Thompson (2006) found that peer and media influences were stronger predictors of body dissatisfaction than parental influences. In addition, some studies imply that important gender differences exist. For example, there is the assumption that adolescent girls are more vulnerable to sociocultural influences on eating behaviour than adolescent boys

(Ricciardelli & McCabe, 2001). However, Smolak et al. (2005) found that media, peer and parent influences were each related to muscle building techniques, such as food supplement and steroid use, in middle-school boys. These relationships were partially mediated by social comparison and carried implications for body esteem and depression among boys (Smolak et al., 2005).

It seems that the influences of peers, parents and the media cause body dissatisfaction in girls and boys, supporting the link between sociocultural factors and body dissatisfaction in the dual-pathway model (Stice, 1994; 2001). No single factor has yet proved adequate in predicting eating pathology (Polivy & Herman, 2002). Body dissatisfaction has been studied in relation to other vulnerabilities regarding disordered eating (Cooley & Toray, 2001b). It can predict eating pathology directly (Shroff & Thompson, 2006) or indirectly through other mediating variables (Stice, 2001).

Dieting

Dieting is one pathway to bulimic pathology as indicated in the dual-pathway model (Stice, 2001). One possible result of body dissatisfaction is the drive for thinness (Wertheim et al., 2001). The Relentless Pursuit of Thinness (RPT) may eventuate in attempts to lose weight, such as dieting (Stice & Shaw, 2002), and is identified as a feature of ED (Polivy & Herman, 2002). Research indicates that dieting is more common among girls than among boys (Sweeting & West, 2002). However, body dissatisfaction has been associated with dieting among girls and boys (Ricciardelli & McCabe, 2004). Dieting, in turn, predicts bulimic pathology. Stice (2001) found that the association between body dissatisfaction and bulimic behaviours became non-significant when dieting was controlled, suggesting effects of mediation. Other research does not support this view. Johnson and Wardle (2005) found that body dissatisfaction predicted bulimic symptoms directly, both cross-sectionally and longitudinally. The reason for this discrepancy, as suggested by Johnson and Wardle (2005) may be explained by the different measurement strategies used in the two studies. For example, body dissatisfaction as measured by Stice (2001) included the assessment of nine body parts, whereas Johnson and Wardle (2005) used a more general measure of body dissatisfaction examining global feelings of body image distress.

Hitherto, research is inconsistent about the role of dieting in the development of bulimic pathology. For instance, Presnell and Stice (2003) found that dieting appears to reduce bulimic symptoms in a randomised experiment. This finding represents a challenge to the dieting pathway of Stice's model (2001). Moreover, one may question whether dieting and bulimic behaviour are distinct experimental components as presented in the dual-pathway model or whether dieting is virtually part of bulimic pathology triggering caloric deprivation (Urbszat, Herman, & Polivy, 2002) and consequently bingeing. Hence, due to the obscure role of dieting in this relationship, the present study chooses to emphasise negative affect as the mediator variable between body dissatisfaction and ED symptoms.

Negative Affect

A second route to bulimic pathology is through negative affect (Stice, 2001). The role of negative affect in predicting eating pathology has received support in numerous research. For example, negative emotions and lower self-efficacy have been found to predict BN in women (Cooley & Toray, 2001b). On the other hand, Sim and Zeman (2006) found that adolescent girls who experienced problematic eating reported higher levels of negative affect. In particular, bingeing and compensatory behaviours have been linked to negative affect in a non-clinical population (Stice & Agras, 1998; Stice, Killen, Hayward, & Taylor, 1998, both cited in Cooley & Toray, 2001a). Moreover, cross-sectional studies (reported in a review by Ricciardelli & McCabe, 2004) illustrate that negative affect has been associated with eating disorders among adolescent boys.

The relationship between negative affect and body dissatisfaction. Body dissatisfaction is a possible risk factor for negative affect in predicting bulimic pathology (Stice, 2001; 2002). Conversely, induced negative affect has been found to increase body dissatisfaction in BN patients (Carter, Bulik, Lawson, Sullivan, & Wilson, 1996; Kulbartz-Klatt, Florin, & Pook, 1999, both cited in Polivy & Herman, 2002). These findings suggest that negative affect and body dissatisfaction are implicated in bulimic pathology.

The relationship between negative affect, body dissatisfaction and bulimic symptoms. Considerable research has found evidence for the assumption that negative affect mediates the relation between body dissatisfaction and bulimic symptoms. For instance, Stice (2001) found that when negative affect was controlled, there was no significant effect of body

dissatisfaction on bulimic symptoms. Sim and Zeman (2005) found that negative affect accounted for partial mediation between body dissatisfaction and bulimic pathology among girls. This mediation has been supported by data with boys (Ricciardelli & McCabe, 2001; Shephard & Ricciardelli, 1998, cited in McCabe & Ricciardelli, 2006). On the other hand, some studies do not sustain that negative affect predicts binge eating longitudinally (Stice, Akutagawa, Gaggan, & Agras, 2000, cited in McCabe & Ricciardelli, 2006), nor that negative affect predicts compensatory behaviour over a period of 8 months (Ricciardelli & McCabe, 2003, cited in McCabe & Ricciardelli, 2006). The inconsistency of findings may, perhaps, be explained by methodological limitations. First, one possible explanation is the duration of follow-up, as those studies indicating larger effects tend to have longer follow-up periods than those failing to show significance (McCabe & Ricciardelli, 2006). Second, the various ways that body dissatisfaction was measured, and third, the different ways to which negative affect was operationalised. For example, whether negative affect measured anxiety, depression or other aspects of negative affect.

Stice (2002) analysed the inconsistent findings of the role of negative affect in predicting bulimic symptoms. He concluded that general negative affect is a risk factor for bulimic pathology. In addition, for those individuals who are diagnosed, negative affect plays a persistent role in binge eating. Negative affect therefore seems to be a vital precursor in the development of bulimic symptomatology, and may contribute directly in the persistence of pathology for those who are diagnosed.

The relationship between negative affect, emotional eating and eating disorders.

Emotional eating is one aspect of dysfunctional eating pertinent to negative affect. Johnson and Wardle (2005) postulate that body dissatisfaction predicts emotional eating as a way of providing relief when experiencing negative affect. In support of this relationship, Anschutz et al. (2008) found that those who eat due to emotional reasons are more vulnerable to negative affect. Research shows that people who binge eat (Stice et al., 2002) and people with BN (Johnson & Larson, 1982, cited in Polivy & Herman, 2002) engage in emotional eating. Binge eating also occurs in a subgroup of patients with AN (Casper, Eckert, Halmi, Goldberg, & Davis, 1980; Garfinkel, Moldofsky, & Garner, 1980, both cited in Fairburn, Cooper et al., 2003) suggesting that a subgroup of those with anorexia nervosa may eat due to emotional triggering.

There are multiple reasons to why people engage in emotional eating. One explanatory reason may involve the lack of interoceptive awareness, which refers to the inability to identify internal feelings (Polivy & Herman, 2002). Sim and Zeman (2004) reported that girls with BN experienced more problems with the expression of emotion and lower interoceptive awareness. The objectification theory may account for this effect in girls, because some girls may lose contact with their inner selves due to objectification (and self-objectification) and so be preoccupied with physical appearance as opposed to their inner selves (Fredrickson & Roberts, 1997). For instance, Cooley and Toray (2001b) found that public self-consciousness and figure dissatisfaction together increased the likelihood of restraint and bulimic behaviours. Moreover, research (Heatherton & Baumeister, 1991, cited in Cooley & Toray, 2001a) suggests that those who engage in binge eating tend to be highly self-conscious with high demands about personal appearance. Emotional eating may reflect a maladaptive coping strategy for emotional problems in that those who are self-conscious and who worry considerably about second opinions seek relief from social and personal pressure (Polivy & Herman, 2002).

Further, compensatory behaviours seem to be part of unhealthy “solutions” to emotion and control issues. Those who eat because of emotional struggles may develop feelings of guilt (Polivy & Herman, 2002). One method of relieving guilt is by purging, which may also reduce anxiety, depression (Sanftner & Crowther, 1998; Steinberg, Tobin, & Johnson, 1989, both cited in Polivy & Herman, 2002) and anger (Milligan & Waller, 2000, cited in Polivy & Herman, 2002). Research has found that compensatory behaviours, such as vomiting, laxative misuse and diuretic misuse, are more common in females than in males, whereas no difference was found for exercise between the genders (Anderson & Bulik, 2004).

In boys, emotional eating may be explained by the perceived pressure to conform to the masculine stereotype about being powerful and strong physically and psychologically. Hence, boys may lose contact with their inner feelings as these should not be expressed according to the socially constructed gender role (Connell, 1995; 2000; Watson, 2000). This assumption highlights the detrimental effect of social constructions on health. Overall, emotional eating is related to negative affect in two ways: (1) negative affect may trigger overeating due to lack of internal awareness as a result of social pressure and body dissatisfaction, and (2) emotional eating may lead to negative affect, such as feelings of guilt, and predict purging behaviours.

The relationship between negative affect and anorexic symptomatology. Research tends to emphasise the relationship between negative affect and bulimic pathology often based on affect regulation (i.e. emotional eating and compensatory behaviours). On the basis of the spectrum hypothesis and the transdiagnostic theory, negative affect may too be essential in developing AN. For instance, the regulation of emotions may be central to those diagnosed with anorexia nervosa in that clinical features often comprise feelings of shame (Skårderud, 2007), insecurity and anxiety (Raney et al., 2008; Strober, Freeman, Lampert, & Diamond, 2007), causing a feeling of lack of control (Polivy & Herman, 2002).

Disordered eating in general is believed to reflect emotional conflicts (Interesseorganisasjonen for Kvinner med Spiseforstyrrelser, Retrieved December 3, 2008, from <http://www.iks.no>). Stice (1994) suggests that identity confusion may influence the level of internalisation of social pressures in the development of eating pathology. Specifically, people who experience problems related to identity may conform to the thin ideal as a way to gain acceptance (Stice, 1994). Polivy and Herman (2002) support this view in suggesting that eating disorders reflect problems of identity and personal control. For example, people who feel they have limited control over certain aspects of their lives may become obsessed with controlling weight, shape and eating behaviours generating a (false) sense of control. Polivy and Herman (2002) refer to this as a maladaptive coping strategy to such problems. For instance, the objectification theory postulates that some women who experience being treated as bodies, interpersonally or through visual media, have limited personal control and may come to internalise the observer's view and commit to self-objectification (Fredrickson & Roberts, 1997). Muehlenkamp and Saris-Baglama (2002) found that self-objectification has direct effects on restrictive eating, bulimic behaviours and depressive symptoms among college women. This relationship has been supported by recent work on adolescents (Lindberg, Hyde, & McKinley, 2006). Ironically, manipulating the body to conform to the thin-ideal may lead to feelings of control in women (Fredrickson & Roberts, 1997). Consequently, unhealthy body-change behaviours may reflect symptoms of disordered eating.

In agreement with the above, Stice (2001) holds that body dissatisfaction may lead to eating disturbances through negative affect. Negative affect can be operationalised in different ways. Previous research is unclear about how negative affect is measured. In the dual-pathway model Stice (2001) defines negative affect as the more general term of distress. Research needs to specify how negative affect is measured to improve validity. For example, Stice et al.

(2002) found that depression and low self-esteem were stronger predictors to binge eating than anxiety and anger, supported also by Wertheim et al. (2001). Importantly too, body dissatisfaction predicts depression and low self-esteem in early adolescent girls and in mid-adolescent boys (Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006). On the basis of existing research, the present study will define negative affect in terms of depression and low self-esteem.

Depression as an indicator of negative affect. In medical terms depression is defined as (translated from Danish): “low mood with diminished happiness, energy and activity level” (Vestergaard, Sørensen, Kjølbye, & Videbech, 2008, p. 331). Depression seems to be gendered, with females reporting more of the symptoms than males (Bebbington, 1996). In particular, Bebbington (1996) claims that this gender difference appears in adolescence. However, Newmann (1984, cited in Nazroo, Edwards, & Brown, 1998) has found that boys are less likely to report sub-clinical symptoms of depression than girls, which could explain parts of the difference. Body dissatisfaction has been associated with depression in adolescent boys and girls (e.g., Bearman et al., 2006; Paxton, Neumark-Sztainer et al., 2006), although this relationship is not significant in other studies (Davison & McCabe, 2006). Research by Bearman, Stice and Chase (2003) reveals that an intervention targeting body dissatisfaction diminishes symptoms of both depression and BN over a period of 3 months, but not after 6 months, suggesting short-term benefits only.

Eating disorders have been correlated to depression repeatedly among females (Pomeroy, 2001, cited in Shroff & Thompson, 2006; Stice, Hayward, Cameron, Killen, & Taylor, 2000, cited in Stice & Shaw, 2002; Wardle, Waller, & Rapoport, 2002, cited in Johnson & Wardle, 2005) and among males (Cafri, Thompson et al., 2005), but the direction of causality is unclear. On the one hand, because similar symptoms are observed among those who experience starvation, the DSM suggests that depressive symptoms are possible outcomes of AN (APA, 2000). On the other hand, Burton et al. (2007) conducted a randomised experiment with 145 female participants with elevated depressive symptoms and the findings demonstrate that by decreasing depressive symptoms bulimic pathology may be reduced, suggesting that depressive symptoms may lead to bulimic pathology. Stice et al. (2004) found that depressive symptoms predicted onset of bulimic pathology and that bulimic symptoms predicted depressive symptoms, indicating a two-way relationship.

AN and BN patients experience a number of symptoms, which may reflect the Major Depressive Disorder (APA, 2000). For example, many individuals with AN have symptoms, such as depressed mood, social withdrawal, irritability, insomnia and diminished interest in sex (APA, 2000).

Low self-esteem as an indicator of negative affect. Self-esteem is described by Rosenberg (1965, p. 30) as a “positive or negative attitude toward a particular object, namely, the self”. Low self-esteem is a negative attitude toward the self. According to Cash (2002) positive attitudes towards the self may reflect higher levels of self-esteem and body satisfaction, whereas negative attitudes towards the self may reflect lower levels of self-esteem and body dissatisfaction (Cash, 2002).

Numerous studies have found a relationship between body dissatisfaction and low self-esteem among males and females (Cafri et al., 2006; Johnson & Wardle, 2005; Paxton et al., 2006; Ricciardelli & McCabe, 2004; Tiggemann, 2004). For instance, Tiggemann (2004) found that the level of a woman’s body satisfaction has important consequences for her self-esteem. Johnson and Wardle (2005) found that body dissatisfaction promotes low self-esteem among adolescent girls. Moreover, Cafri et al. (2006) reported several studies in their review that have found large to moderate effects between muscle dissatisfaction and poor self-esteem in males. However, some possible gender differences may exist. First, research has found that girls endorse lower levels of self-esteem than boys (Hoare & Cosgrove, 1998, cited in McCabe & Ricciardelli, 2004). Second, research shows that adolescent girls are more concerned about others’ opinions in predicting self-esteem, whereas for boys, general attractiveness is important for self-esteem (Davison & McCabe, 2006). Third, it was concluded in a meta-analysis that body dissatisfaction will impact on women’s self-esteem to a larger degree than for men (Miller & Downey, 1999, cited in Tiggemann, 2004)

Existing literature ascertains that there is a relationship between body dissatisfaction, low self-esteem and eating pathology. For instance, there is a relation between body dissatisfaction and eating disturbances with direct effects on self-esteem (Shroff & Thompson, 2006; Stice & Shaw, 2002). Body dissatisfaction is implicated in both BN and AN, for example, body weight and shape are important for self-evaluation in both disorders (APA, 2000), which impacts on self-esteem. The DSM (APA, 2000) asserts that self-esteem among individuals with AN is dependent on body shape and weight. Weight loss is valued and may improve self-

esteem, whereas weight gain is perceived as a personal failure of self-control, thus acting negatively on self-esteem (APA, 2000). Further, Bardone-Cone and Cass (2007) found that women exposed to a pro-anorexia website displayed lower social self-esteem compared to a control group. In contrast, a self-esteem program for reducing eating disorder risk factors proved ineffective in practice (Wade, Davidson, & O'Dea, 2003). These results contradict previous findings (by O'Dea & Abraham, 2000, cited in Wade et al., 2003) and could be due to methodological limitations, such as the way in which the program was carried out (Wade et al., 2003). Several studies (reported by Ricciardelli & McCabe, 2004) claim that low self-esteem in adolescent boys is correlated to disordered eating. However, findings by Ricciardelli and McCabe (2003, cited in Ricciardelli & McCabe, 2004) illustrate no relation between low self-esteem and weight loss behaviour over a period of 8 months among boys.

