Restrained Eating

Development and Models of Prediction in Girls

BY

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ACTA UNIVERSITATIS UPSALIENSIS
UPPSALA 2003
Dissertation presented at Uppsala University to be publicly examined in Minus, Gustavianum, Thursday, May 22, 2003 at 09:15 for the degree of Doctor of Philosophy. The examination will be conducted in Swedish.

Abstract

Body image concerns and dieting emerge at an early age among girls and become more pronounced with increasing age. Knowledge about risk factors for disturbed eating is crucial in order to develop theoretical models and to suggest new paths for preventive efforts. The aim of the present thesis was to investigate the development of disturbed eating and to evaluate a conceptual model of predictors of body dissatisfaction and disturbed eating in girls. The included studies are part of a seven-year longitudinal project employing an accelerated multi-cohort design, including several age groups (7, 9, 11, 13, 15 years at inclusion).

Study I demonstrated a marked increase in the wish to be thinner and dieting attempts between the ages 10–14 and 9–13 years, respectively. In Study II, the Body Mass Index (BMI) predicted weight-related teasing and body dissatisfaction, and body dissatisfaction predicted restrained eating among Swedish girls in Grade 8 and Australian girls in Grades 7 and 8. Weight-related teasing partially mediated between BMI and body dissatisfaction in all three samples. Study III partially supported a conceptual model implying that BMI, weight-related teasing, and body dissatisfaction at 7–11 years predicted restrained eating among girls 12–14 years old. Study IV provided support for a conceptual model positing that BMI, body esteem, and to some extent weight-related teasing, predict body dissatisfaction and restrained eating during adolescence and young adulthood.

In conclusion, there was partial support for a conceptual model including these risk factors for disturbed eating among girls.

Keywords: teasing, body image, disturbed eating, cross-cultural, longitudinal, path analysis, structural model

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ISSN 0282-7492
ISBN 91-554-5606-5
urn:nbn:se:uu:diva-3374 (http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-3374)
Sammanfattning

Om en flicka har provat att banta, väger mer än normalt för sin ålder, har blivit retad för sitt utseende och är missnöjd med sin kropp är hon i riskzonen för att etablera problemfyllda ätbeteenden i tonåren.

Delstudierna baseras på data från ett flerårigt projekt som följt flickor som vid studiens början var i åldrarna 7, 9, 11, 13, och 15 år. I studie I ökade andelen flickor som önskade att de var smalare mest i åldrarna 10 till 14 år. Andelen flickor som bantade ökade mest mellan 9 och 13 års ålder.

I studie II studerades 12-14-åriga svenska och australiensiska flickor. Kroppsmassa (BMI) predicerade om de hade blivit retade för sin vikt och hur nöjda de var med sitt utseende. Flickornas kroppsuppfattning påverkade graden av återhållsamt ätande.

Studie III visade att för 7- och 9-åringar bidrog BMI, kommentarer om utseendet och missnöje med kroppen till i vilken utsträckning flickorna bantade när de blev 9 respektive 11 år. För de yngsta flickorna spelade banntning vid 9 års ålder störst roll för deras benägenhet att banta i 12-årsåldern. Och för de äldre flickorna som var 9 år vid studiens början hade negativ kroppsuppfattning tillsammans med restriktivt ätande i 11-årsåldern betydelse för banntningsbeteende i 14-årsåldern.

“—I want to be thinner, because then I could crawl through small openings and such. And I don’t want to grow out of my children’s clothes. They are so pretty!”

Anonymous girl, 7-years old.
PAPERS INCLUDED IN THE THESIS

This thesis is based on the following papers, which are referred to in the text by their Roman numerals:


III Lunner Katarina, Halvarsson Klara S., Westerberg Josefin, Anteson Frida, Sjödén Per-O low. The role of weight-related teasing for the prediction of body image and restrained eating in 12-14-year old girls. (Manuscript)

IV Lunner Katarina, Halvarsson Klara S., Westerberg Josefin, Anteson Frida, Sjödén Per-O low. A 6-year longitudinal study of predictors of body image and restrictive eating in 16-20-year old girls. (Manuscript)

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Introduction

Eating disorders

There has been a growing recognition of the presence of eating disorders among adolescents and young adults (Folkhälsoinstitutet, 1999; Society for medicine, 1995). Anorexia nervosa and bulimia nervosa are seen as severe health problems mainly because of the intrinsic features of body image disturbance and pathological weight loss efforts (Garner, 1993). Perceptual and cognitive distortions about one's body are prevalent in patients with eating disorders. Their weight loss regimens include extreme restriction of food intake, but also binge eating with compensatory actions. Compensatory behaviors are self-induced vomiting, misuse of laxatives, diuretics, enemas or other medications, fasting or excessive exercise.

DSM-IV diagnoses of eating disorders (American Psychiatric Association, 1994) are fairly uncommon in the age range 6–17 years with prevalence rates of 0.5% – 1.0% for anorexia nervosa (Doyle & Bryant-Waugh, 2000; Fairburn & Beglin, 1990; Råstam, Gillberg, & Garton, 1989), and around 1.0% for bulimia nervosa (Rosenvinge, Sundgot Borgen & Börresen, 1999). However, there are high rates of body image concerns and weight reduction efforts among females below 18 years of age (Thompson & Smolak, 2001). Scholars have therefore adopted a continuum model in which modest weight and body concerns are placed at one end and severe full-syndrome eating disorders are found at the opposite end of the spectrum (Rathner, 1992; Shisslak, Crago & Estes, 1995). The continuum model allows identification of partial syndrome eating disturbances. The present thesis concerns mainly
the lower end of this continuum of less severe eating disturbances and dieting behaviors.

**Definition of concepts**

In the present thesis, several concepts are used to denote various levels of problematic eating behaviors and attitudes to eating. The terms eating disorders and full-syndrome eating disorders refer to the clinical and pathological end of the eating spectrum. Full-blown eating disorders such as anorexia nervosa and bulimia nervosa are classified according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). The diagnosis eating disorder not otherwise specified (also referred to as partial syndrome, sub-clinical, and atypical eating disorder) is also described in the DSM-IV (1994). The latter diagnoses are characterized by some but not all of the criteria required for full-syndrome eating disorders and/or by a lower frequency or severity of these (APA, 1994; Killen, Hayward, Wilson, Taylor, Hamner, Litt et al., 1994; Shisslak, Crago, Gray, Estes, McKnight, Parnaby et al., 1998).

Eating disturbance, disturbed eating attitude, disordered eating, dieting, and eating problems are defined by measures estimating sub-clinical levels of symptoms intrinsic to eating disorders. For example, the Children’s Eating Attitudes Test (CHEAT; Maloney, McGuire, Daniels, & Specker, 1989) is utilized in the present study to assess disturbed eating. Girls scoring ≥15 are categorized to be at “high risk” for the development of symptoms related to anorexia nervosa (Maloney et al., 1989; Sasson, Lewin, & Roth, 1995). The concepts disturbed eating pattern, disordered eating pattern, restrained eating, eating restraint, emotional, and external eating refer to dimensions of eating behavior questionnaires that are associated with eating disorder symptoms, (e.g. the Dutch Eating Behavior Questionnaire; DEBQ) (van Strien, Frijters, Berger, & Defares, 1986). The term drive for thinness refers to a subscale in the Eating Disorders Inventory for Children (EDI-C; Garner, Olmstedt & Polivy, 1983) assessing the urge to become thinner. Weight concern is an expression at the most “benign” end of the eating pathology spectrum. This represents thoughts about body weight or minor changes and deviations from normal eating behaviors.
Body dysmorphic disorder is a diagnosis classified in the DSM-IV (APA, 1994). It entails an excessive preoccupation with a minimal or imagined defect in appearance. Body image disturbance, body dissatisfaction, negative body image, dissatisfaction with physical appearance, and body image concerns are closely related concepts signifying discontent with some aspect of one's physical appearance (Cash, 2002). The term body-esteem concerns how satisfied a person is with his or her appearance. The distinction between body-esteem and body dissatisfaction is not straightforward. Body-esteem may be regarded as a special case of self-esteem; self-esteem associated to one's appearance. Global ratings of how much one likes one's body are often referred to as body esteem. It is often assessed by a single question or a scale (Mendelson & White, 1993).

Body shape ideals

The perception of body shape appears to be highly influenced by cultural and social factors (Striegel-Moore, Silberstein, & Rodin, 1986). Over a period of 30 years (1959-1989), there was an overall increase in the number of features emphasizing weight loss (dieting and exercise) in leading women's magazines in the USA (Wiseman, Gray, Mosimann, & Ahren, 1992). Likewise, a tabulation of television commercials focusing on diet foods and weight loss programs has demonstrated a steady increase over a 19-year period (Wiseman, Gunning, & Gray, 1993). Lakoff and Scherr (1984) asserted that the mass media have an extraordinary negative influence because fashion models are perceived as realistic representations of actual people rather than carefully manipulated and artificially developed images. In Western societies, women are led to believe that "what is fat is bad, what is thin is beautiful, and what is beautiful is good" (Striegel-Moore, Silberstein, & Rodin, 1986). The notion that "the thinner, the prettier" among women differs from the conception of female attractiveness held by men. In a sample of female and male undergraduates, Fallon and Rozin (1985) found that males rated their current body size, their ideal body size, and the body size they thought would be the most attractive to the opposite sex as approximately equal. On the other hand, females rated their current body size as heavier than the
most attractive, which in turn was rated heavier than their ideal body size. Interestingly, the females' rating of the ideal female body was thinner than that which the males judged to be most attractive, indicating a thin body ideal held by females.

