

Eating Disorders, Weight Perception, and Dieting in Adolescence

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Abstract

Background: Eating disorders are serious psychiatric disorders, which usually have their onset in adolescence. Body dissatisfaction and dieting, both common among adolescents, are recognised risk factors for eating disorders. The aim of the present study was to assess the prevalence of eating disorders in the general adolescent population, assess the risk of developing eating disorders in subgroups of dieters, and analyse longitudinal concomitants of incorrect weight perception.

Method: A prospective follow-up study on 595 adolescents, aged 15 at baseline, was conducted in western Finland. The study comprised questionnaires directed at the whole study population and subsequent personal interviews with adolescents found to be screen-positive for eating disorders, at both baseline and three-year follow-up.

Results: The lifetime prevalence rates for 18 year old females were 2.6 % for anorexia nervosa, 0.4 for bulimia nervosa, and 9.0 % for eating disorder not otherwise specified (EDNOS). No prevalent case of DSM-IV eating disorders was found among the male participants. Eating disorders, as well as depressive symptoms, social anxiety, and low self-esteem, was more prevalent among females who perceived themselves as being overweight, despite being normal or underweight, when compared to females with a correct weight perception. An incorrect weight perception was associated in males with social anxiety. Female adolescents dieting due to psychological distress, rather than vanity or overweight, had a fifteen-fold risk of developing an eating disorder.

Conclusions: Eating disorders are common among female adolescents, and adolescents choosing to diet due to psychological distress show a markedly increased risk of developing an eating disorder. Promotion of general well-being as well as the prevention of body dissatisfaction and misdirected dieting, accompanied by early detection and proper treatment of eating disorders, is needed to reduce the incidence of and facilitate recovery in adolescents suffering from eating disorders.

Acknowledgements

During my early teenage years I remember considering a vocational education to become a chef. I can't remember how serious this ambition was, but I do recall that my parents thought that an academic education would better fit my endowments. I am now at a point in my career where I can entitle myself an expert, not in food, but in eating and more particularly in disordered eating. The process leading up to the present dissertation started already in the winter of 2004 and many individuals and associations have been helpful along the way.

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List of Original Publications

- I. Isomaa, A-L., Isomaa, R., Marttunen, M., & Kaltiala-Heino, R. (2010). Obesity and eating disturbances are common in 15-year old adolescents. A two-step interview study. *Nordic Journal of Psychiatry*, *64*, 123-129.
- II. Isomaa, R., Isomaa, A-L., Marttunen, M., Kaltiala-Heino, R., & Björkqvist, K. (2009). The prevalence, incidence, and development of eating disorders in Finnish adolescents – a two-step three-year follow-up study. *European Eating Disorders Review*, *17*, 199-207.
- III. Isomaa, R., Isomaa, A-L., Marttunen, M., Kaltiala-Heino, R., & Björkqvist, K. (2010). Psychological distress and risk for eating disorders in subgroups of dieters. *European Eating Disorders Review*, *18*, 296-303.
- IV. Isomaa, R., Isomaa, A-L., Marttunen, M., Kaltiala-Heino, R., & Björkqvist, K. (2011). Longitudinal concomitants of incorrect weight perception in female and male adolescents. *Body Image*, *8*, 58-63.

1 Introduction

Adolescence can be defined as the period between beginning of puberty and adulthood. Adolescence is a unique and distinct developmental period, which comprises both psychological and physiological processes of change. During adolescence significant changes occur in brain development, endocrinology, emotions, cognition, behaviour, and interpersonal relationships (Evans & Seligman, 2005). A large part of the developmental process involves adapting, with increased cognitive capacity and social understanding, to a changing body (Erikson, 1980).

A large part of mental health disorders have their onset in adolescence and many carry over into adulthood. Aside from disorders, many health habits, which influence adult behaviour, have their foundation in adolescence (Evans & Seligman, 2005). Development conceptualised by contemporary developmental science is made up by reciprocal interactions of the individual and context. This dynamic system encompasses all levels of organisation ranging from the biological, psychological, and social actions to the societal, cultural, and physical environment embedded in historical context (Lerner & Castellino, 2002). Developmental psychopathology can therefore be defined as “the study of the origins and course of individual patterns of behavioral maladaptation” (Sroufe & Rutter, 1984, p. 18). When development is conceptualised from a developmental science perspective, the search for the one crucial cause of a disorder is not of particular interest, since such a factor does not by definition exist. Of higher relevance to research stemming from a developmental psychopathology viewpoint are, apart from the actual disorders, subclinical functioning and individuals at a high risk of psychopathology who do not develop a disorder (Cicchetti & Rogosch, 2002).

In contemporary Western society, two contrary trends regarding body weight are present. On the one hand, a rising prevalence of overweight and obese children and, on the other, an increasing drive for thinness and an unhealthy preoccupation with body shape and weight (Cole, Bellizzi, Flegal, & Dietz, 2000; Konstanski & Gullone, 1998; Levine & Smolak, 2002). These contradicting trends result in a situation whereby an increasing number of people are dissatisfied with their actual body size

and shape. Adolescents, faced with the important developmental task of coming to terms with a changing body, may be particularly sensitive to the discrepancy between real and ideal bodies (Levine & Smolak, 2002). The consequential body dissatisfaction accompanied by dieting is one of the most common predecessors of eating disorders (Keel, Baxter, Heatherton, & Joiner, 2007; Paxton & Heinicke, 2008), which constitutes the main focus of the present thesis.

1.1 Eating Disorders

Eating disorders are serious psychiatric disorders which alter cognitive function, judgement, emotional stability and restrict the life activities of sufferers. Eating disorders and anorexia nervosa in particular are among the deadliest psychiatric disorders (Klump, Bulik, Kaye, Treasure, & Tyson, 2009). Increased public and medical awareness during the past decades might give the impression that eating disorders are phenomena of contemporary Western society. However, eating disorders and self-starvation have followed mankind throughout history (Bemporad, 1996). The term anorexia nervosa, which literally means loss of appetite, was coined in 1874 by Sir William Gull, but the medical condition was described already at the end of the 17th century by Richard Morton. Although reports of overeating and vomiting have been present in medical records from the 19th century, the term bulimia nervosa was not coined until 1979 (Vandereycken, 2002).

The understanding of eating disorders has grown substantively during the latter half of the 20th century. A large part of this growth in knowledge can be attributed to the pioneering work of Hilde Bruch, whose view of eating disorders focused on the patient's struggle for autonomy, control, lack of self-esteem, and distorted body image (Skårderud, 2009; Vandereycken, 2002). Eating disorders are psychosomatic problems, which evolve around a strong fear of weight gain, restrictive eating patterns, and a strong preoccupation with body shape (Norrington & Clinton, 2002). Eating disorders in a current view can be defined as "a persistent disturbance of eating behavior or behavior to control weight, which significantly impairs physical health or psychosocial functioning" (Fairburn & Walsh, 2002, p. 171).

1.1.1 Diagnostic Criteria

Criteria for diagnosing eating disorders are found in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) published by the American Psychiatric Association (American Psychiatric Association, 1994) and in the International Classification of Diseases (ICD-10) by the World Health Organization (World Health Organization, 2007). Although the diagnostic criteria for anorexia nervosa and bulimia nervosa are similar in the two classification systems, the “eating disorder not otherwise specified” category in DSM-IV corresponds to the diagnoses for atypical anorexia nervosa, atypical bulimia nervosa, and eating disorder, unspecified, in the ICD-10. In the present thesis, eating disorders are conceptualised according to the diagnostic criteria in the DSM-IV. The DSM-IV uses a multi-axial system for classification. The five axes comprise clinical syndromes, developmental disorders and personality disorders, physical conditions, severity of psychosocial stressors, and highest level of functioning. All diagnoses are based on a proposed definition of a mental disorder, which states that a mental disorder is a clinically significant behavioural or psychological syndrome associated with distress or disability that is not an expectable and culturally sanctioned response to a particular event or a manifestation of conflicts between the individual and society (American Psychiatric Association, 1994).