Overall, several studies seem to support the roles of depression and low self-esteem as indicators of negative affect with relation to body dissatisfaction and various eating disorders across gender.

Objective and Conceptual Model

Research has previously suggested different risk factors and models in predicting eating disorders. Due to the complexity of eating disorders with the many factors (risk, maintenance, mediators and moderators) involved, this paper is confined to evaluate some specific factors and the relations between them. The present study is partly based on Stice's (2001) dual-pathway model of bulimic pathology, particularly testing selected features of the original model.

The rationale of present study is to evaluate Stice's (2001) model, with the main objective of criticising existing findings, and in light of this, present new and possibly improved areas of research. The study is concerned with body dissatisfaction and negative affect as two risk factors to eating pathology. Specifically, the current study aims to test whether negative affect mediates the relationship between body dissatisfaction and eating disorder symptomatology. In this study, negative affect operates through measures of depression and low self-esteem as opposed to the original model's general measure of distress. The study is based on the notion that common risk and maintenance factors exist for the various eating disorders, which is sustained by the spectrum hypothesis (Van Der Ham et al., 1997) and the transdiagnostic

theory (Fairburn, Cooper et al., 2003). The current study examines the mediating effects of eating disorders in general, focusing primarily on restrictive eating and bulimic symptoms, but not solely bulimic pathology. The following conceptual model is tested (Figure 2). The model is conducted separately for low self-esteem and for depression. The model is also tested separately with restrained eating (AN), bulimic pathology (BN) and general eating disorder symptoms (ED). Given that problematic eating may begin in adolescence (APA, 2000), participants in this study are adolescent girls and boys. Research indicates that boys, as well as girls, suffer from disordered eating. Hence, gender differences are considered.

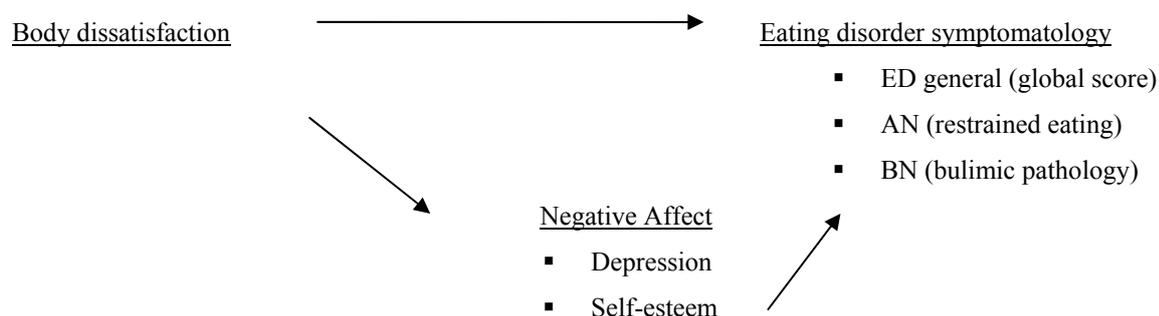


Figure 2

The Conceptual Model is Tested separately for low Self-esteem and for Depression, for the Various Eating Disorder Symptoms (AN, BN and ED general), and for Adolescent Girls and Boys

Considerable research has been concerned with identifying risk factors of eating pathology. Limited research has focused on the theoretical framework underlying these relations. From a psychological perspective, theoretical arguments are essential in understanding the development of disordered eating. The present study attempts to explain results with relevance to theory.

Methodology

Participants

A total of 113 junior high-school boys (n = 50) and girls (n = 61) participated. Two of the participants did not give their sex status. Participants were in the 10th grade and were recruited

from seven classes at two public junior high-schools in Oslo. The mean age was 15 (S.D. = 0.00). Approximately 90% of the sample who reported their ethnicity were North-European.

Design

The present study is part of a more comprehensive project. The original study was conducted by Ph.D. student Inge Brechan for the department of psychology at the University in Oslo. The project is an investigation of the relationship between body image, emotions and eating behaviours among adolescents. It is a quantitative, questionnaire based study and has a short-term longitudinal design with the intention to measure the same psychological variables at three time points: December (T1), March (T2), and June (T3). Participants will take part in all three conditions. The current study examines parts of the original study and uses selected measures of the questionnaire to test independent research questions. The questionnaire was described as an investigation of feelings toward the body and relationship to food among adolescents. The present study is based on baseline data (T1) collected in December 2008.

Materials

The study consisted of a questionnaire, which included randomly generated ID numbers of participants. The questionnaire comprised several self-report measures, and some of these were selected for the purpose of this study.

Body dissatisfaction. The Body Satisfaction Scale (Alsaker, 1992) was used to assess body dissatisfaction and was initially developed for adolescents. The scale comprises four items that measure general satisfaction/dissatisfaction with body and appearance. Participants were asked to indicate their general level of body satisfaction along a six-point scale ranging from *does not apply at all* to *applies exactly*. Sample items include “I would like to change a good deal about my body” and “By and large, I am satisfied with my looks”. The present study used the Norwegian version of the scale as described in Kraft, Breivik, Røysamb and Holsen (2001). Two of the items needed to be reversed and all four items were averaged for analyses. According to Alsaker (1992) the Body Satisfaction scale has good internal consistency, with Cronbach’s alpha coefficient reported of .82. In the current study the Cronbach’s alpha coefficient was .89 ($n = 112$). According to Nunnally (1978) scales are reliable if they have an alpha value greater than 0.7.

Body dissatisfaction is best measured by strategies to which people report specifically what underlies their dissatisfaction (Polivy & Herman, 2002). An additional item was added to measure body dissatisfaction in more definite terms (i.e. “If you are concerned about your appearance, what specifically bothers you about your appearance? Write your response on the lines below”). The item was derived from the Body Image Disturbance Questionnaire (BIDQ) (Cash, Phillips, Santos, & Hrabosky, 2004), which was initially developed to assess characteristics related to body dysmorphic disorder in a non-clinical population. The BIDQ item was adopted for the purpose of the expanded method of measurement for body dissatisfaction in this study.

Self-esteem. The Rosenberg Self-Esteem Scale (RSES) was used to measure global self-esteem (Rosenberg, 1965). Self-esteem was measured by a ten-item scale, which has been used in studies with adolescents (Wertheim et al., 2001). The majority of previous research has found satisfactory internal consistency reliability with Cronbach’s alpha coefficients of, for example, .81 (Bosson, Pinel, & Thompson, 2008) .82 (Shaw et al., 2004), and .88 (Jarry & Kossert, 2007). The scale in the present study has satisfactory internal consistency reliability with a Cronbach’s alpha of .89 ($n = 111$). Participants indicate their level of agreement or disagreement with each item along a four-point scale, ranging from *strongly disagree* to *strongly agree*. Sample items include “I feel that I have a number of good qualities” and “I feel I do not have much to be proud of”. Five of the items needed to be reversed and all ten items were averaged for analyses. A low score indicates low self-esteem. This study used a Norwegian translation of the scale, which has been used in previous research (Brechan, 2007, August).

Depression. A shorter version of the Center for Epidemiologic Studies Depression Scale (CES-D 10) was employed to measure depressive symptoms in a non-clinical population (Andresen, Malmgren, Carter, & Patrick, 1994). The original CES- D consists of 20 items and was developed by Radloff (1977). Ten items comprise the shorter form (CES-D 10) and results demonstrate good reliability and validity for this version (Andresen et al., 1994). Internal consistency (Cronbach’s alpha) for this study was .69 ($n = 106$), which is just below the acceptable value of 0.7 (Nunnally, 1978). Statistics show that one item (i.e. “I felt hopeful about the future”) in this scale has the most negative impact on the final alpha value. When checking the corrected item-total correlation for this item, the item’s value was -.261, which is considered a low value of less than 0.3 (Pallant, 2005). However, the item was

retained in the scale in order to compare findings with other studies that have used this scale. Participants rated each item in terms of the frequency that each mood or symptom occurred during the past seven days on a four-point scale, ranging from *no days* to *5-7 days*. Sample items are “I felt that everything I did was an effort” and “I felt depressed”. The current study used the Norwegian version of the scale, which has been used in previous research (Brechan, 2007, August). Two positive mood items were reversed, and all ten items were averaged for analyses. Higher scores indicate more depressive symptoms during the past seven days.

General eating disorder symptoms. The Eating Disorder Examination – Questionnaire (EDE-Q) was used to assess general eating disorder symptoms including those related to the psychopathology of anorexia nervosa (Fairburn & Beglin, 1994). The EDE-Q is a self-report measure based on the Eating Disorder Examination (EDE) interview (Fairburn & Cooper, 1993), which is suitable for use in non-clinical populations (Fairburn & Cooper, 1993). EDE has acceptable reliability and validity (Luce & Crowther, 1999) and is previously used in the assessment of adolescents (Binford & le Grange, 2005). Results show that EDE-Q is a satisfactory alternative to EDE (Fairburn & Beglin, 1994). Research has previously used the EDE-Q to reflect restraint eating, body and weight concerns with Cronbach’s alpha values of .77 and .94 respectively (Ross and Wade, 2004).

Four key subscales comprise the EDE-Q: (1) Eating Restraint, (2) Eating Concern, (3) Shape Concern, and (4) Weight Concern, in addition to a global score that combines the four. In this study, 22 items assessed symptoms of general eating disorders and dietary restraint. Particularly, 5 items reflect restraint eating, 5 items reflect eating concerns, 8 items reflect shape concerns, and 5 items describe weight concerns. One item examines both shape and weight concerns. The EDE-Q is concerned with participants’ attitudes during the past 28 days. Participants rated the first 13 items in terms of the frequency that each symptom occurred during the past four weeks on a seven-point scale, ranging from *no days* to *every day*. The next item was rated on a seven-point scale from *never* to *always*, whereas the last 8 items were rated on a seven-point scale from *not at all* to *marked*. An example of a restraint eating item is “...have you been consciously trying to restrict what you eat to influence your shape or weight?”. Item scores of the subscales were averaged and the global score was derived by calculating the average of subscale scores (i.e. by totalling the subscale scores and dividing by the number of subscales). Higher scores indicate more symptoms during the past month. The Norwegian version of the scale was employed in this study (see Brechan, 2007, August) and

the internal consistency (Cronbach's alpha) in this sample was .96 (n = 101) for the global score, .84 (n = 110) for restraint eating, .80 (n = 109) for eating concern, .94 (n = 107) for shape concern, and .89 (n = 108) for weight concern.

Bulimic symptoms. The Eating Questionnaire – Revised (EQ-R) was employed to assess bulimic symptoms, particularly those of binge eating and compensatory behaviour (excluding excessive exercise) (Williamson, Davis, Goreczny, McKenzie, & Watkins, 1989). The Eating Questionnaire (EQ) was first developed by Williamson, Kelly, Cavell and Prather (1987, cited in Williamson, Davis et al., 1989) as a self-report measure of bulimic symptomatology. The revised version offers a symptom checklist for bulimia with 15 items as opposed to the original 16-item scale of the EQ, and can be used in both clinical and non-clinical groups. Results demonstrate high internal consistency among the items with an alpha of .87 and significant test-retest reliability for all items, with coefficients ranging from .53 to .97 (Williamson, Davis et al., 1989). It was also found that the EQ-R highly correlates with the widely used Bulimia Test (BULIT) (Smith & Thelen, 1984). Hence, research has found good reliability and validity properties of this inventory (Williamson, Davis et al., 1989).

Eleven of the items measure binge eating, whereas three of the items measure compensatory behaviour. One item measures weight change. The items tend to have different response ratings. An example of an item measuring binge eating is “How often do you binge eat?”, which is rated on a five-point scale, ranging from *seldom* to *every day*. In this particular case, an additional point was added and was referred to as *never*. Another example includes “Do you ever vomit after a binge?”, which measures one type of compensatory behaviour and is rated on a five-point scale from *never* to *about 100% of the time*. Two of the items needed to be reversed for analyses and the scores of binge eating and compensatory behaviour were derived separately by averaging the items of each subscale. The final score was obtained by totalling the scores of all 15 items. The Norwegian version of the scale was used in the current study (see Brechan, 2007, August), and the Cronbach's alpha in this sample was .78 (n = 34) for the total and .70 (n = 35) and .81 (n = 44) for binge eating and compensatory behaviour respectively.

Demographic variables. Participants were asked to indicate their age (year of birth), sex, weight, height and ethnicity. The Body Mass Index (BMI) was measured by dividing weight by height (squared). BMI –for-age percentile charts (Center for Disease Control,

Retrieved April 17, 2009, from <http://www.cdc.gov/growcharts>) were employed to control for growth among adolescents. For girls, 54 responses were available with BMI values ranging from 15 to 28.7. The majority (88.9 %) of 15 year old girls reported standard weight (BMI ranging from 16.3 to 28.1). Five girls reported underweight (BMI below 16.3). One girl reported overweight (BMI above 28.1). For boys, 45 responses were available with BMI values ranging from 15.9 to 24.7. In 15 year old boys, 93.3 % reported standard weight (BMI ranging from 16.6 to 26.8). Three of the boys reported BMI values below 16.6, which reflect underweight, whereas none of the boys reported overweight (BMI above 26.8). According to the BMI guidelines for teens, these numbers indicate that the majority of girls and boys in this sample have normal weight.

Ethnicity was measured by asking participants to describe their appearance in accordance with different parts of the world (continents). Various alternatives were given and examples of countries were outlined in parentheses. For example, North-European (Ireland), South Asian (India, Afghanistan), South East Asian (Philippines, Thailand), Native American (American Indian), Native Australian (Aborigine), etc. Participants were asked to tick off more than one of the alternatives if they believed their appearance was mixed. An additional alternative referred to as *other* was included, whereby participants were asked to write down their alternative response if any.

Procedure

The project leader contacted the head teacher from 32 public junior high-schools in Oslo, seeking permission to carry out a study on the relationship between body image, emotions and eating behaviours among adolescents (Appendix A). Two of the 32 schools granted permission, which resulted in a 6.25 % participation rate. Seven of the total of eight 10th grade classes from these two schools agreed to participate.

An informed consent procedure was used in accordance with the ethical guidelines. A parental assent form was sent to the schools (Appendix B) and given to the students by teachers. Students were asked to return a signed assent to the teacher if agreeing to take part. The assent form asked for both student and parental signatures.

When signed consent forms were received by the teachers, the research assistant was invited by the respective head teachers to visit the schools for data collection. Participants were fully informed about the true purpose of the study prior to taking part and participation was voluntary. Participants were ensured confidentiality by a numeric code.