Although thinness is considered to be something one should strive for, its antagonist—obesity—is seriously denigrated in our weight-conscious society (Rand & Kuldau, 1990; Rodin, Silberstein, & Striegel-Moore, 1985). Obesity is judged to be less physically attractive and the result of personal misbehavior (Rosen, 1996). The implication is that anyone can achieve a thin and fit physique if he or she has the willpower (Striegel-Moore et al., 1986). It has been demonstrated that misconceptions about obese children are prevalent in 7-11-year old girls and boys (Ricciardelli & McCabe, 2001). Obese children are perceived to be lazier, less successful at school, and unhealthier compared to average or thinner peers (Hill & Silver, 1995). Similarly, obese children are rated as being less liked by parents, less likely to be nominated as pretty, and less happy than are children of normal size (Hill & Silver; 1995; Tiggemann & Wilson-Barrett, 1998). However, it is uncertain whether heavier children actually have fewer friends. Phillips and Hill (1998) found that body weight had no impact on popularity among peers. Undoubtedly, the current societal standard for thinness in females is pervasive and in most cases unattainable as the average weight has increased while the ideal has become notably thinner (Garner & Garfinkel, 1980).
Body dissatisfaction

Body dissatisfaction is pervasive and some authors have referred to it as a “normative discontent” (Rodin, Silberstein and Striegel-Moore, 1985) in adolescent as well as adult populations. The idea is that the slim ideal espoused for females and the longing for an unattainable body figure result in appearance dysphoria. Body dissatisfaction seldom reaches diagnosable levels of psychopathology. Nevertheless it is associated with marked emotional distress and appearance rumination.

Body dissatisfaction is often operationalized as the discrepancy between the ideal and current body figures indicated by selecting body silhouettes ranging from thin to obese (Collins, 1991; Thompson & Gray, 1995; Truby & Paxton, 2002; Williamson & Delin, 2000). Body dissatisfaction scales are aimed at measuring a subjective evaluation of the body, including size, fat and shape globally or for particular body parts (Body shape questionnaire, BSQ; Cooper, Taylor, Cooper & Fairburn, 1987; EDI-C; Garner, 1991; McKnight risk factor survey III; Shisslak et al., 1999).

Prevalence of body dissatisfaction

There is evidence to suggest that prepubertal children express body dissatisfaction (Edlund, Halvarsson, & Sjödén, 1996; Hill, Draper, & Stack, 1994; Rolland, Farnill, & Griffiths, 1997; Sasson, Lewin, & Roth, 1995). Dissatisfaction with the body has been found among children as young as 4–6 years (Collins, 1991; Davison, Markey, & Birch, 2000; Wardle, Volz, & Golding, 1995). In a sample of 9–12-year old girls, Schur, Sanders, and Steiner (2000) found that 42% wanted to look thinner, 52% desired no change, and 6.5% wanted to look heavier.

Gender differences have been well documented. Thus, girls desire a thinner body size (Gardner, Sorter, & Friedman, 1997; Lawrence & Thelen, 1995) and express more body image concerns than boys (Mendelson, White, & Mendelson, 1996; Wood et al., 1996). An Australian study of 5–10-year old children (Williamson & Delin, 2000) reported that girls of all ages preferred a thinner
ideal than silhouette drawings of their current size. Also, they expressed more dissatisfaction with their body than did the boys. These researchers demonstrated a preference for a small body in girls at the age of 5 years (Williamson & Delin, 2000).

Thus, it has been shown that body image concerns emerge at an early age. It has also been demonstrated that dissatisfaction with the body becomes more pronounced with increasing age (Maloney et al., 1989; Ohtahara, Ohzeki, Hanaki, Motozumi, & Shiraki, 1993). For example, Sasson et al. (1995), found that the number of girls who wanted to be thinner were 59.5% in Grades 3–6 and 74.8% in Grades 7–11. Another study (Flannery-Schroeder & Chrisler, 1996) supported these claims by showing that body dissatisfaction increased with increasing age in different groups of children: 13.0% of the 6–7-year-olds, 20.6% of the 8–9-year-olds, and 52.0% of the 10–11-year-olds showed dissatisfaction. Moreover, a Scottish study (Hoare & Cosgrove, 1998) demonstrated that in a sample of 10–16-year-old girls, older girls showed less body-esteem compared to younger girls. However, some results on age differences with regard to negative body image are contradictory. A recent study (Sands & Wardle, 2003) found that body dissatisfaction was not associated with age in girls between 9 and 12 years.

Repeatedly, researchers have demonstrated that heavier girls express most discontent with their present body size and a desire to become thinner (Field et al., 2001; Gustafsson-Larsson & Terry, 1992; Robinson et al., 2001; Schur, Sanders, & Steiner, 2000; Stice & Whitenton, 2002). Rolland and colleagues (1997) found that 88% of the overweight girls wanted to be thinner as opposed to 36% of the normal-weight girls. Thus, body dissatisfaction is more prevalent in girls who are heavier, but the discontent is not restricted to overweight or obese children (Rolland et al., 1996; Sands & Wardle, 2003).

**Dieting**

Dieting is a common strategy to change the appearance of the body to conform to the current cosmetic ideals demanded by the social environment. Thus, dieting may become a consistent behavior in prepubertal girls which is of special concern because
excessive weight loss at this age may lead to a retardation of
growth, delayed puberty, and adversely affect cognitive
performance (Mallick, 1983; Pugliese, Lifshitz, Grad, Fort, &

People diet for a variety of reasons. Already normal or thin
females may have unrealistic expectations for how much they can
lose in search for the perfect body and ignore the fact that weight
loss can be harmful. Others may be obese and diet in order to
promote their health. Given this variety of reasons, it is important
to sort out whether dieting is a feasible method of weight control.
Some researchers adhere to the setpoint theory (Nisbett, 1972;
Reiff & Lampson Rieff, 1998). This approach supports the
contention that deviations from a person’s setpoint weight are
likely to cause difficulties in maintaining the new weight. Relapse
occurs mainly because the body strives to return to the earlier
equilibrium. Many studies show that individuals who are
successful at weight control in the short term most often have
regained their lost weight after five years (Wadden, Brownell, &
Foster, 2002). The body is unable to differentiate between dieting
and starvation, and many dieters behave as if they were starving
(Reiff & Lampson Rieff, 1998). They get irritable, are obsessed
with food, lose concentration, and are hungry. Their nutritional
state may deteriorate and if/when they relapse, they have feelings
of failure. Dieting may also make a person heavier than he or she
would be without dieting (Stice, Cameron, & Killen, 1999). After a
period of restrictive dieting, the body may even become more
efficient in storing energy in the form of fat from the food that is
consumed. Moreover, as people become obese it is likely that the
setpoint gradually adjusts to a new higher level. Unfortunately, it
is still as difficult to reduce weight as before, and now from a
newly established higher setpoint weight. These circumstances
partly explain why individuals often end up heavier than before
the period of dieting.

Prevalence of dieting

A number of studies have shown a high prevalence of dieting
behavior during the early school ages (Edlund, H alvarsson, &
Sjödén, 1996; Hill, Oliver & Rogers, 1992; Maloney, McGuire,
Daniels & Specker, 1989; Rolland, Farnill, & Griffiths, 1997) and
young adolescence (Davies & Furnham, 1986; Koff & Rierdan,
One of the first studies to examine dieting behaviors in children in Grades 3–6 was performed by a group of researchers located in Ohio in the U.S. (Maloney et al., 1989). They found that 40% of girls in Grade 3 and nearly 80% in Grade 6 expressed a desire to be thinner (Maloney et al., 1989). Among girls as well as boys, between 27 and 60% (M = 37%) reported that they had tried to lose weight. Two subsequent studies replicated the findings by Maloney and colleagues. Israeli girls (Sasson et al., 1995) reported wishes to be thinner (47–72%, M = 60%) and behaviors aimed at losing weight (girls: 21–50%, M = 39%; boys: 18–39%, M = 29%) to a similar degree as those of the American girls and boys. Two hundred and forty-four Australian children in Grades 3 through 6 (Rolland et al., 1997) were asked about their wishes to be thinner and weight loss attempts. Between 41 and 51% of the girls as compared to 19 and 39% of the boys reported that they wanted to be thinner. Furthermore, 36–41% of the girls and 19–33% of boys reported that they had tried to lose weight. In a comparable study of 7-year-olds (Halvarsson, Lunner, & Sjödén, 2000), 21.0% reported that they had tried to lose weight. One year later, at follow-up, the corresponding figure was 25.5%. In an Australian study, 51.5% of the girls (Wertheim, Paxton, Maude, Szmukler, Gibbons, Hiller, 1992) reported having been on a diet at least once in the past. A total of 66% of U.S. middle school girls reported trying to lose weight during the past year (Shisslak et al., 1998). A survey of weight control practices (Serdula, Collins, Williamson, Anda, Pamuk, Buyers, 1993) revealed that among 11,000 American adolescents, nearly three times more girls than boys reported weight-loss attempts. A total of 42.5% of the 9th graders were currently trying to lose weight. This agrees well with results of a previous Swedish study (Edlund, 1998) showing that 50.2% of 12–14-year old girls had tried to lose weight. It is interesting to note that the reported frequency of weight loss attempts of 13-year-old girls today is comparable to that of 18-year old girls in 1971 (Nylander, 1971), suggesting that these practices appear at successively earlier ages. One aim of the present thesis is to study the prevalence of the wish to be thinner and dieting attempts, and to what extent these figures change with increasing age in a sample of Swedish girls in the ages between 7 and 17 years.
Cultural influences

Most studies of disturbed eating, comparing ethnically diverse groups have been conducted in the USA and Britain (Altabe, 1996). In a large-scale cross-sectional study of 9- and 10-year-old girls (N = 2,379), approximately 40% of black and white girls reported that they were trying to lose weight (Schreiber, 1996). Recent research indicates that ethnic-specific social norms influence weight and body-related concerns. Neumark-Sztainer and co-workers (Neumark-Sztainer, Croll, Story, Hannan, French, & Perry, 2002) found that among 4,746 adolescent U.S. students, African-American girls had less while Hispanic, Asian-American, and Native-American had equal or more weight-related concerns/behaviors in comparison to White girls. The prevalence of weight-related concerns was similar to or higher among non-white groups as compared to among White boys. The authors (Neumark-Sztainer et al., 2002) suggested that preventive and treatment efforts should be based on the specific needs of the particular target group. Asian and Caucasian schoolgirls living in Britain were focused in another study (Ahmad, Waller, & Verduyn, 1994). Caucasian girls displayed more body dissatisfaction while Asian girls had more eating disturbance than the Caucasian girls. The researchers suggested that these findings were related to parenting style rather than to culturally determined pressures to be thin (Ahmad et al., 1994). In a large sample of ethnically diverse children (mean age 8.5 years), Latina and African-American girls displayed higher or equivalent levels of disturbed eating attitudes and behaviors in comparison to White girls (Robinson, Chang, Haydel, & Killen, 2001). These results indicate that a negative body image and concerns with overweight are prevalent across sex, ethnicity, and socioeconomic class. Thus, belonging to a certain ethnic or SES group does not buffer against body image and eating problems (French, Story, Neumark-Sztainer, Dowes, Resnick, & Blum, 1997; Robinson et al., 2001).
Cross-cultural research

Cross-cultural studies are essential for the evaluation of socio-cultural models of eating disorders, and may also help to explain why thinness is the ideal in Western countries today (Altabe, 1996). Cross-cultural research on eating disturbances is best undertaken within the context of multisite collaboration by investigators from different cultures and settings (Pate, Pumariega, Hester & Garner, 1992). Gunewardene, Houn, and Zheng (2001) compared three groups of 14–16-year-old girls in terms of westernization and dieting. They found that exposure to westernization predicted dieting. Australian girls dieted the most and Chinese Australian girls the least. Although Chinese girls living in China had a lower BMI, they seemed to perceive more peer pressures to diet than did the Chinese Australian girls. The authors (Gunewardene et al., 2001) argued that Chinese Australian girls have a lower BMI than Australian girls and may therefore experience less body and weight comparison and as a consequence perceive less social pressure to diet. In contrast, Chinese and Australian females compare themselves with peers in a similar BMI range. Hence, the social pressure to be thin may be more evident for these groups of girls.