In 2000 the American Psychiatric Association published a text revision of the manual, DSM-IV-TR (American Psychiatric Association, 2000), but no changes were made to the diagnostic criteria for eating disorders. The DSM-IV contains three diagnoses for eating disorders: anorexia nervosa, bulimia nervosa, and eating disorder not otherwise specified (EDNOS). The diagnostic criteria of anorexia nervosa concern an intense preoccupation with weight and shape, pursuit of thinness, and physical consequences of the disorder. A diagnosis of bulimia nervosa is based on episodes of binge eating and recurrent inappropriate compensatory behaviours. The EDNOS category is a residual category for disorders of eating that do not meet the criteria for anorexia nervosa or bulimia nervosa. Most EDNOS cases resemble anorexia nervosa or bulimia nervosa, but lack one of the diagnostic criteria sufficient for diagnosis (Fairburn & Walsh, 2002). Complete descriptions of diagnostic criteria for eating disorders in the DSM-IV are presented in Tables 1 to 3.

Table 1

Diagnostic criteria for Anorexia nervosa (307.1) in DSM-IV

-
- A. Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).
 - B. Intense fear of gaining weight or becoming fat, even though under weight.
 - C. Disturbance in the way one's body weight or shape are experienced, undue influence of body weight or shape on self evaluation, or denial of the seriousness of the current low body weight.
 - D. In postmenarcheal females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles. A woman is considered to have amenorrhea if her periods occur only following hormone administration e.g. oestrogen.

Specify type:

Restricting type: During the current episode of anorexia nervosa, the person has not regularly engaged in binge-eating or purging behaviour (i.e., self-induced vomiting or misuse of laxatives, diuretics, or enemas).

Binge-eating–purging type: During the current episode of anorexia nervosa, the person has regularly engaged in binge-eating or purging behaviour.

Table 2

Diagnostic criteria for Bulimia nervosa (307.51) in DSM-IV

-
- A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:
 1. Eating, in a discrete period of time, an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.
 2. A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating).
 - B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise.
 - C. The binge eating and inappropriate compensatory behaviour both occur, on average, at least twice a week for 3 months.
 - D. Self evaluation is unduly influenced by body shape and weight.
 - E. The disturbance does not occur exclusively during episodes of anorexia nervosa.

Specify type:

Purging type: During the current episode of bulimia nervosa, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.

Nonpurging type: During the current episode of bulimia nervosa, the person has used inappropriate compensatory behaviour but has not regularly engaged in self-induced vomiting or misused laxatives, diuretics, or enemas.

Table 3

Diagnostic criteria for EDNOS (307.50) in DSM-IV

The Eating Disorder Not Otherwise Specified category is for eating disorders that do not meet the criteria for any specific eating disorder. Examples include

1. For females, all of the criteria for anorexia nervosa are met except that the patient has regular menses.
 2. All of the criteria for anorexia nervosa are met except that, despite significant weight loss, the patient's current weight is in the normal range.
 3. All of the criteria for bulimia nervosa are met except that the binge eating and inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than 3 months.
 4. The regular use of inappropriate compensatory behaviour by an individual of normal body weight after eating small amounts of food (e.g., self-induced vomiting after the consumption of two cookies).
 5. Repeatedly chewing and spitting out, but not swallowing, large amounts of food.
 6. Binge-eating disorder: recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviours characteristic of bulimia nervosa.
-

1.1.2 Prevalence and Incidence

Two commonly used measures in descriptive epidemiology are prevalence and incidence. Prevalence estimates provides the proportion of cases in a given population at a specific point in time, point prevalence, or during a specified period, for example lifetime prevalence. The number of new cases in relation to the total number of individuals at risk during a specified period is expressed as incidence. To facilitate comparison between studies the incidence of eating disorders is often expressed as new cases per 100 000 person-years (Keski-Rahkonen, Raevuori, & Hoek, 2008).

The American Psychiatric Association stated in 2006 that the true incidence and prevalence of eating disorders is still unclear and that results vary depending on the sampling and assessment methods (American Psychiatric Association, 2006). In a much cited review of the prevalence and incidence of eating disorders Hoek and van Hoeken (2003) reported an average prevalence for anorexia nervosa of 0.3 % and of 1.0 % for bulimia nervosa in young females. Recent methodologically sound large-scale studies on the lifetime prevalence of DSM-IV anorexia nervosa in Finland (Keski-Rahkonen et al., 2007), Sweden (Bulik, Sullivan, Tozzi, Furberg,

Lichtenstein, & Pedersen, 2006), Australia (Wade, Bergin, Tiggemann, Bulik, & Fairburn, 2006), and the United States (Hudson, Hiripi, Pope, & Kessler, 2007) have reported figures ranging from 0.9 to 2.2 % for women and from 0.1 to 0.3 for men (Keski-Rahkonen, et al., 2008).

Recent prevalence estimates for DSM-IV bulimia nervosa resemble those for anorexia nervosa; 1.7 % in Finland (Keski-Rahkonen et al., 2009) and 1.5 % in the United States (Hudson et al., 2007). A review of studies on bulimia nervosa found the lifetime prevalence to be between 1-2 % for women and 0.5 % for men (Keski-Rahkonen et al., 2008).

Sub-threshold cases of anorexia nervosa or bulimia nervosa are the most common forms of eating disorders in the community and fall into the category of eating disorders not otherwise specified (EDNOS) (American Psychiatric Association, 1994; Machado, Machado, Goncalves, & Hoek, 2007). In outpatient settings, EDNOS accounts for 60 % of all cases, but this category has often been overlooked by researchers (Fairburn & Bohn, 2005). Cases fulfilling all but one criterion for anorexia nervosa (Bulik et al., 2006; Keski-Rahkonen et al., 2007; Wade et al., 2006) or bulimia nervosa (Keski-Rahkonen et al., 2009) have been as common as full syndrome cases in population-based studies. The prevalence of DSM-IV EDNOS has ranged from 2.4 % to 4.9 % in recent studies of young women (Keski-Rahkonen et al., 2008). The prevalence of binge-eating disorder, a subtype of EDNOS, was 3.5 % among women and 2.0 % among men in the United States (Hudson et al., 2007).

Studies on the incidence of eating disorders have usually been conducted in clinical settings leading to an underestimation of the true incidence, since far from all cases are detected by the health care system (Hoek & van Hoeken, 2003). Community based studies on the incidence of eating disorders have reported figures of 270 per 100 000 person-years for anorexia nervosa and 210 per 100 000 person-years for bulimia nervosa in female adolescents (Keski-Rahkonen et al., 2009; Keski-Rahkonen et al., 2007). Anorexia nervosa usually has its onset earlier than bulimia nervosa. Peak-years of incidence are 15-19 years for anorexia nervosa and 20-24 years for bulimia nervosa (Hoek & van Hoeken, 2003; Keski-Rahkonen et al., 2008).

Estimates of the incidence of EDNOS in adolescents and young adult females have ranged from 960 to 2800 per 100 000 person-years (Ghaderi & Scott, 2001; Lahortiga-Ramos, De Irala-Estevéz, Cano-Prous, Gual-García, Martínez-González, & Cervera-Enguix, 2005).

Based on the above mentioned studies on the incidence and prevalence of eating disorders between one in twenty and one in ten young women suffer from eating disorders during their lifetime and between one and three percent develop an eating disorder every year during peak years of incidence.