No specific time was given to complete the task, but participants were told beforehand that the questionnaire would take approximately 15-30 minutes. Questionnaires were completed individually in class and returned to the researcher for analyses. After completion, participants received a sheet with contact information regarding eating disorders (Appendix C) and were given the opportunity to ask questions. They were then thanked for taking part in the study.

Results

Data were analysed using SPSS version 16.0. Numerous tests, including correlations, regressions and Sobel tests for mediation were calculated to assess the direct and indirect effect of body dissatisfaction on various eating disorder symptoms among genders.

Preliminary Analyses

Preliminary analyses were performed to prepare the data prior to conducting correlation and regression analyses. Specifically, statistical assumptions were tested to ensure no violation of these. Assumptions included sample size, multicollinearity and singularity, normality, outliers, linearity and homoscedasticity (Tabachnick & Fidell, 2001). However, some of these assumptions were violated because of the underlying nature of the variables that were measured (Pallant, 2005). These violations are commented below.

Statistical power. Tabachnick and Fidell (2001) give sample size requirements to generalisability based on the number of independent variables. They presented a formula, $N > 50 + 8m$ (where m is the number of independent variables). In accordance to these criteria, the present study had a reliable sample size of 113 participants [$N > 50 + 8(3)$]. However, the statistical power of a study increases with larger samples. The statistical power was calculated for the current study.

Cohen's (1988) power tables were used to identify the statistical power based on the following information. (1) Sample size ($n = 113$). (2) The number of variables in the original model, which is one (body satisfaction, depression or self-esteem). (3) The number of additional variables in the extended model, which is one (body satisfaction, depression or self-esteem). (4) The R square (R^2) value in the original model, which in this case is in the range of 0.10 – 0.50. These values correspond to the correlations between either of body satisfaction, depression or self-esteem and either of the eating disorder variables, which in this case is in the range of .32 - .70 (see Table 5). (5) The R^2 value in the extended model, which is the effect size in terms of an increase in R^2 . According to Cohen (1988), an increase in R^2 as low as 1.96 % is considered a small effect size, and an increase in R^2 as low as 13 % is considered a medium effect size. In this case, the power to identify a small effect size, 0.196, is in the range of 34-56, while the power to identify a medium or larger effect size is greater than 99 (see Table 1). The desired effect size is 80 or above (Cohen, 1988). In this study sufficient power was reached with an increase in R^2 of .0602 or larger when initial R^2 was at its lowest, in this case .10. Sufficient power was also reached with an increase in R^2 of .0335 or larger when initial R^2 was at its highest, in this case .50 (see Table 1).

Table 1

Calculations of Statistical Power Values. Initial R^2 Values and Changes in the Initial R^2 Values are Presented

Initial R^2	R^2 Change				
	.0196	.0335	.0468	.0602	.1300
.10	34.41			80.02	> 99
.30	42.43		80.01		> 99
.50	55.75	80.08			> 99

This means that with any non-significant multiple regression coefficient in the analyses it is quite (80 %) certain that the true effect size is, if not zero, at least smaller than a 6 % contribution to explained variance (R^2 change).

Assessing normality. The distribution of scores for variables in this study violated the assumption of normality. The distribution of scores for body satisfaction and self-esteem were negatively skewed, where the majority of participants reported higher scores. Conversely,

depression and the various eating disorder symptoms tended to be positively skewed, where the majority of participants reported few symptoms (example given in Appendix D). The approach of transforming the non-normal distribution of scores into a more normal distribution has been discussed in the literature. However, research is contradictory about the use of this method (Pallant, 2005). Consequently, due to the controversy of findings and arguments against transforming variables (discussed in Tabachnick & Fidell, 2001, p. 80-82), none of the variables had their scores statistically transformed in this study.

Checking for outliers. Statistical tests are often sensitive to outliers (Pallant, 2005). For multiple regression outliers are defined as those with standardised residual values above approximately 3.3 or less than approximately -3.3 (Tabachnick & Fidell, 2001, p. 122). All variables, including the independent variables, the dependent variables and the mediator variables, were checked for outliers. No outliers were observed for body satisfaction or self-esteem. Some outliers were identified for each of the remaining variables, although none of these were detected as errors in the data. For example, three outliers were observed for bulimia with values of 57, 48 and 46 respectively (Appendix E). The mean of this variable was 21.68 (S.D. = 8.71). When compared to the 5% Trimmed Mean (20.71) these were not substantially different and the three cases were retained in the data file. This procedure was conducted for all the variables and none of the detected outliers were deleted from the data set and none had their value changed.

The reason outliers are retained in the present data file is because, for instance, some of the participants may score very high on ED symptomatology and reflect clinical level symptoms of these disorders. The majority of others may score very low and display few or none of the symptoms. It would be erroneous, therefore, to omit those values suggesting clinical level symptomatology as these are essential to the analyses.

Descriptive statistics. The number of participants, the means and the standard deviations of each condition and for each gender are presented in Table 2. Independent-samples t-tests were conducted to compare scores in each condition for males and females. All t-tests were two-tailed, and P-values ≤ 0.05 were considered significant. Statistical significant differences were found between genders in scores of body satisfaction [$t(109) = 4.18, p < .001$] and in scores of self-esteem [$t(109) = 4.28, p < .001$], where boys scored higher than girls on both measures (see Table 2). On the other hand, girls scored significantly higher

than boys on scores of depression [$t(109) = -2.67, p < .05$] and for general eating disorder symptoms [$t(109) = -4.65, p < .001$], particularly for eating restraint [$t(109) = -4.93, p < .001$] and for displaying eating concerns [$t(109) = -3.39, p < .001$], shape concerns [$t(109) = -4.55, p < .001$] and weight concerns [$t(109) = .3.96, p < .001$]. Significant differences were also found between genders for bulimic symptoms [$t(109) = -2.623, p < .01$] including symptoms of binge eating [$t(107) = -2.60, p < .01$] and for compensatory behaviour [$t(109) = -2.32, p < .05$], where girls scored higher than boys (see Table 2). To sum up, girls scored significantly higher than boys did on each scale, with the exception of the body satisfaction scale and the self-esteem scale.

Table 2

Descriptive Statistics for Girls and Boys on Research Measures

Condition	Male	Female
Body Satisfaction	4.66 (0.97) n = 50	3.80 (1.15) n = 61
Self-esteem	22.71 (4.72) n = 50	18.81 (4.8) n = 61
Depression	5.57 (3.87) n = 50	7.60 (4.08) n = 61
Bulimia	19.46 (5.88) n = 50	23.72 (10.18) n = 61
Binge eating	1.32 (0.52) n = 49	1.67 (0.86) n = 60
Compensatory behaviour	1.05 (0.18) n = 50	1.22 (0.56) n = 61
Eating restraint	0.31 (0.75) n = 50	1.25 (1.24) n = 61
Eating concern	0.22 (0.64) n = 50	0.74 (0.91) n = 61
Shape concern	0.70 (1.28) n = 50	1.96 (1.58) n = 61
Weight concern	0.57 (1.24) n = 50	1.63 (1.52) n = 61
Eating disorder global examination	0.45 (0.94) n = 50	1.40 (1.16) n = 61

Note. The mean of each condition is given. Standard deviations (S.D.) are given in parentheses. N = the number of participants in each condition.

Body dissatisfaction was measured in more definite terms. A total of 54 girls (n = 39) and boys (n = 15) reported specific aspects of appearance dissatisfaction. Table 3 and 4 present the top five lists of appearance concerns for girls and boys. There are some gender differences

in the dissatisfaction of specific body parts. Although girls and boys share some common concerns these tend to be ranked differently. Both genders seem to be most dissatisfied with their stomachs. Girls are concerned about their thighs and their weight in reporting “feeling fat”. They also worry about their skin and face, although boys seem to worry more about skin issues than girls. Boys too report dissatisfaction with body fat, and some worry about being “too skinny”. When it comes to body size, however, boys seem to be more concerned about lacking muscles.

Table 3

The top Five Concerns about Appearance for Girls Presented in Percentages (%)

Concerns	Percentage (%)
1. Stomach	28.21
2. Thighs	23.08
3. "Feeling fat"	20.51
4. Skin	17.95
5. Face	17.95

Table 4

The top Five Concerns about Appearance for Boys Presented in Percentages (%)

Concerns	Percentage (%)
1. Stomach	26.67
2. Skin	26.67
3. "Lack of muscles"	20.00
4. "Feeling fat"	13.33
5. "Too skinny"	6.67

Relationship between Variables

Pearson correlation coefficients. Pearson correlation coefficients were conducted prior to using multiple regression analyses. Correlations were two-tailed, and P-values ≤ 0.05 were considered significant. Statistical significant correlations were found between body dissatisfaction and all measures of eating disorder symptomatology (see Table 5). It can be seen in Table 5 that there was a strong, negative correlation between body satisfaction and

general eating disorder symptoms with low scores of body satisfaction associated with higher levels of eating disorder symptomatology. In particular, there was a moderate, negative correlation between body satisfaction and restraint eating, and there was a moderate, negative correlation between body satisfaction and symptoms of bulimia. When calculating the coefficient of determination it was found that body dissatisfaction and general eating disorder symptoms share 42.3 % of their variance. The shared variance between body dissatisfaction and eating restraint and between body dissatisfaction and symptoms of bulimia were 22.1 % and 14.4 % respectively. Results indicate that body dissatisfaction significantly overlaps with general eating disorder symptoms, and with restraint eating and bulimic behaviour to a less degree.

It can be seen in Table 5 that body satisfaction correlates separately to depression and to self-esteem. A strong, negative correlation was found between body satisfaction and depression with a shared variance of 28.1 %. A strong, positive correlation was found between body satisfaction and self-esteem sharing 53.3 % of their variance. These findings suggest that body satisfaction correlates more strongly to self-esteem than to depression, but that both have significant correlations.

Table 5
Correlations between all Variables Presented

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Body Satisfaction	-										
Negative Affect											
2. Depression	-.53**	-									
3. Self-Esteem	.73**	-.64**	-								
ED Symptomatology											
4. Bulimia	-.38**	.49**	-.39**	-							
5. Binge eating	-.34**	.41**	-.33**	.98**	-						
6. Compensatory behaviour	-.38**	.47**	-.32**	.47**	.28**	-					
7. Eating restraint	-.47**	.55**	-.54**	.48**	.38**	.64**	-				
8. Eating concern	-.54**	.59**	-.54**	.62**	.54**	.59**	.79**	-			
9. Shape concern	-.70**	.59**	-.65**	.49**	.45**	.35**	.69**	.78**	-		
10. Weight concern	-.62**	.59**	-.61**	.55**	.48**	.47**	.71**	.84**	.89**	-	
11. ED Global	-.65**	.63**	-.65**	.57**	.50**	.53**	.85**	.91**	.94**	.95**	-

Note. **. Correlation is significant at the 0.01 level

*. Correlation is significant at the 0.05 level

Further, depression and self-esteem were separately correlated to all measures of eating disorder symptoms (see Table 5). There was a strong, positive correlation between depression

and general eating disorders with a shared variance of 39.7 %. There was a strong, positive correlation between depression and restraint eating overlapping by 30.3 %. A moderate, positive correlation was also found between depression and bulimia scores sharing 24 % of the variance. A strong, negative correlation was found between self-esteem and general eating disorders with 42.3 % shared variance. Self-esteem and eating restraint share a strong, negative correlation with a variance of 29.2 %. A moderate, negative correlation was identified between self-esteem and bulimia scores sharing 15.2 % of their variance. Overall, depression and self-esteem are both variables with significant correlations to eating disorder symptomatology. However, both mediator variables have stronger relations to general eating disorder symptoms, and to restraint eating, than to symptoms of bulimia.

Comparing correlation coefficients for boys and girls. The sample was split by gender using the split file procedure described in Pallant (2005, p. 130). To compare the correlation coefficients for males and females separately a strategy described by Cohen (1988) was employed. First, the r values were converted into z scores, and an equation (Figure 3) was used to calculate the observed value of z (Z_{obs}).

$$Z_{obs} = \frac{z_1 - z_2}{\sqrt{\frac{1}{n_1 - 3} + \frac{1}{n_2 - 3}}}$$

Figure 3

Equation to Calculate Z_{obs}

The value obtained from the equation was tested for statistical significance by using the decision rules below (Pallant, 2005, p. 134):

- If $-1.96 < Z_{obs} < 1.96$: correlation coefficients are not statistically significantly different
- If $Z_{obs} \leq -1.96$ or $Z_{obs} \geq 1.96$: correlation coefficients are statistically significantly different

Results indicate that there was a statistically significant difference in the strength of the correlation between body dissatisfaction and general eating disorder symptoms for males and females. Specifically, body satisfaction explains significantly more of the variance in general

eating disorder symptoms for girls ($r = -.77$) than for boys ($r = -.28$), with an observed z value of 3.73 [$3.73 > 1.96$]. Identical procedures were performed for all variables in exploring possible gender differences. It was found that body dissatisfaction explains significantly more of the variance in eating concern, shape concern and in weight concern for females compared to males. However, no statistically significant difference was found in the correlation between body dissatisfaction and eating restraint for boys and girls. Further, no statistically significant difference in the strength of the correlation between body dissatisfaction and bulimic symptoms was found for boys or girls, neither for binge eating nor for compensatory behaviour.

No significant gender differences were observed in the strength of the correlation between body satisfaction and self-esteem, neither for the correlation between body dissatisfaction and depression. There was no statistically significant difference in the strength of the correlation between self-esteem and the various eating disorder symptoms for the genders, neither for general eating disorder symptoms (including eating restraint), nor for bulimic symptomatology. Similarly, there was no statistically significant difference in the strength of the correlation between depression and the various eating disorder symptoms for males and females, neither for general eating disorder symptoms (including eating restraint) nor for bulimic symptomatology, with one exception only. This exception applies to the correlation between depression and compensatory behaviour, in which depression explains significantly more of the variance in compensatory behaviour for girls than for boys.

Predicting Eating Disorder Symptomatology using Multiple Regression Analyses

Standard multiple regression analyses were conducted to predict the direct effect of body dissatisfaction on various eating disorder symptoms. Indirect effects via depression and self-esteem were also calculated. These predictions were checked with certain criteria for mediation.

According to Baron and Kenny's (1986) criteria for mediation, mediation can only occur if (1) the independent variable significantly predicts the dependent variable, (2) the independent variable significantly predicts the mediator variable, and (3) the mediator variable significantly predicts the dependent variable controlling for the independent variable. It should be noted that criterion 1 may not apply in the case of inconsistent mediation

(MacKinnon, Fairchild, & Fritz, 2007). Criteria 1 and 2 have already been supported by correlation analyses (total effect). However, in order to test for mediation, criterion 1 needs to be assessed when the mediator variable is controlled (direct effect). Several regressions were carried out to test these criteria.

First, simple regression analyses were performed to generate standardised beta coefficients (beta) for the second criterion, the effect of body dissatisfaction on depression and low self-esteem (see Table 6, Column 1).

The effect of depression and low self-esteem on eating disorder symptomatology when body dissatisfaction is controlled. Multiple regression analyses were conducted for variables of negative affect (i.e. depression and low self-esteem) in predicting the various eating disorder symptoms. The third criterion of mediation was checked by testing depression and self-esteem separately when body satisfaction was controlled. Standardised beta coefficients (beta) were used to interpret these effects and are presented in Table 6, Column 2. P-values ≤ 0.05 were considered significant.