A number of studies have found support for the hypothesis that westernization (Davis & Katzman, 1999; Mumford, Whitehouse & Choudry, 1992; Nasser, 1986) and acculturational stress (Perez, Zachary, Voelz, Petit, & Joiner, 2002) are pathogenic for eating disturbances. On the other hand, other studies have failed to demonstrate a relationship between acculturation and disordered eating (Haudek, Rorty, & Henker, 1999; Rieger, Touyz, Swain, & Beumont, 2001). Some studies have demonstrated that eating disturbance is associated with a more traditional cultural orientation (Hill & Bhatti, 1995; Mumford, Whitehouse & Platts, 1991). According to Rieger and co-workers (2001), there is a rarely discussed possibility that "Non-Western cultures share with Western cultures an ideology that values thinness" (p.211).

A substantial part of research related to risk factors for body dissatisfaction and disturbed eating has been conducted in the U.S.A. (Stice, 2002; Thompson et al., 1995), in Great Britain (Hill & Silver, 1995; Fairburn, Cooper, Doll, & Welch, 1999), or in Australia (Paxton, Shutz, Wertheim, & Muir, 1999; Ricciardelli &
McCabe, 2001; Tiggemann & Wilson-Barrett, 1998). Only a minor part of research on these issues has been performed in Sweden (Edlund, 1997; Halvarsson, 2000). It is often assumed that the U.S. is about 5 to 10 years ahead of Sweden concerning many issues (Seidell, 2002), in this case trends related to body ideals, food consumption, eating behaviors, and strategies to change appearance and to reduce weight. The position of Australia in these respects is more uncertain. Therefore, one of the studies on which the present thesis is based was performed in collaboration between research groups in Australia and Sweden.

**Risk factors**

At present, the most active area of research in the field of eating disorders and body dissatisfaction concerns risk factors (Thompson & Smolak, 2001). Risk factor research is aimed atformulating etiological models of a disturbance/disorder and to identify groups or individuals most at risk for developing the targeted disturbance (Shisslak & Crago, 2001). Risk factors are correlated with the criterion variable and should precede the pathological outcome in time (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001). The pathogenesis of eating disorders and subclinical levels of related symptoms are considered to be multifactorially determined (Garner, 1993). The three main groups of risk factors are individual, familial, and sociocultural variables.

**Individual risk factors**

The individual factors are further divided into biological, behavioral, and psychological/personality aspects.

**Biological aspects**

Putative biological risk factors are genetic predisposition (Garfinkel & Garner, 1982; Strober & Humphrey, 1987), neurobiological factors (Kaye, Wrightman, George & Ebert, 1991; Ploog, & Pirke, 1987), and maturational timing (Duncan, Ritter, Dornbusch, Gross & Carlsmit, 1985; Shisslak et al., 1998).
The influence of adiposity on body image and eating disturbance

Being above average weight or perceiving oneself as being overweight is considered to be a predictor of more frequent dieting in adolescents (Davies & Furnham, 1986a; Hill, Rogers, & Blundell, 1989; Killen et al., 1994; Toro, Castro, Perez, & Cuesta, 1989; Wertheim et al., 1992). It has been demonstrated that adiposity is significantly associated with “Drive for thinness” in black and white preadolescent girls (Striegel-Moore, Schreiber, Pike, Wilfley, & Rodin, 1995). A recent retrospective study (Swenne, 2001) showed that adolescent girls who developed an eating disorder with weight loss did not follow the normal tracking patterns in growth curves prior to the onset of their disease. At all assessments, these girls were significantly above average weight, confirming an association between a higher BMI and subsequent disturbed eating (Edlund, H alvarsson, Gebre-Medhin, & Sjödén et al., 1999; Shisslak et al., 1998).

Puberty

The role of maturational timing for the development of body dissatisfaction and eating disturbances is controversial (Shisslak et al., 1998). Sexual maturation is a developmental period with profound effects on physiology (e.g. changes in stature, body composition, and fertility) and mental processing (Striegel-Moore, MCM ahon, Biro, Schreber, Crawford, & Voorhees, 2001). It has been found that girls who mature earlier are shorter and, in relation to their height, heavier than girls who develop on time or later (Biro, MCM ahon, Striegel-Moore, Crawford, O barzanek, Morrison et al., 2001; Garn, Labelle, Rosenberg, & Hawthorne, 1986). The physical consequences of puberty, such as an increase in adiposity tissue, have been suggested to be associated with an elevated risk for developing eating pathology (Killen et al., 1992). Research supports the contention that early maturation is correlated to or predictive of body dissatisfaction and eating disturbances (Field et al., 1999; Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997; Hayes, Ayward et al., 1997; Swarr & Richards, 1996). However, other researchers have found no such relations between early menarche and body image and eating problems (Attie & Brooks-Gunn, 1989; Cattarin & Thompson, 1994; Keel et al., 1997; Leon et al., 1995). A recent 10-year prospective study (Striegel-Moore et al., 2001) found that early maturers were at risk for developing body image and dieting concerns. Interestingly, the
effect of maturational timing was related to the impact of early- or late-onset menarche on body weight (Striegel-Moore et al., 2001). Thus, the results are inconsistent and additional prospective studies are required to investigate the impact of puberty in greater detail (Stice, 2001).

**Behavioral aspects**

Earlier eating problems, dieting or eating disorders as well as initiation of dating and promiscuous behaviors are considered to be potential behavioral risk factors. For example, a 17-year study (Kotler, Cohen, Davies, Pine, & Walsh, 2001) showed that early adolescent bulimia nervosa was related to a 9-fold and 20-fold increase in the risk for late adolescent and adult bulimia, respectively. A 35-fold increase in risk for adult bulimia was related to the occurrence of late adolescent bulimia nervosa (Kotler et al., 2001).

Dieting related to subsequent disturbed eating

There is a general consensus among researchers (Garner, 1993; Killen, et al., 1994; Maloney, McGuire, Daniels, & Specker, 1989; Patton, Johnson-Sabine, Woods, Mann & Wakeling, 1990; Smolak & Levine, 1994; Theelen, Powell, Lawrence, & Kuhnert 1992) that dieting is a necessary but not sufficient risk factor for the development of disturbed eating and eating disorders. In addition, prospective studies suggest that children who attempt to lose weight in elementary school tend to increase their dieting by middle school, and are at risk for developing disordered eating later on (Calam, 1998; Wood, 1994).

A lso, disturbed eating behaviors accompanied by compensatory actions (e.g. laxatives, vomiting, binge eating) imply an increased risk for obesity in adolescent girls (Stice, Cameron, Killen, Hayward & Taylor, 1999). Thus, disturbed eating behaviors may result in hazardous health consequences at both ends of the weight continuum.

**Psychological aspects**

Low self-esteem (Silverstone, 1990), depression (Wiederman & Pryor, 2000), negative affect (Shatford & Evans, 1992), coping skills (Koff & Sangiani, 1997), stress and life events (Schmidt, Tiller, Blanchard, Andrews, & Treasure, 1997) are examples of
psychological and personality risk factors for a negative body image and eating disturbances.

Body dissatisfaction related to dieting
The perception of body shape appears to be strongly influenced by cultural and social factors (Striegel-Moore, Silverstein, & Rodin, 1986). Specific stereotypes of an ideal female physique exist among both men and women. In their study of adolescent girls, Hill, Oliver, and Rogers (1992) came to the conclusion that the perception of body shape was the foundation of the girls' motivation to diet. In a study of ethnic differences including over 17,000 adolescent females, French and co-workers (1997) demonstrated that in all ethnic groups, dieting was associated with weight dissatisfaction, perceived overweight, and low body pride. The link between body dissatisfaction and eating disturbance is well documented (Attie & Brooks-Gunn, 1989; Bruch, 1962; Cattarin & Thompson, 1994; Leon, Fulkerson, Perry, & Cudeck, 1993). Thus, the growing disparity between the "real" and "ideal" norms for body shape is at least partly responsible for the pervasiveness of dieting among females (Garner, Garfinkel & Olmsted, 1983). In 8- to 13-year old children, Veron-Guidry and Williamson (1996) showed that as body dissatisfaction increased, so did the presence of disordered eating patterns. Further, Attie and Brooks-Gunn (1989) studied a number of variables including eating disturbance, body dissatisfaction, maturational status, general psychopathology, and family relationships. They found that body dissatisfaction was the only significant predictor of level of eating disturbance two years later.