1.1.3 Outcome

Important parameters of outcome in eating disorders are remission and mortality. Anorexia nervosa usually has its onset during the mid-teenage years. In some cases the disorder is short-lived, but in some unremitting (Fairburn & Harrison, 2003). Studies of the outcome of eating disorders have shown anorexia nervosa to have the least favourable outcome with regard to both remission and mortality. Moreover, studies of outcome, with a follow-up time over five years, have reported remission in 48-84 % of cases with anorexia nervosa, 70-72 % of cases with bulimia nervosa, and 75 % of cases with EDNOS. Mortality figures have ranged from 1-8 % of cases with anorexia nervosa and 0-2 % of cases with bulimia nervosa (Keel & Brown, 2010). In Finland, Keski-Rahkonen and colleagues reported clinical recovery in two-thirds of women suffering from anorexia nervosa and half of women suffering from bulimia nervosa within five years. After reaching clinical recovery, many still suffer from psychological problems for several years (Keski-Rahkonen et al., 2009; Keski-Rahkonen et al., 2007).

1.1.4 Weight Perception and Dieting in Relation to Eating Disorders

Body image is a multidimensional concept which encompasses both self-perceptions and self-attitudes (Cash, 2004) and is related to the sociocultural norms and ideals, more specifically to the ideal of thinness in females and of muscularity in males (Smolak, 2004). Weight perception is the subjective interpretation of an individual's weight status and perceiving oneself as overweight or underweight is related to low self-esteem and other mental health problems in both male and female adolescents

(Al Mamun, Cramb, McDermott, O'Callaghan, Najman, & Williams, 2007; Perrin, Boone-Heinonen, Field, Coyne-Beasley, & Gordon-Larsen, 2010).

In childhood, boys and girls have similar body compositions, but during puberty the fat percentage increases in females and decreases in males (Moelgaard & Michaelsen, 1998). Adapting to the physical changes during puberty is a time-consuming and challenging process, and body dissatisfaction usually increases in adolescence. Among female adolescents the decrease in body satisfaction generally ends in middle-adolescence, but among male adolescents, the process continues into young adulthood. Still, males express markedly less body dissatisfaction than females during this developmental period (Eisenberg, Neumark-Sztainer, & Paxton, 2006; Paxton & Heinicke, 2008).

Some degree of body dissatisfaction may be regarded as normative in adolescent females, and this dissatisfaction usually concerns excess fat on hips, buttocks, stomach, and thighs. Adolescent males also strive to avoid being fat, but instead of pursuing thinness, they seek to gain weight in the form of muscles (Levine & Smolak, 2002). The drive for thinness as well as the drive for muscularity is associated with negative psychological outcomes (Kelley, Neufeld, & Musher-Eizenman, 2010).

A logical consequence of perceiving oneself as being overweight or unfit is dieting. Dieting is a widely recognized risk factor for eating disorders in adolescence and can be defined as the intentional and sustained restriction of caloric intake for the purposes of weight loss or weight maintenance (Abraham, 2003; Patton, Johnson-Sabine, Wood, Mann, & Wakeling, 1990; Patton, Selzer, Coffey, Carlin, & Wolfe, 1999; Stice, Burton, Lowe, & Butryn, 2007). Dieting has effects on both physical and mental health. In a review of the consequences of weight loss, French and Jeffrey (1994) found dieting-induced weight cycling to be associated with alterations in metabolic rate and an increased risk for future weight gain. The psychological effects of dieting can be depression, anxiety, and lower self-esteem. Dieting can also be detrimental to people with pre-existing psychological problems. Moreover,

adolescents who diet are more likely to engage in unhealthy eating and physical activity behaviours (Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007).

Different reasons for dieting may lead to different means of dieting, which in turn may lead to different outcomes or consequences of the diet (Putterman & Linden, 2004). Dieting accompanied with negative affect has an established relation to a more severe eating pathology, emotional distress and lower likelihood of recovery (Chen & Le Grange, 2007; Grilo, 2004; Jansen, Havermans, Nederkoorn, & Roefs, 2008; Stice & Agras, 1999; Stice, Bohon, Marti, & Fischer, 2008; Stice & Fairburn, 2003).

1.2 Summary of the Literature Reviewed

Several nationally representative methodologically sound studies on the prevalence and incidence of eating disorders have recently been published (Keski-Rahkonen et al., 2008). In order to identify prevalent cases of eating disorders, a two-stage methodological approach is recommended. In the first stage, a large population is screened for the likelihood of eating disorders, and in the second stage, the eating disorder is confirmed or rejected in a personal interview (Hoek & van Hoeken, 2003; Jacobi, Abascal, & Taylor, 2004). Most large-scale epidemiological studies have been retrospective and have mainly focused on anorexia nervosa and bulimia nervosa. Even though sub-threshold cases of anorexia nervosa or bulimia nervosa are the most common forms of eating disorders in the community, the EDNOS category has still received little attention in epidemiological studies (Machado et al., 2007; Fairburn & Bohn, 2005). More studies on the full spectrum of eating disorders, aimed at the population during the peak-years of incidence, are needed to be able to provide reliable estimations of both point and lifetime prevalence. Furthermore, prospective study designs are more suitable when analysing the incidence and outcome of disorders (Bhopal, 2008; Keel & Brown, 2010), and may provide a valuable comparison for retrospective studies.

Even though a substantial number of studies have been published during the last decades on weight and body dissatisfaction, its concomitants and outcomes, most

studies have focused on being overweight, using either the body mass index or a subjective overweight as a departure of analysis, which does not enable analysis of incorrect weight perception and may also fail to notice an important group of males who incorrectly perceive themselves as being underweight instead of overweight. Therefore, more epidemiological and prospective research on the different nature of body dissatisfaction in males and females is needed (Smolak, 2004).

Although dieting is a widely recognised risk factor for eating disorders in adolescence (Abraham, 2003; Patton et al., 1990; Patton et al., 1999; Stice et al., 2007), only a minority of dieters develops an eating disorder (French & Jeffrey, 1994; Patton et al., 1990). The question then arises: what distinguishes those adolescent dieters who develop an eating disorder from those dieters who do not? Studies elaborating the concept of dieting as a risk factor for eating disorders are called for.

1.3 Aims

The main aim of the present study was to investigate the prevalence, incidence, and outcome of anorexia nervosa (AN), bulimia nervosa (BN), eating disorder not otherwise specified (EDNOS), and subclinical eating pathology in Finnish adolescents. Eating disorders were assessed in personal interviews and diagnosed according to the DSM-IV diagnostic criteria (Original publications I, II).

The second aim of the present study was to analyse the longitudinal concomitants of an incorrect weight perception, such as depressive symptoms, social anxiety, self esteem, dissatisfaction with body shape, and eating disorders in adolescence, with special attention to the different form of incorrect weight perception in males and females. Females who, despite being of normal or underweight, regarded themselves as overweight and males who, despite being of normal weight, regarded themselves as underweight were classified as having an incorrect weight perception (Original publication IV).

The third aim was to predict the risk of developing an eating disorder and assess psychological distress in subgroups of dieters. Dieting was confirmed in personal interviews and dieters assessed for their reason for starting to diet. Subgroups of dieters, based on the reason for starting to diet, were compared on questionnaire measures of psychological distress and the risk of developing an eating disorder was analysed in follow-up interviews (Original publication III).

2 Method

The present study is a two-step prospective follow-up study on eating disorders, weight perception, and dieting in female and male adolescents.

2.1 Participants and Procedure

All pupils in the ninth grade (mean age = 15.4, $SD = 0.3$) of comprehensive school, the nine-year basic education in Finland, in the Jakobstad region were invited to participate in the baseline study (T1). The region is part of the Ostrobothnia district on the west coast of Finland. The Jakobstad region with a population of approximately 40.000 inhabitants comprises two small cities and two rural areas. A questionnaire regarding mental health, mental health problems, health behaviour, and life circumstances was distributed to a total of 606 adolescents (318 males and 288 females) in their classrooms during a normal school lesson in the autumn of 2004.