Depression significantly contributes to the complete set of ED symptomatology in this study. Depression predicts eating disorder symptoms in general [beta = .404, B = .116, SE = .022, $p < .001$, $R^2 = .537$, Initial $R^2 = 42.3\%$, R^2 change = 11.4 %], including those of restraint eating [beta = .422, B = .119, SE = .026, $p < .001$, $R^2 = .347$, Initial $R^2 = 22.1\%$, R^2 change = 12.6 %], and bulimic symptoms [beta = .402, B = .861, SE = .206, $p < .001$, $R^2 = .264$, Initial $R^2 = 14.4\%$, R^2 change = 12 %]. Self-esteem significantly predicts general eating disorder symptoms [beta = -.374, B = -.085, SE = .023, $p < .001$, $R^2 = .483$, Initial $R^2 = 42.3\%$, R^2 change = 6 %], including those of restraint eating [beta = -.422, B = -.095, SE = .026, $p < .001$, $R^2 = .301$, Initial $R^2 = 22.1\%$, R^2 change = 8 %], but not bulimic symptoms [beta = -.225, B = -.385, SE = .219, $p > .081$, $R^2 = .170$, Initial $R^2 = 14.4\%$, R^2 change = 2.6 %], although it approaches significance at $p = .081$. Moreover, sufficient power was not reached in the relationship between self-esteem and bulimic symptoms when body satisfaction was controlled. In order to reach the desired power, R^2 would have to reflect an increase of .0602 or larger (see Table 1), which was not the case [R^2 change = 2.6 %]. Hence, there is a chance that self-esteem significantly predicts bulimic symptoms in larger samples when controlling for body dissatisfaction.

Overall, findings suggest that depression predicts all eating disorder symptoms to a larger extent than does self-esteem. Additionally, self-esteem fails to significantly predict bulimic symptoms in this study, although effects need to be interpreted with caution due to insufficient power. These effects give partial support to the third criterion by Baron and Kenny (1986).

The direct effect of body dissatisfaction on various eating disorder symptoms when the mediator variable is controlled. Multiple regression analyses were carried out to predict the direct effect of body dissatisfaction on eating disorder symptoms when controlling for the mediator variable (i.e. depression or self-esteem). Effects (beta) are presented in Table 6, Column 3. P-values ≤ 0.05 were considered significant.

The effect of mediation can be reported in two ways dependent on the strength of this effect (Baron & Kenny, 1986). Complete mediation has occurred if the effect of the independent variable on the dependent variable decreases to near zero (direct effect is no longer significant) when the mediator variable is controlled. Partial mediation has occurred if this effect decreases considerably, but not to zero (direct effect is significant).

It was found that body satisfaction significantly predicts general eating disorder symptoms when controlling for depression [beta = -.435, B = -.443, SE = .078, $p < .001$] and for self-esteem [beta = -.372, B = -.379, SE = .103, $p < .001$]. Results suggest that body satisfaction and depression explain 53.7 % [$R^2 = .537$, Initial $R^2 = 39.7$ %, R^2 change = 14 %] of the variance in general eating disorder symptoms, whereas body satisfaction and self-esteem explain 48.3 % [$R^2 = .483$, Initial $R^2 = 42.3$ %, R^2 change = 6 %] of the variance. It seems that both models produce respectable contributions, but that body satisfaction and depression explain slightly more of the variance in general eating disorder symptomatology compared to the body satisfaction and self-esteem model. Moreover, an increase in R^2 was observed when the mediator variables were added separately to the initial model. The direct effects are significant, which suggest partial mediation by depression and self-esteem.

Table 6

Results (beta) of the Standard Multiple Regression Analyses to test for Mediation. Sobel Test (z) Values are Reported

Three variable mediational chains (IV → MV → DV)	Criteria for mediation			z-value
	IV - MV	MV - DV	IV - DV	
Body Satisfaction → Depression → Bulimia	-.525**	.402**	-.172	3.51**
Body Satisfaction → Depression → Binge eating	-.525**	.321**	-.174	2.80**
Body Satisfaction → Depression → Compensatory behavior	-.525**	.371**	-.181	3.17**
Body Satisfaction → Depression → Eating restraint	-.525**	.422**	-.246**	3.74**
Body Satisfaction → Depression → Eating concern	-.525**	.420**	-.314**	3.85**
Body Satisfaction → Depression → Shape concern	-.525**	.311**	-.534**	3.49**
Body Satisfaction → Depression → Weight concern	-.525**	.368**	-.423**	3.73**
Body Satisfaction → Depression → Eating disorder global	-.525**	.404**	-.435**	4.09**
Body Satisfaction → Self-esteem → Bulimia	.734**	-.225	-.217	1.74
Body Satisfaction → Self-esteem → Binge eating	.734**	-.178	-.212	1.36
Body Satisfaction → Self-esteem → Compensatory behaviour	.734**	-.094	-.306*	0.73
Body Satisfaction → Self-esteem → Eating restraint	.734**	-.422**	-.157	3.48**
Body Satisfaction → Self-esteem → Eating concern	.734**	-.325**	-.296**	2.71**
Body Satisfaction → Self-esteem → Shape concern	.734**	-.305**	-.473**	3.02**
Body Satisfaction → Self-esteem → Weight concern	.734**	-.335**	-.371**	3.08**
Body Satisfaction → Self-esteem → Eating disorder global	.734**	-.374**	-.372**	3.52**

Note. IV = independent variable, MV = mediator variable, DV = dependent variable. Column 2 reflects the relation between the MV and the DV when the IV is controlled. Column 3 reflects the relation between the IV and the DV when the MV is controlled. The last column reflects Sobel test values (z) for mediation.

** . Significant at the 0.01 level

* . Significant at the 0.05 level

Further, body satisfaction predicts restraint eating when depression is controlled [$\beta = -.246$, $B = -.247$, $SE = .091$, $p < .008$], explaining 34.7 % [$R^2 = .347$, Initial $R^2 = 30.3$ %, R^2 change = 4.4 %] of the variance in restraint eating. However, body satisfaction failed to significantly predict eating restraint when self-esteem was controlled [$\beta = -.157$, $B = -.158$, $SE = .118$, $p > .184$], explaining 30.1 % [$R^2 = .301$, Initial $R^2 = 29.2$ %, R^2 change = 0.9 %] of the variance in restraint eating. It was found that the R^2 value increased in both cases. Findings indicate that the direct effect is significant when depression is controlled, suggesting partial mediation by depression. When self-esteem was controlled this relationship becomes non-significant, which means that one cannot exclude the possibility of complete mediation by self-esteem. However, it should be noted that sufficient power was not reached, with an increase in R^2 of less than .0468 (see Table 1) for this test. Results must therefore be interpreted with caution.

Body satisfaction and depression explain 26.4 % [$R^2 = .264$, Initial $R^2 = 24$ %, R^2 change = 2.4 %] of the variance in bulimic symptoms, whereas body satisfaction and self-esteem

explain 17 % [$R^2 = .170$, Initial $R^2 = 15.2$ %, R^2 change = 1.8 %] of the variance in bulimic symptoms. These effects are low compared to the results reported for general eating disorder symptoms. No significant effects were found between body satisfaction and bulimic symptoms, neither when controlling for depression [$\beta = -.172$, $B = -1.310$, $SE = .733$, $p > .077$], nor when controlling for self-esteem [$\beta = -.217$, $B = -1.657$, $SE = .975$, $p > .092$]. These findings do not exclude the possibility of complete mediation. However, the contribution of body dissatisfaction in predicting bulimic symptomatology is approaching significance with an effect at $p = .077$, when controlling for depression and with an effect at $p = .092$, when controlling for self-esteem. The failure of reaching significance level might be due to the low statistical power of the study, and results should be considered carefully with relevance to the Type II error. For example, sufficient power was not reached for either of the two tests. As can be seen in Table 1, sufficient power would need to reflect an increase in R^2 of at least .0602 or larger. Hence, with larger samples these effects could result in being significant, and partial mediation would have occurred.

Moreover, body satisfaction significantly predicts compensatory behaviour, as part of bulimic pathology, when self-esteem was controlled [$\beta = -.306$, $B = -.118$, $SE = .050$, $p < .02$] explaining 14.5 % [$R^2 = .145$, Initial $R^2 = 10.2$ %, R^2 change = 4.3 %] of the variance, but not when controlling for depression [$\beta = -.181$, $B = -.069$, $SE = .037$, $p > .067$] explaining 24 % of the variance [$R^2 = .240$, Initial $R^2 = 22.1$ %, R^2 change = 1.9 %]. However, results demonstrate approaching significance at $p = .067$ for depression. When depression was controlled sufficient power was not reached with an increase in R^2 of less than .0468 (see Table 1). Overall, results suggest partial mediation by self-esteem in predicting compensatory behaviour, whereas the possibility of complete mediation by depression cannot be excluded, although findings must be interpreted cautiously due to insufficient power.

Calculation of the total effect. The total effect of the independent variable on the dependent variable was calculated by totalling the direct effect and the indirect effect of each symptom (see Table 7). These effects correspond to the correlation coefficients obtained between the independent variable and the dependent variable (see Table 5).

Table 7

Calculations of the Total Effect between Body Dissatisfaction and the Various ED Symptoms

Condition	Direct effect	Indirect effect	Total effect
Mediating effect of depression			
Bulimia	-.172	-.211 (-.525×.402)	-.383
Binge eating	-.174	-.169 (-.525×.321)	-.343
Compensatory behaviour	-.181	-.195 (-.525×.371)	-.376
Eating restraint	-.246	-.222 (-.525×.422)	-.468
Eating concern	-.314	-.221 (-.525×.420)	-.535
Shape concern	-.534	-.163 (-.525×.311)	-.697
Weight concern	-.423	-.193 (-.525×.368)	-.616
Eating disorder global	-.435	-.212 (-.525×.404)	-.647
Mediating effect of self-esteem			
Bulimia	-.217	-.165 (.734×-.225)	-.382
Binge eating	-.212	-.131 (.734×-.178)	-.343
Compensatory behaviour	-.306	-.069 (.734×-.094)	-.375
Eating restraint	-.157	-.310 (.734×-.422)	-.467
Eating concern	-.296	-.239 (.734×-.325)	-.535
Shape concern	-.473	-.224 (.734×-.305)	-.697
Weight concern	-.371	-.246 (.734×-.335)	-.617
Eating disorder global	-.372	-.275 (.734×-.374)	-.647

It can be seen in Table 7 that the direct effect (when the mediator variable is controlled) is smaller than the total effect for all symptoms. As discussed above, the majority of direct effects are significant hence complete mediation is rejected in most of the cases. Moreover, in those cases where complete mediation is possible, these effects should be assessed with caution, especially considering that some of the direct effects are approaching significance, and because of the insufficient power of the tests. Overall, effects of mediation tend to be partial.

Sobel Tests for Mediation

Multiple regression analyses are often used to test for mediation (MacKinnon et al., 2007). The significance of mediation is assessed using the Sobel test formula (Figure 4) (Baron & Kenny, 1986). The test is derived by Sobel (1982) and provides an effective test of an indirect effect (Preacher & Hayes, 2004).

$$z = \frac{a \times b}{\sqrt{(a^2 \times s_b^2) + (b^2 \times s_a^2)}}$$

Figure 4

Sobel Test Formula for Mediation

Unstandardised beta coefficients (B) were entered into the equation. The effects (z) of these calculations are presented in Table 6, Column 4. P-values ≤ 0.05 were considered significant.

A statistically significant effect of mediation by depression was found in the relationship between body dissatisfaction and general eating disorder symptoms, including those of restraint eating. Significant mediation was also found by depression in the relationship between body dissatisfaction and bulimic symptoms. Moreover, a statistically significant mediation by self-esteem was found in the relationship between body dissatisfaction and general eating disorders, including those of restraint eating. No significant mediation, however, was observed between body dissatisfaction and bulimic symptoms, with self-esteem as the mediator variable.

Gender Differences: Effects of Mediation by Depression and Self-esteem for Boys and Girls in Predicting Eating Disorder Symptoms

The sample was split by gender to examine possible differences in the effects of mediation for boys and girls. Standard multiple regression analyses were conducted and the unstandardised beta coefficients (B) were entered into the Sobel equation to test for mediation. The effects of mediation (z) are presented in Table 8. P-values ≤ 0.05 were considered significant.

Depression as the mediator variable. A statistically significant mediation was observed by depression in the relationship between body dissatisfaction and general eating disorder symptoms, including those of restraint eating, for both genders. Significant mediation was also observed by depression in the relationship between body dissatisfaction and eating concerns, for boys and girls. It can be seen in Table 8 that depression significantly mediates the relationship between body dissatisfaction and shape concerns for boys, but not for girls. Similarly, a significant mediation was observed by depression in the relationship between body dissatisfaction and weight concerns for boys, but not for girls.

A statistically significant mediation by depression was found in the relationship between body dissatisfaction and symptoms of bulimia for girls and boys. A significant mediation was also found by depression in the relationship between body dissatisfaction and binge eating for boys, but not for girls, although $p = .076$ is approaching significance. On the other hand, depression significantly mediates the relationship between body dissatisfaction and compensatory behaviour for girls, but not for boys.

Table 8

Sobel Test (z) Values for Mediation among Girls and Boys. The P Values are Reported

Mediation	Girls (z)	P	Boys (z)	P
Body Satisfaction → Depression → Bulimia	2.50	.012	2.17	.03
Body Satisfaction → Depression → Binge eating	1.77	.076	2.08	.037
Body Satisfaction → Depression → Compensatory behavior	2.87	.004	1.18	.237
Body Satisfaction → Depression → Eating restraint	2.52	.012	2.45	.014
Body Satisfaction → Depression → Eating concern	2.43	.015	2.49	.013
Body Satisfaction → Depression → Shape concern	1.35	.178	2.53	.012
Body Satisfaction → Depression → Weight concern	1.61	.102	2.63	.009
Body Satisfaction → Depression → Eating disorder global	2.41	.016	2.58	.01
Body Satisfaction → Self-esteem → Bulimia	1.61	.108	0.42	.678
Body Satisfaction → Self-esteem → Binge eating	1.44	.151	0.23	.820
Body Satisfaction → Self-esteem → Compensatory behaviour	0.42	.674	1.35	.178
Body Satisfaction → Self-esteem → Eating restraint	1.90	.056	3.21	.001
Body Satisfaction → Self-esteem → Eating concern	1.21	.225	3.17	.002
Body Satisfaction → Self-esteem → Shape concern	1.44	.150	3.01	.003
Body Satisfaction → Self-esteem → Weight concern	1.58	.114	3.12	.002
Body Satisfaction → Self-esteem → Eating disorder global	1.99	.046	3.26	.001

Self-esteem as the mediator variable. A statistically significant mediation was observed by self-esteem in the relationship between body dissatisfaction and general eating disorder symptoms for both genders (Table 8). However, self-esteem seems to have a larger influence in predicting general eating disorder symptoms among boys than among girls. Particularly, self-esteem significantly mediates the relationship between body dissatisfaction and eating restraint in boys, but not in girls, although $p = .056$ is approaching significance. Significant mediation was also observed by self-esteem in the relationship between body dissatisfaction and eating concerns for boys, but not for girls. Similarly, self-esteem significantly mediates the relationship between body dissatisfaction and shape concerns, and the relationship between body dissatisfaction and weight concerns among boys. These effects were not observed among girls.

No statistically significant mediation was observed by self-esteem in the relationship between body dissatisfaction and symptoms of bulimia in any of the genders. Further, no significant mediation by self-esteem was observed for binge eating or for compensatory behaviour, neither for boys nor for girls.