Self and body esteem related to body dissatisfaction and eating problems
Several studies have demonstrated a negative relationship between, on the one hand, self-esteem and on the other, body dissatisfaction and eating problems (Button, Loan, Davies, & Sonuga-Barke, 1997; Pastore, Fisher, & Friedman, 1996). Low self-esteem is a well recognized symptom in patients with eating disorders (Silverstone, 1990). Silverstone (1990) hypothesized that chronic low self-esteem is a necessary prerequisite for the development eating disorders. Nassar, Hodges and Ollendick (1992) found that a poor self-concept and an active involvement or interest in dieting were associated with a poor body image and predicted the development
of an eating disorder in young adolescent girls. In a cross-sectional study of girls aged 15–16, Button et al. (1997) found that those with abnormal eating behavior scores did have a more pronounced eating pathology as well as lower self-esteem as evidenced in interviews. Further, these girls displayed higher levels of global self-dissatisfaction and more dissatisfaction with their physical appearance and family relationships (Button et al., 1997). A prospective study by Button et al. (1996) demonstrated that girls with low self-esteem at 11–12 years were at a significantly greater risk for developing marked eating problems by the age of 15–16 years. However, a number of studies have found no associations between these variables in girls and young adults (Friedman & Brownell, 1995; Gardner et al., 2000; Tiggemann & Wilson-Barrett, 1998). For instance, in a 7-year longitudinal study, Calam and Waller (1998) found that self-esteem was only weakly linked with subsequent eating psychopathology in girls assessed when 12 and 19 years old. Body esteem is closely related to self-esteem and refers to a global rating of how much the girl likes her body (Smolak & Levin, 2002). The questions are typically phrased such that the individual replies whether he or she likes or dislikes her body based on weight or shape (Mendelson & White, 1993; Smolak & Levin, 2002).

**Familial risk factors**

Family factors have been considered as contributors to eating disturbances (Smolak, Levine, & Schermer, 1999). Initially, family dysfunction such as enmeshment and conflict were in focus (Strober & Humphrey, 1987 for a review). Lately, evidence suggests that parents more directly, by way of modeling and comments on shape and weight, contribute to their children's eating problems (Schwartz, Phares, Tantleff-Dunn, & Thompson, 1999; Smolak et al., 1999). Among familial risk factors, the most studied are parental influence (Carper, Orlet-Fisher, & Birch, 2000; Hill & Pallin, 1998; Smolak et al., 1999), parental control (Edmunds & Hill, 1999), parental overprotection, parental neglect, family conflict, eating disorders in the family, family weight and shape concerns (Hill & Franklin, 1998; Tiggeman & Lowes, 2002), and social support (Grissett & Norvell, 1992). Child sexual abuse as a specific risk factor for eating disturbances has been debated (Kent & Waller, 2000; Romans, Gendall, Martin & Mullen, 2001).
A recent meta-analysis (Smolak & Murnen, 2002) demonstrated that a small significant, positive relationship was evident between child sexual abuse and eating disturbance. The researchers (Smolak & Murnen, 2002) concluded that risk models need to specify the aspects most influenced by child sexual abuse and that more empirical examination is warranted.

**Early food experiences and disturbed eating**

Food preferences and eating patterns develop in social settings such as in the home, in day-care, and with friends, the influences of which are mediated by observational learning and direct interactions (Fisher & Birch, 2001). Parental control over eating (Fisher & Birch, 1999a) and parental eating behaviors (Burhans & Dweck, 1995) have been proposed to be of importance and may in some circumstances have effects antithetical to those desired by the parents. Research (Fisher & Birch, 1999b) has shown that restriction of certain foods and directives to eat may result in 1) preferences for “forbidden” food, 2) a restriction of the variety of food choices, 3) eating in response to external cues and incentives, and 4) devaluation of hunger or fullness as a primary determinant of eating. All of these effects may be related to later eating problems. Thus, a large amount of imposed control may place a child at risk for developing problematic eating behaviors.

A prospective study spanning 17 years (Kotler, Cohen, Davies, Pine, & Walsh, 2001) demonstrated that eating problems such as eating conflicts, struggles over food, and unpleasant meals in early childhood conferred a high risk for developing an eating disorder in young adulthood. However, more prospective research is needed to find the critical age at which dieting awareness and eating problems are formed (Kotler et al., 2001; McCabe & Ricciardelli, 2001).

**Sociocultural risk factors**

Gender role conflict, a thin beauty ideal for females, social pressure for thinness (Brownell, 1991), media influences, and psychological and physical trauma have been suggested to be prominent sociocultural risk factors.
Weight-related teasing associated to body dissatisfaction and dieting

A factor that has gained attention recently is the role of teasing in the formation of body image (Heinberg, 1996; Thompson, 1992). In 1986, Cash, Winstead, and Janda demonstrated that adult women who had frequently been teased about their appearance during childhood displayed more body dissatisfaction than did women without such experiences. Fabian and Thompson (1989) showed that among adolescents, teasing was significantly related to body dissatisfaction, eating disturbance, and negative self-esteem. Based on these findings, Thompson (1992) offered a “Negative Verbal Commentary Hypothesis” for the development of body dissatisfaction and eating disturbance. By means of covariance structure modeling and longitudinal investigations, Thompson and his colleagues (Thompson, Coovert, Richards, Johnson and Cattarin, 1995) were able to demonstrate that teasing directly influenced body image, eating disturbances, and overall psychological functioning. Later, a British large-scale survey (Fairburn, Welch, Doll, Davies & O’Connor, 1997) demonstrated that critical comments by the family about shape, weight or eating, childhood obesity and a parental history of obesity were risk factors specific to dieting in bulimia nervosa. In a more recent study, the strongest predictor of weight concern was shown to be the importance peers placed on weight and eating. Other predictors of weight concerns were self-confidence, BMI, attempts to look like females on TV and in magazines, and experiences of being teased about weight (Taylor et al., 1998).

Mass media and toys

The mass media is one of the most aggressive purveyors of a very slender beauty standard that exists today (Groesz, Levine, & Murnen, 2002). Twenty-five percent of elementary school girls read teen magazines twice a week (Field, Leung, et al., 1999). Martin and Kennedy (1993, 1994) reported that 8–11-year-old girls compared themselves to slim models and felt negatively affected by it. Indeed, higher levels of weight concerns and disordered eating have been demonstrated for girls that engage in such comparisons (Field, Carmago, Taylor, Berkey, & Colditz, 1999; Taylor et al., 1998). Toys are not innocent playmates. On the contrary, the toy industry actively supports the idealized body shape with dolls having unrealistic proportions including long legs,
a thin waist, and large breasts (Nichter & Nichter, 1991). Based on 
data on genetics and weight regulation physiology (Groesz, Levine, and Murnen, 2002), it has been estimated that the 
likelihood of having body proportions close to that of Barbie’s is 
less than 1 in 100,000 females (Norton, Olds, Levine, & Dank, 
1996). However, the association between exposure to dolls and 
body image has not been thoroughly examined (Smolak & Levine, 
2001). Interestingly, a recent meta-analysis of experimental 
presentations of media images of thin females (Groesz et al., 2002) 
indicated that body image was increasingly negative among girls 
and women after presentation of thin models as compared to 
average size or plus size images. Thus, exposure to the ultraslender 
ideal seems to be accompanied by body dissatisfaction.

**Longitudinal research**

Longitudinal research is a viable methodology for the 
understanding of predictors, risk factors and the natural 
development of eating disturbances in children and adolescents 
(Wertheim et al., 2001). Moreover, prospective designs enable the 
identification of salient factors predisposing for eating problems 
before eating disturbances confound the matrix of variables (Leon 
et al., 1995).

The empirical evidence for various factors that predispose for 
body dissatisfaction and disturbed eating is somewhat 
contradictory and inconclusive, demonstrating the difficulties of 
risk factor research (Attie, & Brooks-Gunn, 1989; Button, Loan, 
Davies, & Sonuga-Barke, 1997; Calam & Waller, 1998; Killen et 
et al., 1994). This indicates complex relationships between potential 
risk factors and eating disturbances (Stice et al., 1998; Wichstrom, 
2000).

Generally, it appears that the potency of certain risk factors 
varies with the age of the study participants (Shisslak & Crago, 
2001). A plausible reason for this is that risk factors may differ in 
their importance depending on the level of child development 
(Wertheim et al., 2001). There is evidence to suggest that 
prepubertal school children differ from older school children, who 
probably differ from adolescents and adults with regard to factors 
predisposing for body image problems and weight concerns 
(Gralen et al., 1990; McCabe & Ricciardelli, 2001; Smolak & Levine, 
A case in point is that the importance of parental modeling and input may decrease with increasing age (Sanftner, Crowther, Crawford, & Watts, 1996) while peers and media gain increasing influence during early adolescence (Smolak & Levine, 2002).

A recent 17-year longitudinal study (Kotler, Cohen, Davies, Pine, & Walsh, 2001) of relationships between childhood, adolescent, and adult eating disorders suggested that eating problems (eating conflicts, struggles over food, and unpleasant meals) in early childhood may be associated with later eating disorders. Also, there was an increased risk for having an eating disorder in young adulthood if one had a history of eating disorder or severe symptoms thereof in early or late childhood.

In another study spanning 22 years (Moorhead, Stashwick, Reinherz, Giaconia, Striegel-Moore, & Paradis, 2003), women with full or partial eating disorders at age 27 had had more serious health problems before age 5, anxiety-depression at age 9 (reported by the mothers), and more behavior problems at age 15 according to descriptions by the mothers. In two prospective studies, Killen and colleagues (1994; 1996) have shown that 10–12% of those girls who scored in the highest quartile on a measure of weight concerns at baseline had developed partial or full syndrome eating disorders at a follow-up three years later.

Wichstrom (2000) has pointed out that only a handful of the longitudinal studies (Attie & Brooks-Gunn, 1989; Keel, Fulkerson, & Leon, 1997; Leon et al., 1995; Rosen, Tracy, & Howell, 1990; Swarr & Richards, 1996) have included statistical control for initial disordered eating. Wichstrom (2000) suggests that the greater part of correlates with disturbed eating behaviors may be secondary to eating problems. Thus, there is still limited understanding of the development of body dissatisfaction and eating disturbances in children and adolescents (Ricciardelli & McCabe, 2001; Wichstrom, 2000).

Using covariance structural modeling and path analyses, Thompson and colleagues (1995) found support for a model in which 1) level of obesity directionally influenced teasing history and body image; 2) teasing predicted body image and disturbed eating; and 3) body image was a precursor of disturbed eating. Teasing, body image, and eating disturbance seemed to influence global psychological functioning, including self-esteem. Based on the research performed by Thompson and co-workers (1995), the present thesis will examine the relationships between putative risk
and mediating factors for body dissatisfaction and disturbed eating according to the conceptual model presented in Figure 1. Thus, relationships between weight-related teasing and BMI, body dissatisfaction, and restrained eating were the focal interest in the current thesis. The present conceptual model incorporates a limited number of variables as compared to the model by Thompson and colleagues (1995) (puberty, bulimic symptoms, anxiety, and depression are not included). The subjects in the study by Thompson et al. (1995) were reassessed after three years. Two of the present studies expand that design with assessments during three consecutive years and again after three years. The following temporal relationships are proposed to exist between the variables: BMI (Year 1), weight-related teasing (Year 2), body dissatisfaction and disturbed eating (Year 3); and disturbed eating (Year 6).