Table 4

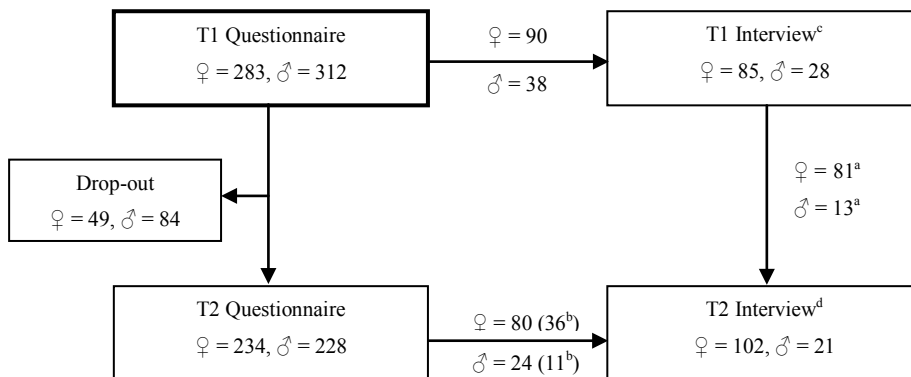
Number of participants and response rates at baseline (T1) and follow-up (T2)

	Baseline				Follow-up			
	Questionnaire		Interview		Questionnaire		Interview	
	Female	Male	Female	Male	Female	Male	Female	Male
<i>N</i>	283	312	85	28	234	228	102	21
%	98.3 ^a	98.1 ^a	94.4 ^b	73.7 ^b	82.7 ^c	73.1 ^c	87.2 ^d	87.5 ^d

- a. Percentage of all ninth graders in the area
- b. Percentage of adolescents invited to an interview at T1
- c. Percentage of T1 participants
- d. Percentage of adolescents invited to an interview at T2

Participants who reported dieting and fulfilled at least one additional criterion for anorexia, or who binged and fulfilled at least one additional criterion for bulimia

were invited to a face-to-face interview to assess potential eating disorders. Participants who reported having suffered from, been suspected of having, or having received treatment for an eating disorder were also invited to an interview. The screening procedure resulted in 128 screen-positive adolescents, of whom 113 participated in an interview. All the participants were interviewed by the same child psychiatrist, who has experience with patients suffering from eating disorders.



- False positive females ($n = 4$) and males ($n = 15$) at T1 were not invited to the T2 interview
- Number of T2 screen-positive females and males not interviewed at T1
- All interviews conducted face-to-face
- Face-to-face $n = 102$ (82.9%), telephone $n = 6$ (4.9%), SEDs $n = 15$ (12.2%)

Figure 1. Number of female and male participants at the different stages of the study.

The follow-up study (T2) was conducted three years later, in the autumn of 2007. The follow-up study followed the same two-step procedure as the baseline study, with a broad questionnaire directed to the whole study population ($N = 595$) and subsequent interviews with participants interviewed at T1 and participants fulfilling screening criteria at T2. The design of the study, number of participants and response rates at the different stages of the study is presented in Figure 1 and Table 4.

Attrition from the follow-up was more common among the male (26.9%) than among the female (17.3%) participants, $\chi^2_{(1)} = 7.89$, $p < .01$. Of those who dropped out, a non-significantly smaller proportion screened positive for eating-disorders at

T1, $\chi^2_{(1)} = 0.75, p = .39$. In the interview at T2, 18 participants declined participation, two of which were diagnosed as subclinical in the T1 interview. No participant with a DSM-IV eating disorder diagnosed at T1 declined participation at T2.

2.2 Measures

The self-report questionnaire comprised questions regarding mental health, mental health problems and life circumstances including questions on eating behaviour and dieting. A questionnaire with a similar set of questions had been used in a previous study concerning mental health problems in 15-year-old adolescents in two major cities in Finland (Fröjd et al., 2004; Fröjd, Kaltiala-Heino, & Marttunen, 2010).

Eating disorders were assessed in personal interviews, to which participants were invited based on their answers to questionnaire items. Additionally, the participants' height and weight were measured at school during the academic year 2004-2005 and individual growth curves were obtained for those participating in the interviews. The following sections describe the instruments used in the present study.

2.2.1 Eating disorders and dieting

Questionnaire items concerning anorectic and bulimic eating pathology were formulated according to the DSM-IV (American Psychiatric Association, 1994) diagnostic criteria of eating disorders by a group of researchers and clinicians with expertise in the field (Kaltiala-Heino, Rissanen, Rimpelä, & Rantanen, 1999; Kaltiala-Heino, Rimpelä, Rissanen, & Rantanen, 2001). Questions pertaining to anorexia nervosa (AN) concerned dieting, fear of gaining weight or becoming fat, feeling fat even though family and friends were of the opposite opinion, and amenorrhea. Questions pertaining to bulimia nervosa (BN) were binge eating at least twice a week for three months, fear of losing control while bingeing, compensatory behaviour, and feeling good about nothing or feeling like a failure if not slim with an ideal figure. The inventory also included questions on suffering from an eating disorder (ED), being suspected of having an ED, and receiving treatment for an ED.

The instrument Rating of Anorexia and Bulimia (RAB) was used in the interviews. At T1, the teenage version (RAB-T) was used, and at T2, the revised version (RAB-R) of the instrument (Clinton & Norring, 1999; Nevenon, Broberg, Clinton, & Norring, 2003). RAB is an instrument developed in Sweden within the framework of the Coordinated Research on Eating Disorders in Sweden (COEAT). The semi-structured interview instrument is based on the Eating Disorder Examination (EDE) consisting of more than 50 items covering a wide range of eating disorder symptoms, related psychopathology, and background variables (Cooper & Fairburn, 1987). All information necessary to establish a DSM-IV diagnosis of an eating disorder is inherent in the RAB.

For nine cases in the follow-up, who did not want to participate in a personal interview, the Survey for Eating Disorders (SEDs) was used. The self-report measure has demonstrated good sensitivity in assessing eating disorders according to the DSM-IV criteria (Ghaderi & Scott, 2002; Göttestam & Agras, 1995).

Diagnoses of eating disorders were set according to the DSM-IV criteria. Individual growth curves were used to estimate body mass index at lowest weight when dieting. A subclinical eating disorder was diagnosed if the participant had dieted or binged, feared gaining weight or becoming fat, was fixated with body weight or shape, and evaluated him-/herself strongly in terms of body weight or shape. The participant was able to eat normal meals, but not completely without reservation. The weight loss or disturbed eating was not severe enough for an EDNOS diagnosis.

2.2.2 Weight and weight perception

Body mass index (BMI, kg/m^2) was calculated using data obtained from the school health care service. Weight class was assessed using age and sex adjusted international BMI cut-offs for underweight and overweight, corresponding to an adult BMI of 18.5 and 25 respectively (Cole et al., 2000; Cole, Flegal, Nicholls, & Jackson, 2007). Using the cut-offs for 15.5 year olds, a BMI below 17.7 for females and 17.3 for males was regarded as underweight. A BMI above 24.4 for females and 23.6 for males was regarded as overweight.

Weight perception was measured with the question “What do you think about your weight? Do you consider yourself to be: normal weight; underweight; overweight”. At follow-up (T2), dissatisfaction with body shape was measured with the question “How do you feel about your body shape? I am satisfied; I am somewhat dissatisfied; I am very dissatisfied”.

2.2.3 Depressive symptoms

Depressive symptoms were measured with the 13-item Finnish modification (RBDI) of the short version of Beck Depression Inventory (Kaltiala-Heino, Rimpelä, Rantanen, & Laippala, 1999; Raitasalo, 2007). Each item is scored from 0-3 resulting in a maximum summed score of 39. A cut-off score of eight points is suggested to indicate moderate to severe depression. The Cronbach’s alpha value for RBDI in the present study was .86 at both T1 and T2.

2.2.4 Social anxiety

Social anxiety was measured with the Social Phobia Inventory (SPIN) (Connor, Davidson, Churchill, Sherwood, Foa, & Weisler, 2000; Ranta, Kaltiala-Heino, Koivisto, Tuomisto, Pelkonen, & Marttunen, 2007). The scale consists of 17 items. Each item is scored from 0-4 resulting in a maximum summed score of 68. A cut-off score of 19 points is appropriate for screening purposes in adolescent populations (Ranta, Kaltiala-Heino, Rantanen, Tuomisto, & Marttunen, 2007). The Cronbach’s alpha value for SPIN in the present study was .86 at T1 and .90 at T2.