Some of the effects presented above are non-significant, although some are approaching significance level. Small samples are particularly vulnerable to the Type II error (Pallant, 2005). This study has low statistical power, thus only the strongest effects of mediation show statistical significance. Consequently, findings presented in this study should not rule out the possibility for more effects of mediation between genders.

Discussion

The present study has examined the effect of body dissatisfaction on various eating disorder symptoms, focusing primarily on restraint eating and bulimic behaviour. In particular, mediating effects of depression and low self-esteem were explored. Gender differences were considered. Present results support previous research in the field, which sustain selected parts of the dual-pathway model (Stice, 2001).

Summary of Results

Results reveal that boys are less dissatisfied with their bodies than girls. However, both genders seem to be most dissatisfied with their stomachs. Girls worry considerably about their body weight and shape. In particular, they worry about their thighs and feelings of being fat. Boys too are concerned about their body weight and shape, especially regarding muscularity. Girls display more of the general eating disorder symptoms, including those of restraint eating and bulimic behaviour, than boys.

The relationship between body dissatisfaction and eating disorder symptoms between genders. Body dissatisfaction correlates to general eating disorder symptoms, including those of restraint eating and symptoms of bulimia. In particular, body dissatisfaction correlates more strongly to eating disorder symptoms in general than to restraint eating, and substantially less to symptoms of bulimia. Body dissatisfaction explains significantly more of the variance in general eating disorder symptoms among girls than among boys, specifically

in eating concern, shape concern and weight concern. Gender differences were not observed in the relationship between body dissatisfaction and eating restraint, or in the relationship between body dissatisfaction and bulimic symptoms.

Mediating effects of depression and low self esteem. Findings indicate that body dissatisfaction correlates to all eating disorder variables, supporting the first criterion for mediation. The second criterion was also supported, in that body dissatisfaction predicts both depression and low self-esteem. However, body satisfaction predicts self-esteem slightly more than body dissatisfaction predicts depression. The third criterion had partial support. It was found that depression predicts the complete set of eating disorder variables, whereas self-esteem failed to predict bulimic behaviour when body dissatisfaction was controlled. However, the power was insufficient for this test and results must therefore be interpreted with caution.

Partial mediation of depression and self-esteem were found on the relationship between body dissatisfaction and general eating disorder symptoms. The significance of these effects was tested by using Sobel tests for mediation, which found significant effects of both mediator variables. Depression was also found to have a partial effect of mediation on eating restraint, whereas complete mediation of self-esteem cannot be excluded in this relationship. Sobel tests found significant effects of mediation in both cases. Finally, the effect of mediation was tested for bulimic symptoms. At this stage, results cannot exclude the possibility of complete mediation by depression and self-esteem. However, findings must be interpreted cautiously due to the small sample size in this study. For example, Sobel tests found significant effects of mediation by depression on bulimic symptoms, however, this effect was not significantly mediated by self-esteem. In particular, neither binge eating nor compensatory behaviour were significantly mediated by self-esteem.

Mediating effects of depression between genders. Girls reflect more symptoms of depression than boys. However, for boys and girls depression mediates the relationship between body dissatisfaction and general eating disorder symptoms, including eating restraint and bulimic behaviour. Depression carries larger effects of mediation for general eating disorder symptoms, such as for shape concern and weight concern, in boys. Moreover, depression carries a stronger influence of body dissatisfaction in predicting binge eating for boys, whereas this mediation is stronger for girls in predicting compensatory behaviour.

Mediating effects of low self-esteem between genders. Boys display higher levels of self-esteem than girls. However, self-esteem mediates the relationship between body dissatisfaction and general eating disorders for both genders, although this effect was stronger among boys. For example, the effect of mediation by self-esteem on eating concern, shape concern and weight concern were not significant among girls. Moreover, self-esteem mediates the relationship between body dissatisfaction and restraint eating in boys, but this effect was not significant in girls. No effect of mediation was observed by self-esteem for bulimic symptoms in either boys or girls.

Overall, the mediating effect of depression seems to carry a larger influence on the prediction of eating disorder symptoms compared to the mediating effect of self-esteem. Findings indicate that depression and self-esteem have a greater influence on predicting eating disorder symptoms among adolescent males than among adolescent females.

Interpretation of Findings in Relation to Previous Research

Eating disorders. Previous research indicates that symptoms of bulimia are more prevalent than symptoms of anorexia among those who are diagnosed (Hoek, 2006; NKH, 2004). However, AN is a health-threatening problem, which deserves attention (Wilson, 2005). Present results support Wilson's (2005) argument because some of the participants in this study engage in restraint eating, which is a symptom of AN (APA, 2000). Moreover, on the basis of self-reported BMI values, approximately 6.67 % of the boys and 9.3 % of the girls report values of underweight. Results reveal that some of the adolescents in this study reflect symptoms of both AN and BN.

Eating disorders and gender differences. Statistics hold that gender differences exist in the development of disordered eating, specifically that girls are more vulnerable to this development than boys (APA, 2000). Consistent with these numbers, present findings reveal that girls reflect significantly more symptoms of general eating disorders, restraint eating and bulimic behaviour, than boys. The objectification theory (Fredrickson & Roberts, 1997) represents one possible explanation for this gender difference. For example, due to objectification girls may be more susceptible to the thin-ideal as presented in the media (Ricciardelli & McCabe, 2001), and perhaps more vulnerable to attitudes and behaviours by

friends and family, which may impact on disordered eating directly (Shroff & Thompson, 2006).

Although eating disorders tend to be gendered, this does not mean that boys are unaffected. For example, previous research indicates that boys too become influenced by the media and through attitudes and behaviours by friends and family (e.g., Cafri et al., 2006; Jones, 2004; McCabe & Ricciardelli, 2005; Smolak et al., 2005). In particular, Smolak et al. (2005) found that sociocultural influences are implicated in muscle building techniques with a detrimental effect on boys' health. In accordance with previous research (e.g., Ricciardelli and McCabe, 2004), boys in a non-clinical population reflect symptoms of dysfunctional eating. Hence, present results reveal that gender differences persist, but that boys too become affected.

Risk factors: body dissatisfaction. Body dissatisfaction was found to be greater among girls than among boys. This effect was evident, despite the additional assessment of body dissatisfaction in this study. It must be noted that the biased effect may still be due to an artefact because of the way that body dissatisfaction was measured (Tiggemann, 2004). Both genders seem to be most dissatisfied with their stomachs. The underlying factor of this dissatisfaction is unclear, for instance, whether it is due to lack of muscularity, excessive body fat, or to an unknown third variable.

In support of the spectrum hypothesis (Van Der Ham et al., 1997) and the transdiagnostic theory (Fairburn, Cooper et al., 2003), similar risk factors seem to be involved in both AN and BN. For instance, body dissatisfaction has been found to represent one of the leading risk factors of eating pathology (Thompson, 2000), and is implicated in both AN and BN (Benninghoven et al., 2006). Present results support previous findings in that body dissatisfaction correlates to eating disorder symptoms (e.g., Cafri et al., 2006; Johnson & Wardle, 2005; Ricciardelli & McCabe, 2004; Smolak et al., 2005; Stice, 2001; Stice et al., 2002; Wertheim et al., 2001), including restraint eating and bulimic behaviour (Shroff & Thompson, 2006). It was found that body dissatisfaction explains more of the symptoms in general eating disorders, including eating concern, shape concern and weight concern, among girls than among boys. The present findings support the gender difference in this field; particularly that body dissatisfaction is a greater risk factor in predicting dysfunctional eating among females than males (Ricciardelli & McCabe, 2004). Importantly, however, as boys seem to worry more about body muscle as opposed to body fat (McCabe & Ricciardelli,

2004), research needs to investigate body dissatisfaction relative to muscularity in boys. The dissatisfaction in body muscle may explain the development of low self-esteem, depression (Smolak et al., 2005) and disordered eating among boys.

Risk factors: mediating effect of depression. It was found that girls reflect more symptoms of depression than boys. This finding is consistent with the acknowledged gender difference in depression (Bebbington, 1996). Present results indicate that body dissatisfaction predicts depression in boys and girls. This finding supports previous findings on the issue (e.g., Bearman et al., 2006; Paxton et al., 2006) and contradicts others (e.g., Davison & McCabe, 2006). Bearman et al. (2003) support short-term effects of this relation, but reject the same effects longitudinally. Hence, present findings need to be studied over time in order to comment on the persistent role of body dissatisfaction on depression. Moreover, it was found that depression correlates to general eating disorder symptoms, restraint eating and bulimic behaviour among both genders. This is consistent with previous research, which claims that depressive symptoms predict bulimic pathology and vice versa (Stice et al., 2004). Interestingly, despite the acknowledged gender difference in depression, depression seems to mediate the relationship between body dissatisfaction and shape concern and between body dissatisfaction and weight concern among boys, but not among girls. This finding suggests that depression is a stronger mediator variable in predicting disordered eating in boys, especially those related to shape and weight concerns.

It should be noted that although gender differences in depression are well-established, these could be due to possible artefacts. For example, research suggests that males are less likely to report sub-clinical symptoms than females for depression (Newmann, 1984, cited in Nazroo et al., 1998), which may also apply to gender differences in eating disorders, and for body dissatisfaction and low self-esteem. For example, the bias between genders in reporting symptoms is possibly due to the socially constructed gender role for boys, in which they perceive pressure to conform to the masculine stereotype (Connell, 1995; 2000; Watson, 2000). Consequently, boys may be less likely to report sub-clinical symptoms because these may threaten their sense of masculinity.

Further, it seems that girls are more likely to engage in compensatory behaviour when mediated by depression than boys. These findings may reflect research which has found that adolescent girls are more likely to diet than adolescent boys (Sweeting & West, 2002).

Moreover, research by Anderson and Bulik (2004) has found that compensatory behaviours, such as vomiting, laxative misuse and diuretic misuse, are more prevalent in adolescent girls than in adolescent boys. This finding is relative to present and previous findings in that girls seem to be more preoccupied with body thinness than boys (McCabe & Ricciardelli, 2001).

When mediated by depression, body dissatisfaction predicts binge eating significantly more in boys than in girls. The effect for girls in this relationship is approaching significance, hence, results may be due to the low statistical power of the study as opposed to no effect. Boys may engage in binge eating due to the possible suppression of emotional difficulties, as a consequence of the socially constructed gender role for males, which is further supported by the implication of depression in this relationship. Interestingly, none of the boys reported BMI values of overweight, and the mediating effect of depression on compensatory behaviour was non-significant. This suggests that boys may regulate their body weight by exercise, which was not assessed in this study. Previous research has found that boys are more likely to engage in exercise, as opposed to purging behaviours, to alter body shape (McCabe & Ricciardelli, 2001). However, given that the present study is based on self-reported information, results must be interpreted with care. Fairburn and Beglin (1994) discuss the distinction between subjective and objective views in research, in which self-report questionnaires may be limited by subjective perceptions. For example, binge eating is difficult to measure and its meaning could have been misinterpreted by the participants. Further, binge eating should be examined independently as a separate type of eating disorder, especially in relation to emotional eating (e.g., Stice et al., 2002).

Risk factors: mediating effect of low self-esteem. It was found that boys display higher levels of self-esteem than girls, which is consistent with previous research (Hoare & Cosgrove, 1998, cited in McCabe & Ricciardelli, 2004). On the basis of the results presented above, which claim that body dissatisfaction is greater among girls, it would be expected that body dissatisfaction impact on women's self-esteem to a larger degree than for men (Miller & Downey, 1999, cited in Tiggemann, 2004). However, no gender difference was identified between body dissatisfaction and low-self esteem, which support previous research on this relation (Davison & McCabe, 2006). Consistent with previous findings (e.g., Cafri et al., 2006; Johnson & Wardle, 2005; Paxton et al., 2006; Ricciardelli & McCabe, 2004; Tiggemann, 2004), the present study found that body dissatisfaction predicts low self-esteem among both genders. Moreover, in accordance with previous research (e.g., Ricciardelli &

McCabe, 2004; Stice et al., 2002; Wertheim et al., 2001), present results reveal that self-esteem correlates to general eating disorder symptoms among girls and boys, including restraint eating and bulimic symptoms.

When it comes to the effect of mediation, however, self-esteem seems to carry larger influences on eating disorder symptoms among boys than among girls. Previous research has linked low self-esteem to disordered eating in boys (reported by Ricciardelli & McCabe, 2004), whereas other research found no relation between low self-esteem and weight loss strategies among boys (Ricciardelli & McCabe, 2003, cited in Ricciardelli & McCabe, 2004). It is an interesting finding that, although girls reflect lower levels of self-esteem than boys, self-esteem seems to mediate the relationship between body dissatisfaction and eating disorder symptoms significantly more in boys. This suggests that self-esteem has a larger effect of mediation in predicting eating pathology in boys. Possible explanations for this difference are relative to socially constructed gender roles for boys, as discussed above.

Limitations of the Study

This study has low statistical power. Present findings are therefore vulnerable to the Type II error. Hence, statistical effects may turn out non-significant, when in fact these may be significant with larger samples. For example, some of the non-significant results, especially those approaching significance, suggest insufficient power of the tests rather than no real difference between groups. However, despite of the reasonably small sample size, the majority of effects are significant. The fact that present results, with the limitation of having a reasonable small sample size, substantiate previous findings in this field indicates a strong underlying theory and supports the negative affect pathway extensively.

Measurement issues in this study involve the measure of body dissatisfaction. In order to fully distinguish between the measure of body muscle and body fat in boys, a more suitable scale that measures both phenomena in one scale should be employed. Further, body dissatisfaction has multiple aspects and, among men, appearance on its own might not be a reliable factor for measuring body dissatisfaction. Other facets of body image, such as general health and fitness may determine whether men are satisfied with body appearance (McCabe & Ricciardelli, 2004). This demonstrates the complexity of body dissatisfaction as a scientific construct, which requires the use of improved methods of measurement.

Another limitation is the nature of design used in this study. The current study is limited by time and has a short-term design. Future research in this area should be studied longitudinally. The original project, on which this study is based, has a longitudinal design. For example, Leon, Fulkerson, Perry and Early-Zald (1995, cited in Cooley & Toray, 2001a) failed to predict disordered eating by body dissatisfaction in a 2-year follow-up. Some longitudinal research, however, demonstrates that body dissatisfaction predicts worsened symptoms of eating pathology over a period of 7 months in one study (Cooley & Toray, 2001b) and 3 years in another (Cooley & Toray, 2001a), supporting the notion that body dissatisfaction may act as a maintenance variable in developing eating disorders.

In addition, there is a problem with the direction of causality because research is unclear about whether negative affect predicts eating disturbances, derives from such problems, or both (Stice et al., 2004). The relationship between negative affect and eating pathology may also be explained by a third variable, such as biological or psychosocial variables (Polivy & Herman, 2002; Stice & Shaw, 2002). Ideal studies would therefore have a randomised and experimental design (Cooley & Toray, 2001a; Wertheim et al., 2001). This study relies on self-report measures. Future studies would benefit from using a qualitative design, including interviews to avoid misperceptions of the different concepts. The present study did not explore differences of ethnicity because the majority of participants were North European.