Figure 1. A conceptual model of relationships between potential risk factors for Disturbed Eating.
Risk factor research

The precursors of eating disturbances are complex. As previously described, it is likely that multiple causal chains (e.g., genetic, individual, and social risk factors) are operating in the development of disturbed eating behaviors (Garner, 1993). An understanding of how these factors work together is crucial to advance research and necessary for the development of preventive interventions (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001).

The terminology in risk factor research has been imprecise and has caused confusion among the public, clinicians, and researchers. Moreover, there have been controversies in mediator/moderator research in psychology (Chaplin, 1991; Kraemer et al., 2001) with reference to advocates of moderated subgroup analysis and those advocating multiple regressions. Moderated subgroup analysis implies that the sample is dichotomized to enhance the ability to identify high-risk subjects (Kraemer et al., 2001).

In order to bridge the gaps between theory and basic and clinical sciences, Kraemer and colleagues (2001) have suggested improved methods for classification of risk factors into causal chains, possibly underlying the etiology of disorders. These authors argue that theoretical and empirical models should be built step by step, by careful examination of each new variable before it is set in place. The following section is based on the proposed methods and recommendations of these authors. The authors (Kraemer et al., 2001) argue that it is a waste of time and energy merely to accumulate or count risk factors as this does not further the understanding of the etiology of psychiatric conditions.

Kraemer and co-workers (2001) propose that risk research should be aimed at a clearer identification of proxy, overlapping, independent, mediating, and moderating variables to promote an understanding of multiple causal paths. The definitions of these terms are based on the parameters precedence, correlation, and potency. Possible ambiguity in directionality between variables is remedied by a requirement of temporal precedence. This means that in order to claim that a variable directly influences another variable, the first variable should preced the second variable in time. Correlations between the risk factors and the outcome variable must be established. Correlation or lack of correlation helps the researcher to define the role of the risk factor in the model.
Definitions of risk factors

The following presentation of the different ways in which risk factors can work together (see Figure 2) is based on the definitions proposed by Kraemer and colleagues (2001). Each definition will be exemplified by possible relationships between the variables BMI, body dissatisfaction, and eating disturbance.

Proxy risk factor

A proxy risk factor may be referred to as being pseudocorrelated to the outcome variable. Variable B is a correlate of A, which is a strong risk factor. B is linked only to the outcome (O) through A, and thus B appears to be a risk factor for the same outcome (O). This means that if A and B are correlated, and if there is no temporal order between A and B or if A predates B, then B is a proxy risk factor for A. Proxy risk factors are to be seen as risk factors and they often serve as indicators of viable ways to examine causal factors. For example, BMI and body dissatisfaction are correlated. If BMI but not body dissatisfaction is directly correlated to eating disturbance, body dissatisfaction is a proxy of BMI as a risk factor for eating disturbance.

Overlapping risk factors

When A and B influence the outcome to a similar degree, are correlated and neither of the variables temporally precedes the other, they are termed overlapping risk factors. A combination of the measures A and B usually increases the reliability of a measure with a shared construct. In our example, BMI and body dissatisfaction are correlated and both are directly correlated to eating disturbance. In that case, BMI and body dissatisfaction are overlapping risk factors for eating disturbance.
Figure 2. Different ways risk factors A and B can work to affect an outcome O according to Kraemer et al., 2000.
Independent risk factors
Kraemer et al. (2001) propose that when no temporal precedence exists between A and B, and they are not correlated, and they are equally influential, each variable affects the outcome independently of the other variable. Using the same example as above, if BMI and body dissatisfaction are not correlated with each other but they are both directly correlated to eating disturbance, they are referred to as independent risk factors for eating disturbance.

Mediator variable
If a variable B explains how and why another variable A affects the outcome, it is referred to as a mediator (Baron & Kenny, 1986). Operationally, A precedes B, A and B are correlated, and either complete mediation (A dominates B) or partial mediation (A and B are equally influential) is evident. Using nonexperimental data, it is only possible to infer that the results are consistent with the expectations of causal paths between A and B to O. According to Kraemer and colleagues (2001), mediators are present in all causal chains, but not all mediators prove to be paths in causal chains. Randomized clinical trials are necessary to claim causal relations between variables. Returning to eating disturbances, suppose that BMI temporally precedes body dissatisfaction, and that BMI and body dissatisfaction are directly correlated with eating disturbance. If BMI dominates body dissatisfaction then it is said that body dissatisfaction completely mediates the effect of BMI on eating disturbance. However, if BMI and body dissatisfaction affect eating disturbance to a similar extent, body dissatisfaction partially mediates the effect.

Moderator variable
When the relationship between a variable (B) and the outcome (O) is affected by another variable (A), then A is considered to be a moderator (Kraemer et al., 2001). Thus, a moderator specifies on whom and under what conditions the other variable produces the effect on the criterion variable (Baron & Kenny, 1986). “A moderates B” implies that A temporally precedes B, A and B are not correlated, and that A and B codominate (Kraemer et al., 1986). The difference between a moderator and a mediator is that a
moderator (A) changes the relationship between B and O without a direct effect upon B, and a mediator (B) is supposed to be affected by the other variable A directly. It is important to note that the present definitions do not allow a variable to be simultaneously a mediator and a moderator of a risk factor in a given sample. In contrast to the example of mediation, BMI is presumed to affect the relationship between body dissatisfaction and eating disturbance but is itself not correlated with body dissatisfaction. However, BMI precedes body dissatisfaction. Then, BMI is said to moderate the effect of body dissatisfaction on eating disturbance.

The main study

The main study on which the present thesis is based is a seven-year prospective study of the development of eating disturbances. The aim of the main study is to identify patterns of eating behavior, to study their change over time, to map their relationships to anthropometric parameters and to identify risk and protective factors related to disturbed eating behaviors among Swedish girls ages 7–22 years.

The study employs an accelerated multicohort design (Kazdin, 1998) including simultaneous assessment of several age groups. In the current study, five age groups (7, 9, 11, 13, 15 years) were included and followed prospectively (Table 1).

Main Cohort

The main study group was recruited in 1995 and consisted of girls ages 7, 9, 11, 13, and 15 years. The Main Cohort was assessed for three consecutive years (1995–1997) and then again after three years (2000). During the first three years, assessments were performed annually. Thus, the ages of the groups overlap to some extent. For example, the 7-year olds became 9 years at the third assessment, which enables comparisons between 9-year olds at the initial assessment and a separate group of 9-year olds at the third assessment. The advantage of this design is that longer periods can be investigated requiring less absolute time as compared to following a single age group over an extended time interval. The
design allows examination of within- as well as between-group differences during a compressed time-span (Kazdin, 1998).

Table 1. Ages of the participating girls and assessments over 6 years for the Main Cohort and the Societal Cohort.

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**Societal Cohort**

An additional study group was recruited in 1999. The Societal Cohort consists of girls of the same ages as those in the Main Cohort Year 1, that is 7, 9, 11, 13, and 15 years of age. The purpose of the Societal Cohort was to investigate the extent to which the data from the Main Cohort are specific to the time period investigated. Thus, this aspect of the design enables the differentiation of effects pertaining to a certain time period from developmental changes within the age groups (Kazdin, 1998, pp.185-187). The Main Cohort and the Societal Cohort may have different histories relevant to disturbed eating that should be revealed by comparing them.

**Earlier research related to the main study**

The present thesis is an extension of research presented in an earlier doctoral dissertation by Halvarsson (2000). Most of the research in that thesis was based on the main study. Halvarsson (2000) found that dieting behavior and the wish to be thinner are present in girls as young as 7 years. Further, dieting attempts were accompanied by more disturbed eating attitudes. At the three-year follow-up, eating patterns and attitudes were the strongest predictors of disturbed eating attitudes in adolescent girls. Weak associations were demonstrated between on the one hand coping strategies (e.g. taking things light; joke and tell yourself the problem is not important) and lower self-esteem, and on the other
more disturbed eating attitudes three years later. Study I in the present thesis is also part of the dissertation by Halvarsson (2000) as Study V. An examination of weight-related teasing as a potential risk factor for body dissatisfaction and restrained eating has not earlier been performed in this project.
Aims

The general aim of the present thesis is to investigate the development of disturbed eating in 7-21-year old Swedish girls and to identify possible predictors of body dissatisfaction and disturbed eating according to a conceptual model. The conceptual model serves to elucidate the relationships between possible risk factors and disturbed eating in three of the studies. A majority of the studies concern Swedish girls, but Study II includes data on two Australian samples.

Specific aims:
1. To study changes in the reported wish to be thinner and weight loss attempts during three consecutive years among girls who were in the ages 7, 9, 11, 13, or 15 at the first assessment (Study I).

2. To study differences in the wish to be thinner, weight loss attempts, eating attitudes and behaviors, as well as the percentage of girls at high risk for eating disorders between two groups of girls ages 7-15 years in 1995 and in 1999 (Study I).

3. To compare overall levels of body dissatisfaction, teasing experiences, and eating disturbances between Swedish girls in Grade 8 and Australian girls in Grades 7 and 8 (Study II).

4. To investigate the extent to which a model including data on BMI and weight-related teasing predicts body dissatisfaction and drive for thinness among adolescent girls from Sweden and Australia (Study II).
5. To investigate the extent to which the relationship between BMI and body dissatisfaction is either partially or completely mediated by weight-related teasing among adolescent girls from Sweden and Australia (Study II).

6. To explore the longitudinal associations between BMI, weight-related teasing, body dissatisfaction, restrained eating, and dieting according to an a priori stated conceptual model. Separate analyses will be conducted for girls who were 7 and 9 years old Year 1 (Study III).

7. To investigate to what extent the inclusion of data on restrained eating assessed at baseline has an impact on the role of weight-related teasing and body dissatisfaction in an a priori stated conceptual model of the development of dieting among girls ages 7 and 9 years (Study III).