2.2.5 Self-esteem

Self-esteem was measured with the Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1989). The scale consists of 10 items scored from 0-3 resulting in a maximum summed score of 30 or scored as 1-4 resulting in a maximum summed score of 40. The Cronbach’s alpha value for RSES in the present study was .88 at T1 and .87 at T2.

2.3 Statistical analyses

Descriptive statistics for continuous data are presented as means (M) and standard deviations (SD), and mean differences were analysed with the t test, with attention to equality of variances. Distributions on discrete variables are presented as percentages and were analysed with the Chi-square (χ^2) test.

Prevalence rates of different eating disorders were calculated by dividing the number of prevalent cases with the number of same-sex participants at the different stages of the study. Prevalence rates are presented in percentages and were analyzed separately for female and male participants. Participants suffering from an eating disorder at the time of the interview were coded as point prevalent cases. The incidence of eating disorders in ages 15-18 was calculated by adding the number of point prevalent cases at T1 with new cases during the follow-up period and dividing this by the number of person-years at risk. Confidence intervals (CI) were calculated using the modified Wald method (Agresti & Coull, 1998) and lower limit CIs below zero were set to zero (Original publications I and II).

A repeated measures MANOVA (doubly-multivariate design) was used to assess between-subjects, within-subjects, and interaction effects of depressive symptoms, social anxiety, and self-esteem in female and male adolescents with and without an incorrect weight perception. The results are presented as test values (F) based on Pillai's Trace, and Partial Eta Squared (η^2_p) for effect size (Original publication IV).

The validity of the qualitatively derived subgroups of dieters was tested with a hierarchical cluster analysis using Ward's method of clustering and squared Euclidian distances as similarity measures. The number of clusters in the final solution was based on the agglomeration schedule and dendrogram. A multivariate analysis of variance, with sex as a covariate, was used to test group differences in depressive symptoms, social phobia, and self-esteem between high- and low-risk dieters. The results are presented as test values (F) with degrees of freedom (df). Pillai's Trace was used for significance testing and Partial Eta Squared (η^2_p) for effect size. The risk of developing an eating disorder was calculated with logistic

regression analysis. The two regression models were evaluated with the Hosmer and Lemeshow test. The results are presented with Wald statistics and associated degrees of freedom (*df*) along with odds ratios (OR) (Original publication III).

2.4 Ethical considerations

Written informed consent was obtained from the participants. For adolescents under 15 years at the beginning of the study, passive parental consent was obtained by sending an information letter to the child's parents in advance asking them to notify the researchers if they do not want their offspring to participate. The study was approved by the Ethical Committee of the Jakobstad Hospital and permitted by the school authorities. The ethical considerations of the study follow the guidelines published by the National Advisory Board on Research Ethics (2009).

3 Results

The results section summarises the most important findings from the present study. More detailed results are found in the original publications.

3.1 Prevalence and Incidence of Eating Disorders

At T1, The point prevalence of eating disorders in females was 0.7 % for AN 0.0 % for BN, and 2.2 % for EDNOS. Additionally 5.3 % of the females were classified as having a subclinical eating disorder. No eating disorders were found among the male participants at the time of the interview. The lifetime prevalence for females was 1.8 % for AN, 0.0 % for BN, and 5.3 % for EDNOS. Lifetime prevalent subclinical eating disorders were found in 5.7 % of the female and 0.3 % of the male participants.

At T2, the point prevalence of eating disorders in females was 0.0 % for AN, 0.4 % for BN, and 1.3 % for EDNOS. The point prevalence of subclinical eating disorders was 8.1 % for females and 0.9 % for males. The lifetime prevalence for females was 2.6 % for AN, 0.4 % for BN, and 9.0 % for EDNOS. The lifetime prevalence of subclinical eating disorders was 8.5 % in female and 0.9 % in male participants (Table 5).

Table 5

Point and lifetime prevalence of eating disorders in 15- and 18-year old females

	T1 point prevalence		T1 lifetime prevalence		T2 point prevalence		T2 lifetime prevalence	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
AN	2	0.7	5	1.8	-	-	6	2.6
BN	-	-	-	-	1	0.4	1	0.4
EDNOS	6	2.2	15	5.3	3	1.3	21	9.0

The total number of incident cases in the present study was 15. The incidence rate of any DSM-IV eating disorder in females aged 15-18 was 1,641 per 100,000 person-years (95 % CI = 980–2724). The incidence rate for anorexic eating disorders (AN, EDNOS type 1 and 2) was 1,204 per 100,000 person-years (95 % CI = 652–2181) and for bulimic eating disorders (BN, EDNOS type 3) was 438 per 100,000 person-years (95 % CI = 132–1175). Determining incidence rates for individual diagnoses was not motivated due to an insufficient sample size.

3.2 Outcome of Eating Disorders

The outcome of female participants with a lifetime diagnosis of an eating disorder or subclinical eating pathology at baseline was assessed at follow-up. Of the 20 females with a lifetime diagnosis of a DSM-IV eating disorder at T1, all had reached clinical recovery at T2. Of those, 14 (70.0 %) were regarded as fully recovered from their eating disorder and six (30.0 %) still demonstrated subclinical eating pathology. Moreover, 12 of the 16 participants with subclinical eating pathology at baseline took part in the follow-up. Nine (75.0 %) were recovered and three (25.0 %) demonstrated a subclinical eating pathology.

Of the eight females who had developed an eating disorder during the period between baseline and follow-up, four (50.0 %) were diagnosed with a DSM-IV eating disorder, three were diagnosed as subclinical (37.5 %), and one (12.5 %) as recovered in the T2 interview. Eight females had developed a subclinical eating pathology and six (75.0 %) of them were still regarded as subclinical while two (25.0 %) had already recovered by the time of the interview.

Two thirds of the participants who had suffered from a DSM-IV eating disorder during ages 15-18 had received treatment at the local specialized outpatient clinic for eating disorders, and only two participants had not been detected by the health care system.

3.3 Weight Perception

According to international cut-offs for BMI, 6.1 % of the female adolescents were underweight, 77.9 % normal weight, and 16.1 % overweight at T1. Of the male adolescents, 3.1 % were underweight, 74.4 % normal weight, and 22.5 % overweight. There was a significant sex difference in weight class distribution, $\chi^2_{(2)} = 6.23$, $p < .05$. According to the adolescents' own weight perception, 44.5 % of females and 18.8 % of males were overweight, and 4.9 % of females and 16.2 % of males underweight, $\chi^2_{(2)} = 54.12$, $p < .001$. Of the females who perceived themselves as being overweight, only 33.6 % were in fact overweight according to their BMI. Of the males that perceived themselves as being underweight, only 14.9 % were underweight, according to their BMI.

Females who perceived themselves as being overweight, in spite of being normal or underweight, were regarded as having a characteristically female incorrect weight perception ($n = 83$). Males who perceived themselves as being underweight, despite being normal or overweight, were regarded as having a characteristically male incorrect weight perception ($n = 40$). Females ($n = 174$) and males ($n = 203$) perceiving themselves in accordance with their weight class, based on BMI cut-offs, were regarded as having a correct weight perception.