Implications for Treatment and Prevention

Eating disorders represent a challenge to society. Considerable research should make attempts toward understanding the etiology of this psychiatric problem with the intention to develop effective prevention and treatment interventions and programs (e.g., Stice, Shaw, Becker, & Rohde, 2008; Stice, Shaw, & Marti, 2007; Wilson, 2005), specifically while exploring the effects of change in body dissatisfaction, depression and low self-esteem on eating pathology. For example, previous research has measured the effect of change in self-esteem in a treatment program (O'Dea & Abraham, 2000, cited in Wade et al., 2003). However, the effects are, by so far, inconsistent (Wade et al., 2003). Similarly, an intervention targeting body dissatisfaction showed short-term effects in terms of a decrease in symptoms of depression and BN, however, these effects were not supported longitudinally (Bearman et al., 2003). Burton et al. (2007) conducted a randomised experiment and found that decreases in depressive symptoms diminish bulimic behaviour. More research is needed to clarify the role

of self-esteem, body dissatisfaction and depression in interventions, specifically emphasising long-term effects. According to the transdiagnostic theory, similar risk factors may underlie AN and BN. The present findings support this theory, hence prevention and treatment interventions based on variables, such as body dissatisfaction, depression and self-esteem might be applicable for both types of eating disorders.

It is acknowledged that eating disorders are more prevalent in females than in males. However, boys too suffer from disordered eating and need help for these problems. Gender-specific treatment interventions and programs should be developed in accordance to gender differences in the development of disordered eating. Differences may exist considering the degree of impact that the various risk factors may have on genders. On the basis of current findings, body dissatisfaction is greater among girls and explains more of the general eating disorder symptoms, such as eating concern, shape concern and weight concern in girls. Self-esteem and depression seem to have greater effects of mediation on the relationship between body dissatisfaction and various eating disorders for boys. Prevention and treatment programs should be developed accordingly. Moreover, interventions could also consider effects of muscularity on body dissatisfaction in boys, whereas body weight, in terms of body fat, are issues for girls. Overall, effective prevention and treatment programs could be developed on the basis of research findings, while considering gender differences in the development of eating disorders.

Implications for Future Research

There is a need to study body dissatisfaction in different contexts. In addition to controlling for gender, research needs to pay more attention to body dissatisfaction with relevance to age, ethnicity and socioeconomic status (SES) (Paxton, Eisenberg, & Neumark-Sztainer, 2006), negative life events (The McKnight Investigators, 2003) and several developmental challenges (Tiggemann, 2004).

For instance, Tiggemann (2004) found that although body dissatisfaction remains stable across the adult life span for women, the importance of body weight, figure and appearance decreases with age. The stability of body dissatisfaction over time may be explained by age specific standards of evaluation: the tendency of comparing bodies to age-appropriate ideals (Grogan, 1999, cited in Tiggemann, 2004). A further explanation holds that the stability of

body dissatisfaction is due to the counterbalance of the increasing deviation from the ideal with age and the decreasing importance of body image (Tiggemann, 2004). Moreover, because body image importance decreases with age, an increase in self-esteem is expected as boys and girls grow older (Tiggemann, 2004). Yet, research indicates that body dissatisfaction predicts low self-esteem among college women and among middle-aged women (Tiggemann, 2004). Similarly, other studies have found significant relations between body dissatisfaction and self-esteem independent of age (Paxton & Phythian, 1999; Tiggemann & Stevens, 1999; Webster & Tiggemann, 2003; Wilcox, 1997, all cited in Tiggemann, 2004).

Previous research is inconsistent about the impact of ethnicity. One study has found that there are more similarities than differences between ethnic groups in the development of eating disorders (Shaw, Ramirez, Trost, Randall, & Stice, 2004). These findings can possibly be explained by the recent diffusion of the Western thin-ideal phenomenon into the Eastern part of the world. For example, in Eastern Europe (Baranowski, Jorga, Djordjevic, Marinkovic, & Hetherington, 2003), and Asia, including China (Chen, Gao, & Jackson, 2007; Jackson & Chen, 2008), Japan (Stark-Wroblewski, Yanico, & Lupe, 2005), Hong Kong (Lam et al., 2002) and Malaysia (Soo, Shariff, Taib, & Samah, 2008).

On the contrary, some research claims that ethnic differences exist (Vaughan, Sacco, & Beckstead, 2008; White & Grilo, 2005). White and Grilo (2005) found that different factors are involved in eating and body image disturbances for various ethnic groups. For example, they found that Caucasians reported more symptoms of disordered eating and body dissatisfaction than African Americans (White & Grilo, 2005). Polivy and Herman (2002) suggest that SES is a better indicator of body dissatisfaction and EDs in modern societies. Although society is becoming wealthier, reflecting smaller differences between socio-economic groups, SES differences may still reflect variations in BMI, with those at the lower rank reporting higher BMI values (McCabe & Ricciardelli, 2004; Polivy & Herman, 2002), and possibly higher levels of body dissatisfaction. Hence, future research needs to investigate the dual-pathway model with different ethnic groups and in relation to SES differences and BMI. Moreover, in order to detect developmental changes (e.g. puberty and menopause) the effect of body dissatisfaction on eating pathology needs to be studied over time, and across various age groups (Tiggemann, 2004; Wertheim et al., 2001).

Future research needs to investigate present findings in relation to the remaining components of the dual-pathway model. For example, the impact of sociocultural factors on body dissatisfaction between genders. The objectification theory (Fredrickson & Roberts, 1997) attempts to present possible reasons to why females are more dissatisfied with their bodies than males, which may also be the underlying reason why girls are more likely to develop disordered eating than boys. More attention should be given to the cognitive processes, especially the consideration of internalisation of social factors (Hargreaves & Tiggemann, 2002; Vartanian, Polivy & Herman, 2004), such as the internalisation of media images. Gender differences could also be explored, for example, whether girls tend to internalise societal messages about the body to a larger degree than boys. Dieting is another component of the dual-pathway model that needs to be studied in relation to gender in this context. More importantly, the role of dieting in this model needs clarification. For example, it is important to avoid confusion about dieting and restraint eating, which is essential in the pathology of AN, and which may be considered as a type of compensatory behaviour in BN.

Finally, the dual-pathway model could be tested separately for Binge Eating Disorder (BED). BED is defined by “recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviours characteristic of BN” (APA, 2000, p. 595). Binge eating is of interest for future research because of the increased risk for obesity in adolescents (Folkehelseinstituttet, Retrieved December 3, 2008, from <http://www.fhi.no>; Neumark-Sztainer, Wall, Story, Haines, & Eisenberg, 2006; Stice et al., 2002). Obesity, in turn, is associated with an increased risk for developing eating disorders (Doyle, le Grange, Goldschmidt, & Wilfley, 2007), suggesting a circular relationship. It would be interesting to study whether risk factors are similar or different to those of AN and BN. According to the transdiagnostic theory assumptions would involve shared symptoms of these disorders. In particular Neumark-Sztainer et al. (2007) found shared risk factors for obesity and disordered eating among adolescents.

Conclusion

The present study supports selected parts of the dual-pathway model and offers new areas of research to this model. It was found that body dissatisfaction explains more of the variance in eating disorder symptoms among girls than among boys. Interestingly, findings indicate that there are larger effects of body dissatisfaction on general eating disorder symptoms, including

restraint eating, than on bulimic symptoms. Effects of mediation were also greater for general eating disorder symptoms and for restraint eating than for bulimic symptoms, especially when mediated by self-esteem. These findings suggest that the model is applicable to symptoms of eating disorders in general, and to anorexic pathology. The mediating effect of depression seems to have a greater influence on the prediction of disordered eating than the mediating effect of self-esteem. The mediating effects of depression and self-esteem seem to have a greater influence on predicting eating disorder symptoms in boys than in girls. Importantly, it seems that gender differences exist and these should be explored further with the intention of developing effective prevention and treatment programs.

References

- Allen, K. L., Byrne, S. M., McLean, N. J., & Davis, E. A. (2008). Overconcern with weight and shape is not the same as body dissatisfaction: Evidence from a prospective study of pre-adolescent boys and girls. *Body Image, 5*, 261-270.
- Alsaker, F. D. (1992). Pubertal timing, overweight, and psychological adjustment. *Journal of Early Adolescence, 12*, 396-419.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*. (4th ed.). Washington, DC: American Psychiatric Association.
- Anderson, C. B., & Bulik, C. M. (2004). Gender differences in compensatory behaviours, weight and shape salience, and drive for thinness. *Eating Behaviours, 5*, 1-11.
- Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *American Journal of Preventive Medicine, 10*, 77-84.
- Anschutz, D. J., Engels, R. C. M. E., & Van Strien, T. (2008). Susceptibility for thin ideal media and eating styles. *Body Image, 5*, 70-79.
- Baranowski, M. J., Jorga, J., Djordjevic, I., Marinkovic, J., & Hetherington, M. M. (2003). Evaluation of adolescent body satisfaction and associated eating disorder pathology in two communities. *European Eating Disorders Review, 11*, 478-495.
- Bardone-Cone, A. M., Abramson, L. Y., Vohs, K. D., Heatherton, T. F., & Joiner Jr., T. E. (2006). Predicting bulimic symptoms: An interactive model of self-efficacy, perfectionism, and perceived weight status. *Behaviour Research and Therapy, 44*, 27-42.
- Bardone-Cone, A. M., & Cass, K. M. (2007). What does viewing a pro-anorexia website do? An experimental examination of website exposure and moderating effects. *International Journal of Eating Disorders, 40*, 537-548.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality & Social Psychology, 51*, 1173-1182.
- Bearman, S. K., Presnell, K., Martinez, E., & Stice, E. (2006). The skinny on body dissatisfaction: A longitudinal study of adolescent girls and boys. *Journal of Youth and Adolescence, 35*, 229-241.
- Bearman, S. K., Stice, E., & Chase, A. (2003). Evaluation of an intervention targeting both depressive and bulimic pathology: A randomized prevention trial. *Behaviour Therapy, 34*, 277-293.
- Bebbington, P. (1996). The origins of sex differences in depressive disorder: Bridging the gap. *International Review of Psychiatry, 8*, 295-332.
- Benninghoven, D., Jürgens, E., Mohr, A., Heberlein, I., Kunzendorf, S., & Jantschek, G. (2006). Different changes of body-images in patients with anorexia or bulimia nervosa during inpatient psychosomatic treatment. *European Eating Disorders Review, 14*, 88-96.
- Binford, R. B., & le Grange, D. (2005). Adolescents with bulimia nervosa and eating disorder not otherwise specified-purging only. *International Journal of Eating Disorders, 38*, 157-161.
- Bosson, J. K., Pinel, E. C., & Thompson, J. K. (2008). The affective consequences of minimizing women's body image concerns. *Psychology of Women Quarterly, 32*, 257-266.

- Brechan, I. (2007, August). *Body ideal importance strengthens adverse consequences of negative body image*. Poster presented at the 21st conference of the European Health Psychology Society, August 15-18, Maastricht, The Netherlands.
- Burton, E. M., Stice, E., Bearman, S. K., & Rohde, P. (2007). Experimental test of the affect-regulation theory of bulimic symptoms and substance use: A randomized trial. *International Journal of Eating Disorders, 40*, 27-36.
- Cafri, G., van den Berg, P., & Thompson, J. K. (2006). Pursuit of muscularity in adolescent boys: Relations among biopsychosocial variables and clinical outcomes. *Journal of Clinical Child and Adolescent Psychology, 35*, 283-291.
- Cafri, G., Thompson, J. K., Ricciardelli, L., McCabe, M., Smolak, L., & Yesalis, C. (2005). Pursuit of the muscular ideal: Physical and psychological consequences and putative risk factors. *Clinical Psychology Review, 25*, 215-239.
- Cafri, G., Yamamiya, Y., Brannick, M., & Thompson, J. K. (2005). The influence of sociocultural factors on body image: A meta-analysis. *Clinical Psychology: Science and Practice, 12*, 421-433.
- Cash, T. F. (2002). Cognitive-behavioural perspectives on body image. In T. F. Cash & T. Pruzinsky (Eds.), *Body image: A handbook of theory, research, and clinical practice* (p. 38-46). New York: Guilford.
- Cash, T. F., Melnyk, S. E., & Hrabosky, J. I. (2004). The assessment of body image investment: An extensive revision of the Appearance Schemas Inventory. *International Journal of Eating Disorders, 35*, 305-316.
- Cash, T. F., Phillips, K. A., Santos, M. T., & Hrabosky, J. I. (2004). Measuring "negative body image": Validation of the Body Image Disturbance Questionnaire in a nonclinical population. *Body Image, 1*, 363-372.
- Cash, T. F., & Pruzinsky, T. (Eds.) (2002). *Body image: A handbook of theory, research, and clinical practice*. New York: Guilford.
- Center for Disease Control, Retrieved April 17, 2009, from <http://www.cdc.gov/growcharts>.
- Chen, H., Gao, X., & Jackson, T. (2007). Predictive models for understanding body dissatisfaction among young males and females in China. *Behaviour Research and Therapy, 45*, 1345-1356.
- Chen, E. Y., & le Grange, D. (2007). Subtyping adolescents with bulimia nervosa. *Behaviour Research and Therapy, 45*, 2813-2820.
- Cohen, J. W. (1988). *Statistical power analysis for the behavioral sciences*. (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Connell, R. W. (1995). *Masculinities*. Cambridge: Polity Press.
- Connell, R. W. (2000). *The men and the boys*. Cambridge: Polity Press.
- Cooley, E., & Toray, T. (2001a). Body image and personality predictors of eating disorder symptoms during the college years. *International Journal of Eating Disorders, 30*, 28-36.
- Cooley, E., & Toray, T. (2001b). Disordered eating in college freshman women: A prospective study. *Journal of American College Health, 49*, 229-235.
- Davison, T. E., & McCabe, M. P. (2006). Adolescent body image and psychosocial functioning. *The Journal of Social Psychology, 146*, 15-30.
- Doyle, A. C., le Grange, D., Goldschmidt, A., & Wilfley, D. E. (2007). Psychosocial and physical impairment in overweight adolescents at high risk for eating disorders. *Obesity, 15*, 145-154.
- Durkin, S. J., Paxton, S. J., & Sorbello, M. (2007). An integrative model of the impact of exposure to idealized female images on adolescent girls' body satisfaction. *Journal of Applied Social Psychology, 37*, 1092-1117.