8. To compare overall levels of weight-related teasing, body dissatisfaction, restrained eating, and dieting between normal weight and overweight 7- and 9-year old girls (Study III).

9. To evaluate a model (Original Model) incorporating predictors of body dissatisfaction, dieting and drive for thinness over a 6-year study period among girls ages 11, 13, and 15 years Year 1 (Study IV).

10. To compare the Original Model with an alternative model including Year-1 data on restrained eating behavior among girls ages 11, 13, and 15 Year 1 (Study IV).
Method

Designs

Studies I–IV are part of an ongoing seven-year prospective longitudinal study of risk and protective factors related to the development of eating disturbances. The study employs an accelerated multicohort design (Kazdin, 1998) including simultaneous assessment of several age groups. In the current study, five age groups (7, 9, 11, 13, 15 years) were included and followed prospectively (for additional information see Table 1 in the Introduction).

The main study group was recruited in 1995 and consisted of girls of ages 7, 9, 11, 13, and 15 years. This group will be referred to as the Main Cohort. It was assessed for three consecutive years (1995-1997) and then again after three years (2000).

An additional study group was recruited in 1999 (Study I). This group will be referred to as the Societal Cohort. The Societal Cohort consists of girls of the same ages as in the Main Cohort Year 1, i.e., 7, 9, 11, 13, and 15 years of age.

Study II includes data from an Australian sample participating in the first year of a two-year longitudinal study.
Subjects

Study I

Subjects were girls in five age groups: 7, 9, 11, 13 and 15 years of age Year 1 (1995). The sample was achieved by a stratified random sampling procedure based on all school classes in Uppsala County (central Sweden, pop. 289,062). Uppsala county was first divided into six areas in order to represent the city, urban communities and the countryside. The purpose was to achieve a random sample of girls that would match the distribution of living conditions in Uppsala county as closely as possible, in order to enhance external validity. A total of 38 schools were sampled randomly from the 97 schools (N = 7,330 students) in the county. Recruitment was terminated when the number of girls who had accepted the invitation had reached at least 250 per age group. Year 1, 2197 girls were invited (age: 7: 397; age 9: 396; age 11: 390; age 13: 459; age 15: 555). One thousand and eleven girls (46%) accepted the invitation, 413 (19%) declined participation, and 769 (35%) did not reply to the invitation. Two hundred and sixty-eight additional girls (12%) were included after delayed consent (they decided to participate on the day of the data collection). Thus, the total number of participants was 1279 (58%) Year 1 (1995). In Year 2 (1996), all girls who had participated were invited again. One thousand and eleven girls (79%) accepted the invitation, 128 (10%) declined, and 141 (11%) did not reply. An additional 65 girls were included who had not replied to the invitation in time (acceptance at data collection), resulting in a total of 1076 participants (84%) Year 2 (1996). The same procedure for inviting the girls was performed Year 3 (1997), 909 (71%) accepted the invitation, 93 girls (7%) declined participation, and 288 (22%) never replied. A total of 1085 girls (85%) participated Year 3.

With the principal purpose to explore whether any historical period effects occurred and to limit the threats to external validity, an additional group was recruited Year 5 (1999; the Societal Cohort). This cohort was age-matched at the group level with the Main Cohort Year 1 (1995) to enable comparisons between girls 7, 9, 11, 13, and 15 years old in 1995 and in 1999. A total of 3929 girls were invited to participate. One thousand two hundred and seventy-nine girls (33%) accepted the invitation, 648 (17%)
declined, and 1972 (51%) did not reply. In total, 1759 girls (45%) participated.

Study II
Study II included 263 girls from the Main Cohort, who were enrolled in Grade 8 and who participated in the second assessment (1996) of the prospective longitudinal study. For this age group, the response rate was 59%. Two Australian comparison groups were included. The Australian samples comprised 159 female adolescents from Grade 7 and 210 girls from Grade 8. Of all girls invited, 78% received parental consent to participate and were present on the day of the study. The girls were recruited from coeducational secondary schools representing a variety of socioeconomic status areas in suburban Melbourne and a large country town in the state of Victoria.

Study III
In Study III, data from the first three assessments of the Main Cohort (1995–1997) were supplemented by data from the fourth assessment Year 6 (2000). Subjects in Study III were the same as those in Study I, however, only girls who were 7 and 9 years of age at baseline were included. The total number of participants was 443 (age 7: 231; age 9: 212, in total 56%) Year 1. Regarding the fourth assessment (Year 6, 2000), the same procedure as previous years was used for invitation and inclusion. In total, 363 girls (age 12: 184; age 14: 179, in total 82%) participated Year 6, but only girls who had completed the questionnaires at all four assessments were included in the current analyses, resulting in a sample of 244 girls.

Study IV
Study IV includes data from three yearly consecutive assessments (1995–1997), as well as an additional assessment three (2000) years later. Subjects in Study III were the same as those in Study I although the analyses were now restricted to girls ages 11, 13, and
15 years Year 1. In total, 582 girls (69%) participated Year 6. Only girls who had completed questionnaires at all four assessments were included in the current analyses, resulting in a sample of 358 girls.

**Procedures**

All principals were sent a written invitation for their school to participate. Three of the invited 38 schools declined (two schools participated in other research projects, no reason was given for one school). Two additional schools were excluded from the study due to their requirement of economic compensation, and problems with the Swedish language among the girls. Six new schools replaced the non-participating schools, leaving 39 schools in the final sample. When the principal of each school had been informed about the purpose and procedure of the study, and had approved the school’s involvement, separate invitations were sent to the girls, their parents, teachers and school nurses. These letters included information about the purpose and procedure of the study, and that all data were to be treated confidentially. Informed consent was required from both the girls and their parents in order for the girls to participate. Girls who had not replied to the invitation or had declined participation were allowed to change their minds and to participate on the day of the data collection, given that they were 11 years or older. Girls in Grades below 4 participated in an individual structured interview (based on questionnaires). Interviews was also used with a few older girls with reading and writing difficulties. The interviews were conducted by one of the research staff during regular class time. Girls in Grade 4 and above completed questionnaires during regular class time supervised by the research staff. The participants were informed about the longitudinal design of the study, and that they would receive new invitations each year. After the girls had completed the assessment, they were asked to bring an envelope with questionnaires home to their parents, who were asked to return the completed forms by mail (data presented elsewhere). The teachers received and completed forms concerning the participating girls after the assessments in the schools had been
completed (data presented elsewhere). Height and weight were recorded on a separate occasion by the school nurse at the two first assessments, and by self-report Year 3.

Prior to the first data collection, the project staff met with all teachers involved to make sure that they had proper information about the study. All the staff involved in the project received interview training.

The Australian data were collected during May, July, and August of 1997. Informed consent was obtained from the principals of each school, the participants’ parents, and from participants. Students were informed that participation was voluntary and they were identified by code numbers to ensure confidentiality. Participants completed the questionnaires during regular classroom periods supervised by research assistants. Weight and height were measured by the research assistants on site.

Measures

Please refer to Table 2 for an overview of measures used in the particular studies.

Body Mass Index

Body Mass Index (BMI, Keys et al., 1972) (Studies II-IV) was calculated from data on weight and height (BMI = kg/m²). According to Swedish population standards (Lindgren, Strandell, Cole, Healy, & Tanner, 1995; Lindgren, Strandell, & Tanner, 1997), girls who had a BMI at the 91st centile or above were considered overweight (7-year-olds: BMI ≥ 18.0 and 9-year-olds: BMI ≥ 19.0) (Study III).

Demographic and Dieting Questionnaire

An extended 43-item version of the Demographic and Dieting Questionnaire (D & D, Maloney, McGuire, Daniels, & Specker, 1989; Swedish version: Edlund, Hallqvist, & Sjödén, 1994) (Studies I & II) was employed to assess dieting, dieting habits in the family, body shape, physical activity, and eating habits. Results
concerning the questions “Do you wish to be thinner today?” (yes/no) (Study I), “Have you ever tried to lose weight?” (yes/no) (Study II), and “Are you trying to lose weight today?” (yes/no) (Study I) will be reported on in the present thesis.

**Children's Eating Attitudes Test**

A Swedish version (Edlund et al., 1994) of the Children's Eating Attitudes Test (ChEAT, Maloney, McGuire, Daniels, & Specker, 1989) (Studies I–IV) was used. This is a 26-item questionnaire assessing attitudes towards eating and dieting behavior. ['Dieting' (13 items), 'Bulimia and food preoccupation' (6 items), 'Oral control' (7 items)]. Each item is rated on a 6-point Likert scale (“never”-“always”). The response reflecting the most disturbed eating attitude is scored 3, the adjacent response 2, and the next response 1. Remaining three responses are not scored (Study II). In Study I, data are presented in terms of these values referred to as ChEAT-scores (Garner & Garfinkel, 1979). In accordance with the recommendations of Schoemaker, van Strien, and van der Staak (1994), untransformed scores (1-6) were utilized in Studies III and IV. Items 19 (Edlund et al., 1999; Maloney, McGuire, & Daniels, 1988; Smolak & Levine, 1994) and 25 (Smolak & Levine, 1994) have been reported to have low item-total correlations, and were excluded. As a consequence, a new cut-off score of ≥15 (“high-risk group”) was employed in the present study (as well as in our previous studies; Edlund et al., 1999; Halvarsson, Lunner, & Sjödén, 2000).

**Dutch Eating Behavior Questionnaire**

A version of the Dutch Eating Behavior Questionnaire modified for children (DEBQ; van Strien et al., 1986; Swedish version: Halvarsson & Sjödén, 1998) (Studies II, III, & IV) was employed. It contains 33 questions forming the subscales Restrained Eating, Emotional Eating, and External Eating. The response format ranges from 'never' to 'always' on a 5-point scale. The DEBQ has proved to have good reliability (Cronbach's alphas between .80 and .95; van Strien et al., 1986). Halvarsson and Sjödén (1998) have reported alphas between .77 and .86 for the present version. The Restrained eating subscale will be reported on in the present thesis.
The Perception of Teasing Scale

This questionnaire (POTS, Thompson, Cattarin, Fowler & Fisher, 1995) (Studies II, III & IV) assesses history of being teased about physical appearance (Weight Teasing-Frequency, WT-F), competence (Competency Teasing-Frequency, CT-F), and how upset the subjects were by the teasing (Weight Teasing-Effect, WT-E and Competency Teasing-Effect, CT-E). It consists of 6 weight-teasing items and 5 competency items scored in a five-point response format (from “never” to “very often”). The instrument was translated and adapted to Swedish for the present study with permission by the original authors (Thompson et al., 1995). Good internal consistency (Cronbach alphas from .75 to .88) and test-retest reliabilities (WT-F = .90, WT-E = .85, CT-F = .82, CT-E = .66) have been reported (Thompson, Cattarin, Fowler & Fisher, 1995). Data from the Weight Teasing-Frequency subscale will be reported in the present thesis.