A multivariate repeated measures analysis of variance with incorrect weight perception versus correct weight perception as independent variable and depressive symptoms, social anxiety, and self-esteem as dependent variables, revealed significant between-subjects, $F_{(3, 207)} = 10.65$, $p < .001$, $\eta^2_p = .13$, within-subjects, $F_{(3, 207)} = 10.72$, $p < .001$, $\eta^2_p = .13$, as well as interaction effects, $F_{(3, 207)} = 5.29$, $p < .01$, $\eta^2_p = .07$, in females. Females with an incorrect weight perception had higher levels of depressive symptoms and social anxiety, and lower levels of self-esteem than females with a correct weight perception at both time points. A larger decrease in depressive symptoms, $F_{(1, 209)} = 6.29$, $p < .05$, $\eta^2_p = .03$, and a larger increase in self-esteem, $F_{(1, 209)} = 9.29$, $p < .01$, $\eta^2_p = .04$, was observed among females with an incorrect weight perception compared to females with a correct weight perception from baseline to follow-up. However, the group differences were still statistically

significant at T2. The corresponding analysis in males revealed no significant multivariate between-subjects, $F_{(3, 171)} = 1.88, p = .14, \eta^2_p = .03$, within-subjects, $F_{(3, 171)} = 2.34, p = .08, \eta^2_p = .04$, or interaction effects, $F_{(3, 171)} = .19, p = .91, \eta^2_p = .00$. A univariate test for social anxiety revealed higher levels of social anxiety in males with an incorrect weight perception than males with a correct weight perception, $F_{(1, 173)} = 4.92, p < .05, \eta^2_p = .03$.

Dissatisfaction with body shape was more prevalent among females with an incorrect weight perception than a correct weight perception, $\chi^2_{(2)} = 19.16, p < .001$, with 63.8 % of females with an incorrect weight perception being somewhat dissatisfied and 11.6 % very dissatisfied with their body shape, in comparison to 41.7 % and 3.5 % of females with a correct weight perception. In the case of males there was no significant difference in body shape dissatisfaction between an incorrect and correct weight perception, $\chi^2_{(2)} = 1.76, p = .42$.

Based on the responses to the questionnaire items on eating disorders, 49.4 % of females with an incorrect weight perception and 23.0 % with a correct weight perception were regarded as screen-positive at T1, $\chi^2_{(1)} = 18.16, p < .001$, and 53.6 % of females with an incorrect weight perception compared to 25.7 % with a correct weight perception at T2, $\chi^2_{(1)} = 16.05, p < .001$. The subsequent interviews, with screen-positive participants, revealed that eating disorders and subclinical eating pathology were more prevalent among females with an incorrect than a correct weight perception at baseline, $\chi^2_{(2)} = 16.09, p < .001$, but not at follow-up, $\chi^2_{(2)} = 0.01, p = .99$. A larger proportion of females with an incorrect than a correct weight perception also had a history of eating disorders, $\chi^2_{(2)} = 15.58, p < .001$. The lifetime prevalence of DSM-IV eating disorders for females with an incorrect weight perception was 14.5 % at T1 and 16.9 % at T2. The corresponding lifetime prevalence for females with a correct weight perception was 3.4 % at T1 and 5.7 % at T2.

3.4 Dieting

The analysis of the data from the interviews at T1 revealed four mutually exclusive subgroups of dieters. Vanity dieters ($n = 28$, 26 female, 2 male) had started to diet to obtain a figure in line with the present body ideal. They had a clear purpose for their dieting and usually dieted by omitting high-fat foods and sweets combined with moderately increased exercise. Overweight dieters ($n = 12$, 7 female, 5 male) dieted to lose weight to avoid the associated adverse health consequences of being overweight. They appeared to have a sensible approach to the means of dieting and exercise. All overweight dieters had an age- and sex-adjusted $BMI \geq 25$ at the onset of dieting. Depressed dieters ($n = 33$, 32 female, 1 male) dieted because of depressed mood and emotional problems, which they believed would be resolved by losing weight and obtaining a slim figure. The means of dieting varied among the depressed dieters, but approximately two-thirds used meal-skipping, purging or intense exercise to regulate caloric intake and expenditure. Feeling-fat dieters ($n = 8$, all female) could not provide any other explanation for their dieting than a diffuse feeling of being fat, even though objectively being normal or underweight. They usually dieted by skipping meals, eating very little or exercising intensely.

Subsequent analyses of questionnaire data showed that feeling-fat dieters and depressed dieters had higher levels of depressive symptoms and anxiety, and lower levels of self-esteem than overweight and vanity dieters. Based on questionnaire and interview data, the depressed and feeling-fat dieters were regarded as high-risk dieters ($n = 41$) and vanity and overweight dieters were regarded as low-risk dieters ($n = 40$) in relation to eating disorders.

The high- and low-risk dieters were assessed for lifetime eating disorders at age 18 (T2). Of the low-risk dieters, five had developed a subclinical eating disorder and one a DSM-IV eating disorder. Of the high-risk dieters ten had developed a subclinical eating disorder and 19 a DSM-IV eating disorder. The group difference was significant ($\chi^2_{(2)} = 28.45$, $p < .001$). Since none of the male participants had developed an eating disorder they were excluded from further analysis (Table 6).

Table 6

Eating disorders (ED) and subclinical eating pathology at follow-up in subgroups of dieters

	vanity dieters	overweight dieters	depressed dieters	feeling-fat dieters
	low-risk dieters		high-risk dieters	
	<i>n</i>	%	<i>n</i>	%
No ED	24	80.0	6	17.1
Subclinical	5	16.7	10	28.6
DSM-IV ED	1	3.3	19	54.3

The risk for developing a DSM-IV eating disorder by age 18 was analysed with logistic regression. The high-risk dieters had a fifteen-fold risk (OR = 14.86) of developing a DSM-IV eating disorder compared to the low-risk dieters in a regression model adjusted for depressive symptoms, social phobia, and self-esteem. The regression model correctly predicted 80 % of the cases.

4 Discussion

The discussion section will summarise the central findings of the present study and discuss them in relation to previous research in the area. The discussion section will also review the methodological aspects of the study and potential implications of the results for research as well as prevention and treatment.

4.1 Results

Eating disorders are relatively common in female adolescents. According to the results in the present study, as many as one in ten females have suffered from a DSM-IV eating disorder during their adolescent years.

The lifetime prevalence of 2.6 % for AN in the present study corresponds with population-based research in Finland (Keski-Rahkonen et al., 2007) and Australia (Wade et al., 2006), but is somewhat higher than findings from Sweden (Bulik et al., 2006) and the United States (Hudson et al., 2007). As in a previous study in Finland (Sihvola et al., 2009) bulimia nervosa was not as common as anorexia nervosa in the present study. This might be due to the age group in the present study, since the highest incidence of bulimia nervosa is found among 20-24 year old females (Hoek & van Hoeken, 2003). There is also some evidence of a declining incidence of bulimia nervosa (Currin, Schmidt, Treasure, & Hershel, 2005; Keel, Heatherton, Dorer, Joiner, & Zalta, 2006), which may in part explain the results.

In line with previous research (Bulik et al., 2006; Fairburn & Bohn, 2005; Keski-Rahkonen et al., 2007; Keski-Rahkonen et al., 2009; Machado et al., 2007; Wade et al., 2006) EDNOS was the most common diagnosis. The lifetime prevalence of EDNOS was 9.0 % for 18-year-old females in the present study and accounted for 75.0 % of diagnoses at both baseline and follow-up. The proportion of EDNOS was somewhat higher than reported by Fairburn and Bohn (2005).

The correspondence of prevalence figures in the present prospective study and the nationally representative retrospective study by Keski-Rahkonen and colleagues (2007, 2009) supports the reliability of both studies and gives strength to estimates of the true prevalence of eating disorders in adolescent girls and young women in Finland.

The incidence rate of eating disorders for females aged 15-18 in the present study was substantially higher than previously presented. The incidence rate of 1,204 per 100,000 person-years for anorexic eating disorders (AN, EDNOS type 1 and 2) is more than twice as high as the incidence rate for the comparable broad anorexia reported for females aged 15-19 in Finland (Keski-Rahkonen et al., 2007). The relatively small number of participants in the present study made the impact of individual cases to the incidence rate large. Moreover, the uncertainty of the incidence is reflected in the wide confidence intervals. Even though the incidence of eating disorders overall have remained fairly stable during the last decades (Crowther, Arney, Luce, Dalton, & Leahey, 2008), an increasing incidence of anorexia nervosa in 15-19 year old females has been reported in the Netherlands (van Son, van Hoeken, Bertelds, van Furth, & Hoek, 2006).