- Fairburn, C. G., & Beglin, S. J. (1994). The assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, *16*, 363–370.
- Fairburn, C. G., & Cooper, Z. (1993). The eating disorder examination. (12th ed.). In C. G. Fairburn & G. T. Wilson (Eds.), *Binge eating: Nature, assessment, and treatment* (p. 317–360). New York: Guilford.
- Fairburn, C.G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behaviour Research and Therapy*, *41*, 509-528.
- Fairburn, C. G., Stice, E., Cooper, Z., Doll, H. A., Norman, P. A., & O’Connor, M. E. (2003). Understanding persistence in bulimia nervosa: A 5-year naturalistic study. *Journal of Consulting and Clinical Psychology*, *71*, 103-109.
- Folkehelseinstituttet, Retrieved December 3, 2008, from <http://www.fhi.no/>.
- Fredrickson, B. L., & Roberts, T. A. (1997). Objectification theory: Toward understanding women’s lived experiences and mental health risks. *Psychology of Women Quarterly*, *21*, 173–206.
- Grave, R. D., Calugi, S., & Marchesini, G. (2008). Is amenorrhea a clinically useful criterion for the diagnosis of anorexia nervosa? *Behaviour Research and Therapy*, *46*, 1290-1294.
- Grilo, C. M. (2004). Subtyping female adolescent psychiatric inpatients with features of eating disorders along dietary restraint and negative affect dimensions. *Behaviour Research and Therapy*, *42*, 67-78.
- Haines, J., & Neumark-Sztainer, D. (2006). Prevention of obesity and eating disorders: A consideration of shared risk factors. *Health Education Research*, *21*, 770-782.
- Hargreaves, D., & Tiggemann, M. (2002). The role of appearance schematicity in the development of adolescent body dissatisfaction. *Cognitive Therapy and Research*, *26*, 691-700.
- Hoek, H. W. (2006). Incidence, prevalence and mortality of anorexia nervosa and other eating disorders. *Current Opinion in Psychiatry*, *19*, 389-394.
- Interesseorganisasjonen for Kvinner med Spiseforstyrrelser, Retrieved December 3, 2008, from <http://www.iks.no/>.
- Jackson, T., & Chen, H. (2008). Predicting changes in eating disorder symptoms among Chinese adolescents: A 9-month prospective study. *Journal of Psychosomatic Research*, *64*, 87-95.
- Jarry, J. L., & Kossert, A. L. (2007). Self-esteem threat combined with exposure to thin media images leads to body image compensatory self-enhancement. *Body Image*, *4*, 39-50.
- Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction, and psychological distress: A prospective analysis. *Journal of Abnormal Psychology*, *114*, 119–125.
- Jones, D. C. (2004). Body image among adolescent girls and boys: A longitudinal study. *Developmental Psychology*, *40*, 823-835.
- Keery, H., van den Berg, P., & Thompson, J. K. (2004). A test of the tripartite influence model of body image and eating disturbance in adolescent girls. *Body Image: An International Journal of Research*, *1*, 237-251.
- Kraft, P., Breivik, S., Røysamb, E., & Holsen, I. (2001). Kroppsbilde og depressive tanker – en longitudinell studie av ungdom i alderen 13-18 år. *Tidsskrift for Samfunnsforskning*, *42*, 191-222.
- Krones, P. G., Stice, E., Batres, C., & Orjada, K. (2005). In vivo social comparison to a thin-ideal peer promotes body dissatisfaction: A randomized experiment. *International Journal of Eating Disorders*, *38*, 134-142.

- Lam, T. H., Stewart, S. M., Leung, G., Ho, S. Y., Fan, A. H., & Ma, A. L. T. (2002). Sex differences in body satisfaction, feeling fat and pressure to diet among Chinese adolescents in Hong Kong. *European Eating Disorders Review, 10*, 347-358.
- Lindberg, S. M., Hyde, J. S., & McKinley, N.M. (2006). A measure of objectified body consciousness for preadolescent and adolescent youth. *Psychology of Women Quarterly, 30*, 65-76.
- Luce, K. H., & Crowther, J. H. (1999). The reliability of the Eating Disorder Examination – Self-report questionnaire version (EDE-Q). *International Journal of Eating Disorders, 25*, 349-351.
- MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology, 58*, 593-614.
- McCabe, M. P., & Ricciardelli, L. A. (2001). Body image and body change techniques among young adolescent boys. *European Eating Disorders Review, 9*, 335-347.
- McCabe, M. P., & Ricciardelli, L. A. (2004). Body image dissatisfaction among males across the lifespan: A review of past literature. *Journal of Psychosomatic Research, 56*, 675-685.
- McCabe, M. P., & Ricciardelli, L. A. (2005). A prospective study of pressures from parents, peers, and the media on extreme weight change behaviors among adolescent boys and girls. *Behaviour Research and Therapy, 43*, 653-668.
- McCabe, M. P., & Ricciardelli, L. A. (2006). A prospective study of extreme weight change behaviours among adolescent boys and girls. *Journal of Youth and Adolescence, 35*, 425-434.
- Muehlenkamp, J. J., & Saris-Baglama, R. N. (2002). Self-objectification and its psychological outcomes for college women. *Psychology of Women Quarterly, 26*, 371-379.
- Nasjonalt Kunnskapssenter for Helsetjenesten. (2004). *Forebygging og behandling av spiseforstyrrelser*. Rapport fra Kunnskapssenteret, nr. 13.
- Nazroo, J. Y., Edwards, A. C., & Brown, G. W. (1998). Gender differences in the prevalence of depression: Artefact, alternative disorders, biology or roles? *Sociology of Health & Illness, 20*, 312-330.
- Neumark-Sztainer, D. R., Wall, M. M., Haines, J. I., Story, M. T., Sherwood, N.E., & van den Berg, P. A. (2007). Shared risk and protective factors for overweight and disordered eating in adolescents. *American Journal of Preventive Medicine, 33*, 359-369.
- Neumark-Sztainer, D. R., Wall, M. M., Story, M. T., Haines, J. I., & Eisenberg, M. (2006). Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: How do dieters fare 5 years later? *Journal of the American Dietetic Association, 106*, 559-568.
- Nunnally, J. O. (1978). *Psychometric theory*. New York: McGraw-Hill.
- Pallant, J. (2005). *SPSS survival manual*. (2nd ed.). Berkshire: Open University Press.
- Paxton, S. J., Eisenberg, M. E., & Neumark-Sztainer, D. (2006). Prospective predictors of body dissatisfaction in adolescent girls and boys: A five-year longitudinal study. *Developmental Psychology, 42*, 888-899.
- Paxton, S. J., Neumark-Sztainer, D., Hannan, P. J., Eisenberg, M. E. (2006). Body dissatisfaction prospectively predicts depressive mood and low self-esteem in adolescent girls and boys. *Journal of Clinical Child and Adolescent Psychology, 35*, 539-549.
- Polivy, J., & Herman, C. P. (2002). Causes of eating disorders. *Annual Review of Psychology, 53*, 187-213.
- Polivy, J., & Herman, C. P. (2004). Sociocultural idealization of thin female body shapes: An introduction to the special issue on body image and eating disorders. *Journal of Social and Clinical Psychology, 23*, 1-6.

- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, *36*, 717-731.
- Presnell, K., & Stice, E. (2003). An experimental test of the effect of weight-loss dieting on bulimic pathology: Tipping the scales in a different direction. *Journal of Abnormal Psychology*, *112*, 166-170.
- Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*, 385-401.
- Raney, T. J., Thornton, L. M., Berrettini, W., Brandt, H., Crawford, S., Fichter, M. M., et al. (2008). Influence of overanxious disorder of childhood on the expression of anorexia nervosa. *International Journal of Eating Disorders*, *41*, 326-332.
- Ricciardelli, L. A., & McCabe, M. P. (2001). Self-esteem and negative affect as moderators of sociocultural influences on body dissatisfaction, strategies to decrease weight, and strategies to increase muscles among adolescent boys and girls. *Sex Roles*, *44*, 189-207.
- Ricciardelli, L. A., & McCabe, M. P. (2003). Sociocultural and individual influences on muscle gain and weight loss strategies among adolescent boys and girls. *Psychology in the Schools*, *40*, 209-224.
- Ricciardelli, L. A., & McCabe, M. P. (2004). A biopsychosocial model of disordered eating and the pursuit of muscularity in adolescent boys. *Psychological Bulletin*, *130*, 179-205.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Ross, M., & Wade, T. D. (2004). Shape and weight concern and self-esteem as mediators of externalized self-perception, dietary restraint and uncontrolled eating. *European Eating Disorders Review*, *12*, 129-136.
- Shaw, H., Ramirez, L., Trost, A., Randall, P., & Stice, E. (2004). Body image and eating disturbances across ethnic groups: More similarities than differences. *Psychology of Addictive Behaviours*, *18*, 12-18.
- Shaw, H. E., Stice, E., & Springer, D. W. (2004). Perfectionism, body dissatisfaction, and self-esteem in predicting bulimic symptomatology: Lack of replication. *International Journal of Eating Disorders*, *36*, 41-47.
- Shroff, H., & Thompson, J. K. (2006). The tripartite influence model of body image and eating disturbance: A replication with adolescent girls. *Body Image*, *3*, 17-23.
- Sim, L., & Zeman, J. (2004). Emotion awareness and identification skills in adolescent girls with bulimia nervosa. *Journal of Clinical Child and Adolescent Psychology*, *33*, 760-771.
- Sim, L., & Zeman, J. (2005). Emotion regulation factors as mediators between body dissatisfaction and bulimic symptoms in early adolescent girls. *The Journal of Early Adolescence*, *25*, 478-496.
- Sim, L., & Zeman, J. (2006). The contribution of emotion regulation to body dissatisfaction and disordered eating in early adolescent girls. *Journal of Youth and Adolescence*, *35*, 219-228.
- Skårderud, F. (2007). Shame and pride in anorexia nervosa: A qualitative descriptive study. *European Eating Disorders Review*, *15*, 81-97.
- Smith, M. C., & Thelen, M. H. (1984). Development and validation of a test for bulimia. *Journal of Consulting and Clinical Psychology*, *52*, 863-872.
- Smolak, L., Murnen, S. K., & Thompson, J. K. (2005). Sociocultural influences and muscle building in adolescent boys. *Psychology of Men & Masculinity*, *6*, 227-239.

- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology*, *13*, 290-312.
- Soo, K. L., Shariff, Z. M., Taib, M. N. M., & Samah, B. A. (2008). Eating behaviour, body image, and self-esteem of adolescent girls in Malaysia. *Perceptual and Motor Skills*, *106*, 833-844.
- Stark-Wroblewski, K., Yanico, B. J., & Lupe, S. (2005). Acculturation, internalization of Western appearance norms, and eating pathology among Japanese and Chinese international student women. *Psychology of Women Quarterly*, *29*, 38-46.
- Stice, E. (1994). A review of the evidence for a sociocultural model of bulimia nervosa and an exploration of the mechanisms of action. *Clinical Psychology Review*, *14*, 633-661.
- Stice, E. (2001). A prospective test of the dual-pathway model of bulimic pathology: Mediating effects of dieting and negative affect. *Journal of Abnormal Psychology*, *110*, 124-135.
- Stice, E. (2002). Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin*, *128*, 825-848.
- Stice, E., Burton, E. M., & Shaw, H. (2004). Prospective relations between bulimic pathology, depression, and substance abuse: Unpacking comorbidity in adolescent girls. *Journal of Consulting and Clinical Psychology*, *72*, 62-71.
- Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology*, *21*, 131-138.
- Stice, E., & Shaw, H. E. (2002). Role of body dissatisfaction in the onset and maintenance of eating pathology: A synthesis of research findings. *Journal of Psychosomatic Research*, *53*, 985-993.
- Stice, E., Shaw, H., Becker, C. B., & Rohde, P. (2008). Dissonance-based interventions for the prevention of eating disorders: Using persuasion principles to promote health. *Prevention Science*, *9*, 114-128.
- Stice, E., Shaw, H., & Marti, C. N. (2007). A meta-analytic review of eating disorder prevention programs: Encouraging findings. *Annual Review of Clinical Psychology*, *3*, 207-231.
- Strober, M., Freeman, R., Lampert, C., & Diamond, J. (2007). The association of anxiety disorders and obsessive compulsive personality disorder with anorexia nervosa: Evidence from a family study with discussion of nosological and neurodevelopmental implications. *International Journal of Eating Disorders*, *40*, 46-51.
- Sweeting, H. & West, P. (2002). Gender differences in weight related concerns in early to late adolescence. *Journal of Epidemiology and Community Health*, *56*, 700-701.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics*. (4th ed.). New York: Harper Collins.
- The McKnight Investigators. (2003). Risk factors for the onset of eating disorders in adolescent girls: Results of the McKnight longitudinal risk factor study. *American Journal of Psychiatry*, *160*, 248-254.
- Thompson, J. K. (2000). *Body image, eating disorders, and obesity: An integrative guide for assessment and treatment*. (3rd ed.). Washington, DC: American Psychological Association.
- Thompson, J. K., Coovert, M. D., & Stormer, S. (1999). Body image, social comparison and eating disturbance: A covariance structure modeling investigation. *International Journal of Eating Disorders*, *26*, 43-53.
- Tiggemann, M. (2004). Body image across the adult life span: Stability and change. *Body Image*, *1*, 29-41.

- Tyrka, A. R., Waldron, I., Graber, J. A., & Brooks-Gunn, J. (2002). Prospective predictors of the onset of anorexic and bulimic syndromes. *International Journal of Eating Disorders, 32*, 282-290.
- Urbszat, D., Herman, C. P., & Polivy, J. (2002). Eat, drink, and be merry, for tomorrow we diet: Effects of anticipated deprivation on food intake in restrained and unrestrained eaters. *Journal of Abnormal Psychology, 111*, 396-401.
- Van Der Ham, T., Meulman, J. J., Van Strien, D. C., & Van Engeland, H. (1997). Empirically based subgrouping of eating disorders in adolescents: A longitudinal perspective. *British Journal of Psychiatry, 170*, 363-368.
- Vartanian, L. R., Polivy, J., & Herman, C. P. (2004). Implicit cognitions and eating disorders: Their application in research and treatment. *Cognitive and Behavioural Practice, 11*, 160-167.
- Vaughan, C. A., Sacco, W. P., & Beckstead, J. W. (2008). Racial/ethnic differences in Body Mass Index: The roles of beliefs about thinness and dietary restriction. *Body Image, 5*, 291-298.
- Vestergaard, P., Sørensen, T., Kjølbye, M., & Videbech, P. (2008). *En lærebog om voksnes psykiske sygdomme*. (3rd ed.). København: FADL's Forlag.
- Vohs, K. D., Bardone, A. M., Joiner, T. E., Abramson, L. Y., & Heatherton, T. F. (1999). Perfectionism, perceived weight status, and self-esteem interact to predict bulimic symptoms: A model of bulimic symptom development. *Journal of Abnormal Psychology, 108*, 695-700.
- Vohs, K. D., Voelz, Z. R., Pettit, J. W., Bardone, A. M., Katz, J., Abramson, L. Y., et al. (2001). Perfectionism, body dissatisfaction, and self-esteem: An interactive model of bulimic symptom development. *Journal of Social and Clinical Psychology, 20*, 476-497.
- Wade, T. D., Davidson, S., & O'Dea, J. A. (2003). A preliminary controlled evaluation of a school-based media literacy program and self-esteem program for reducing eating disorder risk factors. *International Journal of Eating Disorders, 33*, 371-383.
- Wasilenko, K. A., Kulik, J. A., & Wanic, R. A. (2007). Effects of social comparisons with peers on women's body satisfaction and exercise behavior. *International Journal of Eating Disorders, 40*, 740-745.
- Watson, J. (2000). *Male bodies: Health, culture and identity*. Buckingham: Open University Press.
- Wertheim, E. H., Koerner, J., & Paxton, S. J. (2001). Longitudinal predictors of restrictive eating and bulimic tendencies in three different age groups of adolescent girls. *Journal of Youth and Adolescence, 30*, 69-81.
- White, M. A., & Grilo, C. M. (2005). Ethnic differences in the prediction of eating and body image disturbances among female adolescent psychiatric inpatients. *International Journal of Eating Disorders, 38*, 78-84.
- Williamson, D. A., Davis, C. J., Goreczny, A. J., McKenzie, S. J., & Watkins, P. C. (1989). The Eating Questionnaire-Revised: A symptom checklist for bulimia. In P. A. Keller, & S. R. Heyman (Eds.), *Innovations in Clinical Practice: A Sourcebook, Vol. 8* (p. 321-326). Sarasota, FL: Professional Resource Exchange.
- Wilson, G. T. (2005). Psychological Treatment of eating disorders. *Annual Review of Clinical Psychology, 1*, 439-465.