Eating Disorder Inventory for Children

The Eating Disorder Inventory for Children (EDI-C) is a version of the EDI (Garner, Olmstedt, & Polivy, 1983) (Studies II & III) adapted for children 7 years and above, consisting of 91 items generating 11 subscale scores. A Swedish version of the EDI-C (Edlund, 1998) and the subscales Drive for Thinness (DT), Bulimia (B), and Body Dissatisfaction (BD) were used in the present study. Respondents rate whether each item applies “always”, usually”, “sometimes”, “rarely”, or “never”.

In Studies II and III, the EDI-C was used, while in Study II, the original EDI was used for the Australian sample. Only two items differ between the EDI and the EDI-C on the subscales used in Study II. In contrast to the instructions in the original manual (Garner et al., 1983), according to which each response is weighted from 0 to 3, untransformed scores (1-6) were used in Studies II and III as they have been found to be more appropriate for nonclinical populations (Schoemaker, van Strien, & van der Staak, 1994). In a group of 11- to 18-year-olds (Garner, 1991), the alpha coefficients for the original EDI scales ranged from .69 to .93. Edlund and colleagues (1998) presented Cronbach alpha values for 10-16 year old girls. The Drive for Thinness (.92) and Bulimia (.79) subscales proved to be homogenous, while the Body Dissatisfaction scale (-
.48) was not. One-week test-retest reliabilities have been reported to range from .65 to .95 (Wear & Pratz, 1987) for a non-patient sample. Data from the Body Dissatisfaction and Drive for Thinness subscales will be reported in the present thesis.

**I Think I Am**

"I Think I Am" is a Swedish instrument for the assessment of self-esteem (Ouvinen-Birgerstam, 1985) (Study III). Its content is derived from a number of well-established self-esteem scales. There are two versions of the questionnaire, a shorter version for elementary school children including 20 items in a yes/no response format, and a longer version for middle and high school students. The long version, used in Study III, consists of 72 items with 4-point Likert scales ("Does not apply" - "Does apply very well"). Both versions comprise five subscales: Body Esteem, Skills and Abilities, Psychological Well-Being, Relation to Family, and Relation to Others. Subscale-total correlations have been reported to be adequate (.71-.82), and good split-half reliability (.91-.93) has been demonstrated (Ouvinen-Birgerstam, 1985). The Body Esteem subscale will be reported on in the present thesis.

**The Body Silhouettes Scale**

"The Body Silhouettes Scale" consists of drawings of five female body silhouettes ranging from very thin to obese, numbered 1 to 5 (Maus, Pudel & Westenhöfer, 1987; Paul, 1985) (Study IV). The subjects were asked to estimate their current and ideal body shape. A discrepancy index was calculated on the basis of the differences between these ratings and was used in the analyses. The discrepancy index is considered to represent the individual’s level of body dissatisfaction (Thompson, 1995).
Table 2. Instruments used in Studies I-IV.

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>I</td>
</tr>
<tr>
<td>D &amp; D</td>
<td>II</td>
</tr>
<tr>
<td>ChEAT</td>
<td>III</td>
</tr>
<tr>
<td>DEBQ</td>
<td>IV</td>
</tr>
<tr>
<td>POTS</td>
<td></td>
</tr>
<tr>
<td>EDI/EDI-C</td>
<td></td>
</tr>
<tr>
<td>&quot;I Think I Am&quot;</td>
<td></td>
</tr>
<tr>
<td>Body Silhouettes</td>
<td></td>
</tr>
</tbody>
</table>

Statistical methods and data analyses

Statistical analyses are described in detail in each of the papers. The Chochran Q-test for overall differences and the McNemar Change Test for specific differences were employed to explore within-group changes over time in the different age groups (Study I). Differences in the wish to be thinner, dieting frequency, and the number of high-risk girls (ChEAT ≥ 15) between the Main Cohort and the Societal Cohort were explored by means of chi-square analysis (Study I). Two-tailed t-tests were used to investigate differences in eating attitudes and behaviors (ChEAT) in the Main Cohort (1995) as compared to the Societal Cohort (1999) (Study I), and to investigate differences between mean values for a number of instruments between overweight and normal weight 7- and 9-year-olds. Analyses of variance (ANOVA) were conducted to study base rate differences in levels of Restrictive Eating, Bulimic Disturbance, Body Dissatisfaction, and Teasing experiences between the three samples from Australia and Sweden (Study II). Tukey’s HSD post-hoc tests were performed in case of significant main effects. The Bonferroni-adjusted alpha level was set at .014 (Study II). Pearson Product Moment Correlations were employed to explore associations among BMI, Weight-Related Teasing, Body Image and Restrained Eating (Studies II & III). Path analyses were conducted to further explore the relationships among the variables (Studies II & III). These path analyses were
based on hierarchical regression analyses forcing the variables to enter in the following order: BMI, Weight-Related Teasing, Body Dissatisfaction, and Drive for Thinness (Study II). In Study III, a series of multiple linear regression analyses with the following forced entries were conducted: BMI Year 1, (Restrained Eating Year 1 in a second analysis), Weight-Related Teasing Year 2, Body Dissatisfaction Year 3, Restrained Eating Year 3, and Dieting Year 6. Confirmatory factor analyses (CFA) were conducted for relevant items and subscales with the purpose to establish new factor structures (Study IV). The new structures were employed in a number of a priori stated models representing the development of body dissatisfaction and disturbed eating over time. These models were evaluated by way of Structural Equation Modeling (SEM) analyses (Study IV). Confirmatory factor analyses and structural equation analyses were estimated by LISREL 8.50 (Jöreskog, Sörbom, du Toit, & du Toit, 2000).
Results

Summaries of Studies I-IV

Study I

Wish to be thinner and weight loss attempts over three years in girls ages 7-15.

The first aim of Study I was to investigate changes in the self-reported wish to be thinner and weight loss attempts among girls in the age groups 7, 9, 11, 13, and 15 years (Main Cohort) over a 3-year study period (Figure 3). The girls were assessed yearly. With respect to the number of girls expressing a wish to be thinner, there were significant overall increases over time in all age groups (McNemar Change Test) with the exception of the 7-year olds. The McNemar Change Test revealed significant increases between Years 1 and 3 for the remaining age groups. For the 13-year olds, there was also an increase between Years 1 and 2, and for the 9-, 11-, 15-year olds also between Years 2 and 3. Accordingly, the results suggest an increasing trend in the wish to be thinner between the ages 9 and 17, most distinct in the 10- to 14-year age range.
To study the effects of participating in the study for two years, 9-, 11-, 13-, and 15-year olds Year 1 were compared to girls who turned 9, 11, 13, and 15 years Year 3. Chi-square analyses indicated that there were no significant differences between any of these age groups. Thus, participation in the project, involving repeated testing, did not seem to influence the scores significantly.
The number of current dieters increased over time for the 9- and 11-year olds (Figure 4). The 9-year olds demonstrated significant increases between Years 1 and 3 and between Years 2 and 3 (i.e. ages 9 to 11 and 10 to 11). For 11-year old girls, an increase was evident between Years 1 and 3 (age 11 to 13). Among the other age groups, the frequency of dieters remained stable with advancing age. As in the case of the wish to be thinner, there were no differences in the number of current dieters between the 9-, 11-, and 13-year olds Year 1, and those who turned 9, 11, or 13 Year 3. Thus, increases in reported dieting seem to occur mainly between the ages 9 and 13.

Figure 4. The proportion of girls reporting Current Dieting in the Main Cohort and the Societal Cohort over three years.
Differences in the wish to be thinner, weight loss attempts, eating attitudes and behaviors, and the percentage of girls at high risk for eating disorders between two cohorts of girls (ages 7–15 years) in 1995 and in 1999.

Another aim of Study I was to study potential differences between the first assessment of girls (age 7–15 years) participating in the longitudinal study (Main Cohort) and an age-matched sample (Societal Cohort) (Table 3). Significantly more 7-year old girls in the Main Cohort had a wish to be thinner as compared to 7-year olds in the Societal Cohort. Regarding both wishes to be thinner and current dieting, there were no overall differences between the two cohorts. Neither were there any differences with respect to dieting when comparisons were performed within age strata.

The mean scores of eating attitudes and behaviors, as well as the percentage of girls at “high risk” for developing eating problems (ChEAT ≥15) were compared between the Main and Societal Cohorts (Table 2). The 11-year olds in the Societal Cohort displayed more disturbed eating attitudes and behaviors than the same age group in the Main Cohort. The proportion of 7-year olds with high ChEAT scores in the Societal Cohort was 5.2% less than in the Main Cohort.

Table 3. Eating attitudes (CheAT-scores) and the percentage of girls at ChEAT ≥15 in the different age groups in the Main Cohort Year 1 and the Societal Cohort Year 5.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Main Cohort Year 1</th>
<th>Societal Cohort Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>7 Year</td>
<td>175</td>
<td>3.25 (5.56)</td>
</tr>
<tr>
<td>9 Years</td>
<td>170</td>
<td>2.17 (3.68)</td>
</tr>
<tr>
<td>11 Years</td>
<td>218</td>
<td>3.05 (4.87)</td>
</tr>
<tr>
<td>13 Years</td>
<td>234</td>
<td>4.48 (7.14)</td>
</tr>
<tr>
<td>15 Years</td>
<td>150</td>
<td>6.19 (7.89)</td>
</tr>
</tbody>
</table>

* t-test p<.05, * Chi-square analysis p<.05
Study II

Overall levels of body dissatisfaction, teasing experiences, and eating disturbances among 13- and 14-year-old girls from Sweden and Australia.