Eating disorders are rare among adolescent males. We found only two cases of subclinical eating disorders and no cases of DSM-IV eating disorders in the male participants. Males with eating disorders might differ in symptomatology (Mosley, 2008; Raevuori, Keski-Rahkonen, Hoek, Sihvola, Rissanen, & Kaprio, 2008; Raevuori, Hoek, Susser, Kaprio, Rissanen, & Keski-Rahkonen, 2009), and thus avoid detection in population studies based on traditional eating disorder criteria.

Discontentment with body weight and shape is related to dieting and eating disorders. The present study suggests that incorrect weight perception is relatively common among adolescents. Female adolescents who perceive themselves as being overweight are, in most cases, of normal weight, according to their BMI. Almost half of the female adolescents in the present study perceived themselves as being overweight, but only one third of them were truly overweight according to suggested cut-offs (Cole et al., 2000). Male adolescents, on the other hand, commonly perceive

themselves as being underweight despite being of normal weight. In the present study, only one in six adolescent males who perceived themselves as being underweight had a BMI below the suggested cut-off for underweight (Cole et al., 2007). The proportion of females and males in the present study perceiving themselves as being under- or overweight were in line with previous findings from Finland (Kaltiala-Heino, Kautiainen, Virtanen, Rimpelä, & Rimpelä, 2003) and the United States (Perrin et al., 2010). The perception of being overweight among the male adolescents was, in most cases, a correct perception. Although, perceiving oneself as too fat or too skinny is related to physical development during puberty, it might also be a reflection of the discrepancy between the real and the ideal body (Eisenberg et al., 2006; Paxton & Heinicke, 2008; Stice, 2002).

Female adolescents with an incorrect weight perception experienced more depressive symptoms, social anxiety, and had lower levels of self-esteem than their counterparts with a correct weight perception. Despite the fact that the prospective analysis revealed that the gap between females with an incorrect and a correct weight perception diminished over the three-year period, the differences were still significant at follow-up. Eating disorders and subclinical eating pathology were more prevalent at baseline among females with an incorrect weight perception than among females with a correct perception of their weight. These findings are in line with previous research (Kelley et al., 2010; Paxton & Heinicke, 2008).

Male adolescents with an incorrect weight perception were similar, to a great extent, to those males with a correct weight perception with respect to the dependent variables. However, they differed from each other with regard to social anxiety. At follow-up, as many as one third of the males, who perceived themselves as being underweight, despite being of normal weight, scored above the suggested cut-off for social phobia. Elevated levels of social anxiety due to discontentment with muscularity may have negative consequences in the form of misuse of muscle-building substances (Raevuori, Keski-Rahkonen, Bulik, Rose, Rissanen, & Kaprio, 2006; Smolak, 2004).

Dieting is a well known risk factor for eating disorders and the present study suggests that analysing adolescents' reasons for dieting is useful, when assessing the risk of the negative consequences of dieting. Dieters were subgrouped into high- and low-risk dieters, based on the adolescents' own accounts of the reason for starting to diet. Overweight and vanity dieters were considered low-risk dieters, and depressive and feeling-fat dieters were considered high-risk dieters. The grouping was based on previous research (French & Jeffrey, 1994; Stice et al., 2008) and data from the interviews and the base-line questionnaire. The high- and low-risk dieters differed significantly from each other on measures of psychological distress and resulted in substantially more eating pathology among those in the high-risk subgroup.

Of the high-risk dieters, 19 had developed a DSM-IV eating disorder, ten had subclinical symptoms, and only six had no symptoms of eating disorders. Only one of the low-risk dieters had an eating disorder of diagnostic severity. The high-risk dieters had a fifteen-fold risk of developing an eating disorder, compared to the low-risk dieters, by age 18, when controlling for depressive symptoms, social phobia, and self-esteem.

4.2 Methods

The present study was conducted using a two-stage prospective follow-up design. Moreover, a two-stage methodology is currently regarded as the best for the investigation of eating disorders in the community (Hoek & van Hoeken, 2003; Jacobi, Abascal, & Taylor, 2004). The participants were recruited from a well-defined catchment area, and nearly all eligible respondents participated in the baseline study. In Finland, education is compulsory, starting from the year in which the child becomes seven and ending at age 16. This means that virtually all Finnish adolescents attend ninth grade and the present study can be regarded as reaching all adolescents of a particular age in the catchment area.

All interviews were conducted by the same child psychiatrist, who has experience with patients suffering from eating disorders. Although using only one interviewer

introduces the possibility of interviewer bias, having an experienced child psychiatrist as an interviewer may be regarded as more valuable.

In addition to the information from the questionnaires and the interviews, we obtained height and weight data from the school health-care service on all the participants at baseline, and weight charts for those participating in the interviews in order to determine the participants' lowest BMI value. No reliable data on weight and height was collected at follow-up, precluding analysis of weight development and correctness of weight perception.

The present study combined objective data on weight and height with the participants' own perceptions of their weight, instead of merely using an either-or approach. The approach used enabled the study of more distinct subgroups of adolescent body dissatisfaction, and the longitudinal design enabled analyses of changes on psychological variables over time.

Due to the relatively small number of participants, the confidence intervals of the prevalence and incidence rates are large and the results should therefore be interpreted with caution. A larger number of participants would also have enabled the determination of the incidence of single eating disorder diagnoses, and following more than one cohort of adolescents would have made analyses of cohort effects possible. With a larger number of participants we would possibly have been able to identify cases of DSM-IV eating disorders among male participants. Interviewing a control group of screen-negative adolescents would have enabled us to evaluate the screening procedure and assess the sensitivity and specificity of the screening procedure.

Since the main focus of the present study was to analyse the epidemiology of eating disorders, stricter selection criteria than merely dieting for the participation in the interviews was used. Thus, all potential dieters in the cohort were not included in the study. However, the number of dieters who did not meet the screening criteria was small and including them would probably not have had a major effect on the results. The relatively small sample size and the low prevalence of eating disorders among

the low-risk dieters are reflected in the large confidence intervals for the odds ratios. A prospective study with explicit focus on dieting as a risk factor for eating disorders should start at an earlier age than the present study, before the peak years of incidence for eating disorders. In the present study the basis for the subgrouping of dieters was the participants' retrospective accounts of the initial reason for starting to diet, not the observed behaviour at T1.

4.3 Implications

The present study has several implications for research as well as for the prevention and treatment of eating disorders.

4.3.1 Implications for research

The central implications of the present study concern the classification of eating disorders, sex differences, and sub classification of dieters. Eating disorders in research are generally classified according to the DSM-IV criteria. The problem with the DSM-IV classification, however, is the large proportion of EDNOS cases. The problematic EDNOS category has been addressed in the upcoming revision of the diagnostic manual. The proposals for DSM-5 (American Psychiatric Association, 2010), scheduled for publication in 2012, pertaining to eating disorders strives to decrease the proportion of EDNOS cases by relaxing the criteria for anorexia nervosa and bulimia nervosa. Utilising the proposed criteria, most EDNOS cases in the present study would have been classified as either anorexia or bulimia nervosa.

Regarding the psychology that revolves around eating, body shape and weight, there are differences between adolescent males and females (Levine & Smolak, 2002; Moelgaard & Michaelsen, 1998). Moreover, although traditional eating disorders are rare among males (Raevuori et al., 2009), there are suggestions of conditions that reflect comparable underlying pathology, for example muscle dysmorphia (Mosley, 2008; Raevuori et al., 2006). The present study showed that an incorrect perception of being underweight was more prevalent than an incorrect perception of being overweight among adolescent males, and that this incorrect perception was related to

social anxiety. Specific modes of male body dissatisfaction and its concomitants warrant scientific attention.