Appendix A

Navn på skole
Att: Rektor

PSYKOLOGISK INSTITUTT

Postboks 1094, Blindern
N-0317 Oslo
Forskningsveien 3

Telefon: +47 22 84 50 00

Telefaks: +47 22 84 50 01

Nettadresse: www.psykologi.uio.no

Dato: 4. juni 2008

Forespørsel om deltagelse i forskningsprosjekt

Vi holder på med et forskningsprosjekt om ungdommers kroppsbilde (syn på eget utseende) og kroppsregulerende atferd (for eksempel slanking og trening). Forskningen vil bidra til økt kunnskap om risikofaktorer for bl.a. spiseforstyrrelser og tiltak for å forebygge disse. Vi ønsker å rekruttere 10. klassinger (skoleåret 2008-2009) til å besvare et spørreskjema høsten 2008 og to ganger våren 2009.

- Elevene bestemmer selv om de vil delta i undersøkelsen eller ikke
- Elevene vil få skriftlig informasjon med hjem til sine foresatte en uke før undersøkelsen
- Spørreskjemaet besvares i løpet av 15 minutter, samlet i klasserommet med lærer tilstede
- En mastergradsstudent i psykologi vil administrere (informere og veilede underveis) undersøkelsen i klasserommet

Vi håper deres skole vil delta i undersøkelsen. Det vi trenger deres hjelp til er å dele ut informasjonsskrivet som elevene skal ta med hjem til sine foresatte, samt 15 minutter av en skoletime for å besvare spørreskjemaet.

Kontakt gjerne undertegnede pr. brev (se adresse over), telefon 22845147, mobil 46967703 eller e-post: inge.brechan@psykologi.uio.no.

Med vennlig hilsen

Inge Brechan, Doktorgradsstipendiat

Appendix B

Til elever på tiende klasstrinn ved XXX og deres foresatte

Dato: 27. november 2008

PSYKOLOGISK INSTITUTT

Postboks 1094, Blindern

N-0317 Oslo

Forskningsveien 3

Telefon: +47 22 84 50 00

Telefaks: +47 22 84 50 01

Nettadresse: www.psykologi.uio.no

Informasjon til elever og foresatte om forskningsprosjektet

Følelser og forhold til mat og kropp blant ungdom

Kjære elever og foresatte

Om en ukes tid vil forskere fra Universitetet i Oslo komme til skolen for å gjennomføre første omgang av en undersøkelse om følelser og forhold til mat og kropp blant skolens tiendeklassinger. Undersøkelsen innebærer at elevene fyller ut et spørreskjema ved tre anledninger: En gang nå i desember, en gang i mars og en gang i juni. Deltagelse i undersøkelsen er helt frivillig og eleven kan når som helst trekke seg fra undersøkelsen uten å oppgi grunn.

Vedlagt finner dere en samtykkeerklæring som beskriver hva forskningsprosjektet går ut på og hva undersøkelsen innebærer. For at eleven skal kunne delta trenger vi underskrift på samtykkeerklæringen av eleven og elevens foresatte. Hvis dere vil hjelpe oss ved å delta i undersøkelsen ber vi om at dere skriver under på samtykkeerklæringen og returnerer den til elevens kontaktlærer så raskt som mulig.

Undersøkelsen gjennomføres etter avtale med skolens rektor og er godkjent av Regional komité for medisinsk og helsefaglig forskningsetikk, Sør-Øst-Norge, og Personvernombudet.

Ta gjerne kontakt med undertegnede på telefon 22 84 51 47 eller e-post inge.brechan@psykologi.uio.no hvis dere har spørsmål. Undertegnede kan også kontaktes i løpet av skoleåret og etter at undersøkelsen er avsluttet.

Med vennlig hilsen
Inge Brechan, Doktorgradsstipendiat
Prosjektleder

Forespørsel om deltakelse i forskningsprosjektet

Følelser og forhold til mat og kropp blant ungdom

Bakgrunn og hensikt

Dette er et spørsmål til deg om å delta i en forskningsstudie for å undersøke sammenhengen mellom holdning til egen kropp, følelser generelt og symptomer på spiseforstyrrelser. Vi vil også undersøke om det er forskjeller mellom ulike grupper basert på kjønn, etnisk bakgrunn, mediebruk, familiens sammensetning og økonomi. Undersøkelsen gjennomføres blant tiendeklassinger ved skoler i Oslo av forskere ved Universitetet i Oslo.

Hva innebærer studien?

Studien innebærer å fylle ut et spørreskjema med spørsmål om holdning til egen kropp, følelser generelt, samt oppfatninger og atferd relatert til vekt og spising. Spørreskjemaet inkluderer også noen spørsmål om bakgrunnsinformasjon om deg selv og din familie, slik som vekt og høyde, alder, bruk av media, etnisitet, hvem du bor sammen med og inntekt. Spørreskjemaet fylles ut på skolen og det tar ca. 20 minutter å fylle ut spørreskjemaet. Studien foregår i tre omganger, henholdsvis i løpet av høsten (august-desember), vinteren (januar-mars) og våren (april-juni). Vi ønsker å følge eventuelle endringer i løpet av skoleåret og derfor benytter vi det samme spørreskjemaet alle de tre gangene. Hvis du velger å delta i undersøkelsen er du ikke forpliktet til å delta i alle tre omgangene. Du kan når som helst trekke deg fra undersøkelsen uten å oppgi noen grunn.

Mulige fordeler og ulemper

Det er ingen åpenbare personlige fordeler eller ulemper ved å delta i denne studien. En mulig konsekvens av å lese og besvare spørsmålene i spørreskjemaet er at du blir mer klar over din holdning til egen kropp, følelser generelt, samt dine oppfatninger og din atferd relatert til vekt og spising. For noen kan kanskje en slik klarhet oppfattes ubehagelig hvis de oppfatter at de har problemer i forhold til kropp og spising spesielt, eller følelser generelt. For de som kan ha slike problemer er det imidlertid også en fordel å være klar over det, slik at man kan søke hjelp. Vi oppfordrer alle som føler at de har slike problemer til å ta kontakt med noen som kan hjelpe. For de fleste er det mest relevant å ta kontakt med sin fastlege og i akutte tilfeller legevakten. Man kan også kontakte skolens helsesøster eller sosiallærer. Det finnes flere opplysningstjenester om mental helse og spiseforstyrrelser blant ungdom. Kontaktinformasjon om noen slike opplysningstjenester står på baksiden av brevet som fulgte denne samtykkeerklæringen. Denne kontaktinformasjonen vil også bli utdelt hver gang spørreskjemaet besvares. Du kan også kontakte prosjektleder Inge Brechan på telefon 22 84 51 47 eller e-post inge.brechan@psykologi.uio.no i løpet av skoleåret og etter at undersøkelsen er avsluttet.

Hva skjer med informasjonen om deg?

Informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. En kode knytter deg til dine opplysninger gjennom en navneliste.

Det er kun autorisert personell knyttet til prosjektet som har adgang til navnelisten og som kan finne tilbake til deg. Navnelisten vil bli slettet 30. juni 2009, når den tredje omgangen med utfylling av spørreskjema er gjennomført.

Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltakelse

Det er frivillig å delta i studien og du kan når som helst trekke deg fra studien uten å oppgi noen grunn. Det vil ikke få noen konsekvenser for deg om du trekker deg fra studien. Dersom du ønsker å delta i studien undertegner du samtykkeerklæringen nedenfor. Dersom du ønsker å trekke tilbake ditt samtykke etter at du har besvart og levert spørreskjemaet i studien kan du kontakte prosjektleder Inge Brechan på telefon 22 84 51 47 eller e-post inge.brechan@psykologi.uio.no. Når navnelisten (se forrige avsnitt) er slettet 30. juni 2009 vil det ikke lenger være mulig å trekke seg fordi vi da ikke lenger kan finne ut hvilken besvarelse av spørreskjemaet som er din.

Personvern

Opplysninger som registreres om deg er kun din besvarelse av spørreskjemaet. Universitetet i Oslo ved universitetsdirektøren er databehandlingsansvarlig.

Rett til innsyn og sletting av opplysninger om deg

Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner. Merk imidlertid at fristen for å trekke seg er 30. juni 2009 (som nevnt over).

Økonomi

Studien er finansiert gjennom forskningsmidler fra Universitetet i Oslo.

Informasjon om utfallet av studien

Du har rett til å få informasjon om utfallet/resultatet av studien. Hvis du ønsker slik informasjon kan du kontakte prosjektleder Inge Brechan på telefon 22 84 51 47 eller e-post inge.brechan@psykologi.uio.no.

Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker/elev, dato)

Jeg gir mitt samtykke til at min datter/sønn deltar i studien

(Signert av foresatte, dato)

Jeg bekrefter å ha gitt informasjon om studien

(Signert av prosjektmedarbeider ved oppstart av studien, dato)

Appendix C

Har du problemer?

Hvis du har problemer med vekt eller spising, eller følelser generelt (for eksempel føler deg deprimert eller nervøs) skal du kontakte fastlegen din. Hvis du lurer på hvem din fastlege er kan du ringe Fastlegetelefonen 810 59 500 eller gå inn på nettsiden www.nav.no/minfastlege. På nettsiden må du oppgi ditt fødselsnummer (11 siffer), navn og postnummer (4 siffer).

På skolen kan du kontakte skolelegen eller helsesøster. Informasjon om skolehelsetjenesten i din bydel kan du få ved å ringe Oslo kommune på telefon 02180 eller på nettsidene til Oslo kommune www.oslo.kommune.no. For å finne informasjon som gjelder din bydel må du først velge din bydel nederst på nettsiden.

Hvis du har behov for hjelp med en gang, og ikke kan få tak i fastlegen din, kan du ringe Legevakten 22 93 22 93 eller møte opp hos Legevakten i Storgata 40. Informasjon om Legevakten finner du på nettsiden www.legevakten.oslo.kommune.no.

Ønsker du informasjon eller noen å snakke med?

Ung Helse & Klara Klok

På nettsidene til Ung Helse www.unghelse.no finner du informasjon om det meste når det gjelder helse og ungdom. Der finner du også kontaktinformasjon til Helsestasjonen og Utekontakten i din bydel. Helsestasjonen i bydelen er et helsetilbud i tillegg til fastlegen og skolehelsetjenesten. Utekontakten er et tilbud til ungdom som trenger noen å snakke med, om hva som helst, ikke bare helse. På nettsidene til Klara Klok www.klara-klok.no kan du sende inn dine egne spørsmål og få svar av fagpersonell. Du kan også lese hva andre har spurt om og hvilke svar de fikk. Du kan være anonym hvis du ønsker det. Ung Helse og Klara Klok drives av Nordland Fylkeskommune i samarbeid med Helsedirektoratet.

Røde Kors

Hvis du trenger noen å snakke med kan du ringe Røde Kors-telefonen for barn og ungdom 800 33 321 gratis på hverdager mellom klokken 14 og 20. Du kan også skrive inn spørsmål på nettsidene www.korspahalsen.no. Du kan være anonym hvis du ønsker det.

Mental Helse

Denne organisasjon for brukere, pårørende og andre som er interessert i psykisk helse driver nettsiden www.mentalhelse.no, døgnåpen hjelpetelefon 810 300 30 (20 øre pr minutt) og nettsiden www.sidetmedord.no hvor du kan sende meldinger og få svar tilbake. Både hjelpetelefonen og nettsidene betjenes av medmennesker med erfaring, ikke av fagspesialister.

Andre tjenester:

Helsedirektoratets nettside: www.psykisk.no

Barne-, ungdoms-, og familiedirektoratets nettside: www.ung.no

Voksne for barn: www.vfb.no & Bekymringstelefonen (for voksne): 810 03 940

Interesseorganisasjonen ROS – Rådgivning om spiseforstyrrelser: www.nettros.no

Opplæringsprogrammene Psykisk helse i skolen: www.psykiskhelseiskolen.no

Nasjonal kompetanseenhet for minoritetshelse: www.nakmi.no

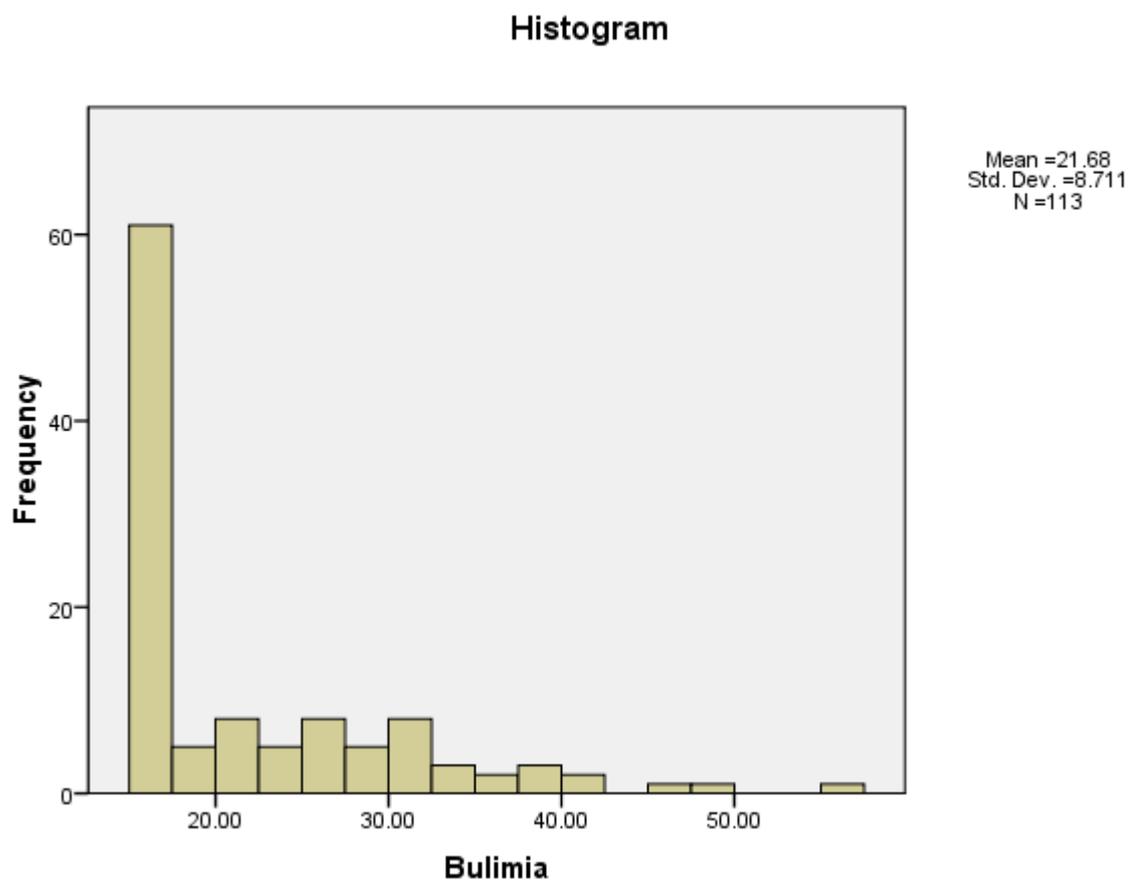
Stiftelsen Psykiatrisk opplysning: www.psykopp.no

Rådet for psykisk helse: www.psykiskhelse.no

Du kan også kontakte prosjektleder Inge Brechan på telefon 22 84 51 47 eller e-post inge.brechan@psykologi.uio.no i løpet av skoleåret og etter at undersøkelsen er avsluttet.

Appendix D

The Histogram Demonstrates the Positively Skewed Scores of Symptoms of Bulimia



Appendix E

The Boxplot shows the Detected Outliers of Bulimia Symptoms (outliers appear as little circles)