Dieting is a widely accepted risk factor for eating disorders (Abraham, 2003; Patton et al., 1990; Patton et al., 1999; Stice et al., 2007). The present study suggests that more emphasis should be placed on the reason for dieting than merely the presence of dieting when assessing risk for developing eating disorders. The significantly elevated risk for eating disorders among depressed and feeling-fat dieters is worth examining more thoroughly.

4.3.2 Implications for prevention and treatment

The present study, accompanied by recent reports on the prevalence of eating disorders in Finland (Keski-Rahkonen et al., 2007; Keski-Rahkonen et al., 2009), verifies that eating disorders are common in female adolescents and warrant attention. Knowledge of eating disorder is needed among school health care and primary care professionals, as well as among everyone working with adolescents, to ensure early detection and intervention. Although the present study also suggests that recovery from eating disorders is possible, easily accessed specialized treatment options are needed to guarantee treatment at an early stage for those afflicted. Furthermore, there is a tendency to restrict eating disorders to merely anorexia or bulimia nervosa (Fairburn & Walsh, 2002), but since the majority of adolescents suffering from eating disorders fall into the eating disorder not otherwise specified category, the full range of eating disorders should be considered when dimensioning treatment and when presenting estimates of the extent of these disorders.

The present study has implications for the prevention of negative outcomes of body weight and shape-related issues. Many adolescents have an incorrect weight perception, which may have negative outcomes in the form of eating disorders, depression, and social phobia. There is a need for prevention programmes, as well as programmes promoting overall well-being, targeting the whole developmental ecology of children and adolescents (Neumark-Sztainer, Levine, Paxton, Smolak, Piran, & Wertheim, 2006).

The clear differences between subgroups of dieters have important clinical implications, since asking adolescents about their reasons for dieting is a task manageable for people who are in every day contact with adolescents, for example parents, teachers, youth workers, and school health personnel. The results from the present study suggest that adolescents who start to diet because of depressive mood or a diffuse feeling of being fat should be closely monitored and may be a suitable group for targeted prevention programmes. The distinction between subgroups of dieters also suggests that dieting, if not accompanied by depressed mood, does not increase the risk of developing an eating disorder. Even if dieting per se, on the basis of the present study, seems benign in relation to eating disorders, dieting has been linked in previous research to unconstructive health behaviours and long-term weight gain (Neumark-Sztainer et al., 2007).

4.4 Summary

Eating disorders are common among adolescent females and rare among adolescent males. As many as one in ten females have suffered from a clinically significant eating disorder during their development towards adulthood. The most prevalent eating disorders among adolescents are unspecified, which may lead to an underestimation of the prevalence of these disorders. Although eating disorders are associated with an unfavourable outcome, remission is possible. In the present study, all adolescents with a lifetime diagnosis of an eating disorder at age 15 had reached clinical recovery at age 18. A third of them, however, still displayed subclinical eating pathology.

Eating disorders are linked to weight perception and dieting. In the present study, half of the 15-year-old females perceived themselves as being overweight, but according to international BMI cut-offs, the perception was in most cases incorrect. Among the males, an incorrect perception of being underweight was more prevalent than an incorrect perception of being overweight. An incorrect weight perception in females was associated with depressive symptoms, social anxiety, low self-esteem, and eating disorders. Males with an incorrect perception of being underweight

experienced more social anxiety at follow-up than their counterparts with a correct weight perception.

In personal interviews with screen-positive adolescents, four mutually exclusive subgroups of dieters emerged. Depressed and feeling-fat dieters had a fifteen-fold risk of developing an eating disorder compared to vanity and overweight dieters.

The present study has implications for prevention, early detection, and treatment of eating disorders as well as the promotion of general well-being among adolescents.

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Sammandrag

Bakgrund

Ätstörningar är allvarliga psykiska störningar som i de flesta fall utvecklas under ungdomsåren. Missnöje med den egna kroppen och försök till viktnedgång är identifierade riskfaktorer för ätstörningar. Det finns ett behov av forskning om ätstörningarnas förekomst hos ungdomar i Finland samt om möjliga preventiva åtgärder för att minska insjuknande i dessa störningar. Målsättningen med föreliggande avhandling var att utreda förekomsten av ätstörningar hos ungdomar i den allmänna befolkningen, att utreda risken för att insjukna i en ätstörning på basen av orsak till bantning samt att analysera betydelsen av felaktig viktuppfattning i förhållande till depressiva symtom, social ångest och självkänsla.

Metod

En prospektiv uppföljningsstudie av 595 ungdomar i Jakobstadsnejden i västra Finland. Undersökningen omfattade enkäter riktade till hela undersökningsgruppen och efterföljande personliga intervjuer med respondenter som i sina enkätsvar uppvisade möjlig ätstörningsproblematik. Uppföljningsstudien tre år senare genomfördes enligt samma upplägg som grundundersökningen. Till intervju vid uppföljningsstudien kallades både de som intervjuats vid grundundersökningen och de som angett möjlig ätstörningsproblematik i enkätdelen.

Resultat

Livstidsförekomsten av ätstörningar diagnostiserade enligt DSM-IV hos aderton år gamla flickor var 2.6 % anorexia nervosa, 0.4 % bulimia nervosa och 9.0 % ätstörningar utan närmare specifikation (UNS) 9.0 %. Inga ätstörningar som fyllde diagnoskriterierna återfanns hos pojkarna i undersökningen.


Så väl ätstörningar som depressiva symtom, social ångest och låg självkänsla var mer förekommande hos flickor som trots normal eller undervikt uppfattade sig som överviktiga än hos flickor med korrekt viktuppfattning. En upplevelse av att vara underviktig trots normal vikt var hos pojkarna sammankopplat med förhöjd ångest i sociala situationer.

I intervjuerna med ungdomar som vars enkätsvar antytt ätstörningsproblematik uppkom fyra ömsesidigt uteslutande grupper av bantare. Gruppindelningen baserade sig på den orsak respondenten uppgav till att börja banta. Analyser av grupperna visade att flickor som börjat banta på grund av nedstämdhet (depressive dieters) eller av en diffus känsla av att vara fet (feeling-fat dieters) hade en femtonfaldig risk att utveckla en ätstörning jämfört med de flickor som bantat på grund av fåfänga (vanity dieters) eller övervikt (overweight dieters).

Diskussion

På basen av tidigare forskning och den aktuella studien kan konstateras att ätstörningar är värda att notera. Var tionde ung kvinna har lidit av en kliniskt betydande ätstörning under sin tonårsutveckling. Traditionella ätstörningar är ovanliga hos pojkar. En uppfattning av sig själv som överviktig är vanlig hos flickor och en dylik uppfattning har samband med psykiska symtom. Vid analyser av kropps- och viktuppfattning hos ungdomar är det viktigt att beakta skillnader i typiska missuppfattningar hos pojkar och flickor. Bantning i sig behöver inte utgöra en ökad risk för att utveckla en ätstörning, men ifall bantningen motiveras av psykiska problem är det skäl att reagera.

Den föreliggande avhandlingen har implikationer för förebyggande och vård av ätstörningar samt främjande av välmående hos ungdomar. Tidigt insatta, välplanerade åtgärder behövs för att minska insjuknandet i ätstörningar och underlätta tillfrisknande hos de som insjuknat.



Eating disorders are psychosomatic problems, which evolve around a strong fear of weight gain, restrictive eating patterns, and a strong preoccupation with body shape. An eating disorder can be defined as a persistent disturbance of eating behaviour or behaviour to control weight, which significantly impairs physical health or psychosocial functioning.

The present dissertation states that eating disorders are common among adolescent females. As many as one in ten females have suffered from a clinically significant eating disorder during their development towards adulthood. However, the most prevalent eating disorders among adolescents are unspecified, which may lead to an underestimation of the prevalence of these disorders.

A broader awareness of eating disorders is needed to facilitate prevention and to ensure early detection and intervention.

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