Australian and Swedish girls in Grade 8 were dissatisfied to the same extent with their bodies, whereas Australian girls in Grade 7 displayed significantly less body dissatisfaction than either of the other samples (Table 4). The two Australian samples did not differ from each other, but both samples reported significantly more teasing than the Swedish sample. Of the Australian girls, 38.0% in Grade 7 and 59.1% in Grade 8 stated that they had dieted to lose weight, whereas 47.7% of the Swedish girls in Grade 8 reported this. For the two measures of restrictive eating (DEBQ-R restraint and EDI-Drive for Thinness), analyses of variance revealed significant differences between the three samples. Post-hoc tests indicated that the Australian girls in Grade 8 had more disturbed eating than those in the other two samples. Australian Grade 7 and Swedish Grade 8 girls did not differ from each other. Concerning bulimic eating disturbances, Australian girls in Grade 8 reported significantly more problems than did Swedish girls in the same grade. No differences were found between Australian girls in Grades 7 and 8 or between Australian Grade 7 and Swedish Grade 8 girls. In sum, there was a slight trend for the older Australian girls to have higher levels of restrained and bulimic eating behaviors as younger Australian girls and compared to the Swedish sample.

A model of BMI and Weight-Related Teasing for prediction of Body Dissatisfaction and Drive for Thinness among female adolescent girls from Sweden and Australia.

There were significant associations among the variables across all three samples. Path analyses revealed that Drive for Thinness was significantly predicted by BMI, Weight-Related Teasing, and Body Dissatisfaction (Figure 5). For all three samples, BMI was a significant predictor of Teasing and Body Dissatisfaction. The relationship between BMI and Body Dissatisfaction was partially mediated by Weight-Related Teasing in all three samples.
mediated by Weight-Related Teasing in all three samples. In addition, Body Dissatisfaction was found to be the primary predictor of Drive for Thinness. The model for Australian girls in Grade 7 differed from the other models in the respect that it included additional paths from BMI and Teasing to Drive for Thinness.

Table 4. Mean values (SD) of BMI, Disturbed Eating, Body Dissatisfaction, and Weight-Related Teasing in Swedish Grade 8 and Australian Grade 7 and 8 girls.

<table>
<thead>
<tr>
<th></th>
<th>Sweden Grade 8</th>
<th></th>
<th>Australia Grade 7</th>
<th></th>
<th></th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>21.22 (3.2)</td>
<td>20.35 (4.78)</td>
<td>20.78 (5.67)</td>
<td>4.25</td>
<td>.015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEBQ-Restraint</td>
<td>21.03 (8.8)</td>
<td>20.35 (9.25)</td>
<td>23.51 (9.61)</td>
<td>6.06</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDI-C (or EDI-2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive for Thinness</td>
<td>18.31 (8.6)</td>
<td>18.36 (7.76)</td>
<td>20.47 (8.15)</td>
<td>4.70</td>
<td>.009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Dissatisfaction</td>
<td>32.08 (10.2)</td>
<td>26.72 (11.88)</td>
<td>33.63 (10.75)</td>
<td>9.50</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulimia</td>
<td>12.36 (4.7)</td>
<td>13.19 (6.00)</td>
<td>14.43 (5.99)</td>
<td>8.27</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight-Related Teasing</td>
<td>7.13 (2.6)</td>
<td>8.57 (4.96)</td>
<td>8.86 (4.91)</td>
<td>11.74</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Bonferroni adjusted alpha level (.10/7) = .014
Figure 5. Path models with beta coefficients for the three samples in Study II (*p.<.01, **p.<.001, ***p.<.000).
Study III

A conceptual model of longitudinal associations of BMI, Weight-Related Teasing, Body Dissatisfaction, Restrained Eating, and Dieting.

Separate analyses were conducted for 7- and 9-year old girls. All variables were included in the path analyses despite some non-significant bivariate correlations between variables among the 7-year-olds. The reason for this decision was the notion that some variables may serve as mediators or moderators in the models.

For the 7-year-olds, BMI was a significant risk factor for Weight-Related Teasing and Body Dissatisfaction 1–2 years later. BMI influenced Restrained Eating practices two years later, directly as well as and indirectly, through Weight-Related Teasing and Body Dissatisfaction. Restrained Eating assessed Year 3 was the only predictor of Dieting three years later (Figure 6) explaining 23% of the total variance of Dieting.

Figure 6. Path diagram of prediction of Body Dissatisfaction and Dieting in Grade 1. Standardized coefficients are enclosed in parenthesis.
For this group of girls, body mass influenced the degree of weight teasing experiences only to a limited extent but to a greater extent the development of Body Dissatisfaction and Restrained Eating. Taken together, BMI, Weight-Related Teasing, and Body Dissatisfaction seemed to be important predictors of Restrained Eating in 9-year-old girls. However, three years later, at age 12, the only variable to influence Dieting was earlier Restrained Eating practices.

Similarly to girls at age 7 years, BMI predicted Weight-Related Teasing one year later and Body Dissatisfaction two years later for the group of 9-year-old girls. Weight-Related Teasing partially mediated between BMI and Body Dissatisfaction. Concurrent Body Dissatisfaction was associated with Restrained Eating Year 3 when the girls were 11 years of age. Both Restrained Eating and Body Dissatisfaction predicted Dieting three years later (Figure 7). Restrained Eating and Body Dissatisfaction explained 36% of the total variance of Dieting at the time girls had become 14 years.

The results indicate that BMI, Weight-Related Teasing, and Body Dissatisfaction are closely related for 9–11-year-old girls, and that Body Dissatisfaction and Restrained Eating may have an impact on Dieting practices from the age of 11 to 14 years.

Figure 7. Path diagram of prediction of body image and dieting in Grade 3. Standardized coefficients are enclosed in parentheses.
Restrained Eating Year 1 related to remaining predictors in the a priori stated conceptual model for the development of Dieting among girls ages 7 and 9 years.

Figure 8 shows the original path model (Figure 6) with the addition of Restrained Eating assessed Year 1 among 7-year-olds. BMI was a weak but significant predictor of Restrained Eating at baseline. Restrained Eating Year 1 increased the proportion of explained variance of Weight-Related Teasing Year 2. However, the path from Weight-Related Teasing Year 2 to Restrained Eating Year 3 became non-significant with the inclusion of Restrained Eating at baseline. The results suggest that Restrained Eating is possibly a stronger risk factor for Dieting than is Weight-Related Teasing and therefore impedes the influence of Weight-Related Teasing. In other respects, the model was largely unchanged as compared to that illustrated in Figure 9.

Figure 8. Path diagram of prediction of body dissatisfaction and dieting in Grade 1 with the addition of data on Restrained Eating Year 1. Standardized coefficients are enclosed in parenthesis.
For 9-year-old girls, the inclusion of Restrained Eating Year 1 did not alter the original path model (Figure 9) in any vital way. BMI directly predicted Restrained Eating Year 1 and Body Dissatisfaction Year 3. In this model, BMI and prior Restrained Eating affected Weight-Related Teasing one year later. As in the previous model, Weight-Related Teasing partially mediated between BMI Year 1 and Body Dissatisfaction Year 3. Restrained Eating Year 1 and Body Dissatisfaction Year 3 directly predicted Restrained Eating Year 3. The path models suggest that prior Body Dissatisfaction and Restrained Eating are salient risk factors for this group of girls when 11 and 14 years old.

Figure 9. Path diagram including structural coefficients of prediction of body image and dieting in Grade 3 with the addition of Restrained Eating Year 1. Standardized coefficients are enclosed in parenthesis.
Overall levels of BMI, Weight-Related Teasing, Body Dissatisfaction, Restrained Eating, and Dieting among normal weight and overweight 7- and 9-years old girls.

The group of 7-year-old, normal weight girls (n=106) had a mean BMI of 15.80 and overweight girls (n=34) (BMI ≥18.0) a mean BMI of 20.03. Thus, 24% of the girls were overweight according to this criterion. The results indicate that overweight girls were significantly more dissatisfied with their bodies at age 8 and reported more Restrained Eating when they were 9 years of age as compared to normal weight girls.

The 9-year-old, normal weight girls (n=103) had a mean BMI of 16.55 and overweight girls (n=31) BMI ≥19.0 a mean BMI of 20.79. Thus, 21.9% of the girls were overweight. The results indicated that overweight girls had been teased about their weight at age 10 more often than normal weight girls. Also, they were significantly more dissatisfied with their bodies at age 11, and reported more Restrained Eating when they were 9 as well as 11 years of age. Overweight girls dieted to a greater extent when they were 14 years old compared to girls with normal weight.

Study IV

A conceptual model (Original Model) incorporating predictors of Body Dissatisfaction, Dieting and Drive for Thinness over a 6-year study period among girls ages 11, 13, and 15 years (Year 1). Items from well-established self-report measures were subjected to confirmatory factor analyses in order to find appropriate subscales for ensuing analyses. The RMSEA index indicated that the derived scales for Weight-Related Teasing and Drive for Thinness met the standard criteria for a close fit. Restrained Eating Year 3 and Body Esteem Years 1 and 3 were of adequate fit. The derived scales for Restrained Eating Year 1, Body Dissatisfaction Year 2, and Dieting Year 6 barely reached an acceptable level of fit. Since most variables were of adequate fit or close to the critical RMSEA value, it was decided to include all in subsequent analyses.
Dieting and Drive for Thinness Year 6 were chosen as dependent variables and BMI Year 1 as the independent variable. Weight-Related Teasing Year 2 was chosen to explore the suggestion that it may serve as a mediational variable between BMI Year 1 and Body Dissatisfaction Year 2 (Thompson et al., 1995). Restrained Eating Year 3 was included for two reasons 1) to study the predictive power of variables assessed 1 and 2 years before, and 2) to study the extent to which Restrained Eating Year 3 was related to Dieting and Drive for Thinness 3 years later.

The Original Model (Figure 10) shows that BMI directly influenced Body Esteem (Year 1), Weight-Related Teasing (Year 2), Body Dissatisfaction (Year 2), Restrained Eating (Year 3), and Dieting (Year 6). Thus, BMI predicted measures of body image and teasing as well as more distal eating behaviors. Baseline Body Esteem (Year 1) directly affected Body Dissatisfaction (Year 2) indicating that these variables are closely related. In this model, negative paths were found from Weight-Related Teasing Year 2 to Body Dissatisfaction (Year 2) and to Body Esteem (Year 3). This means that increased Weight-Related Teasing was related to less Body Dissatisfaction and a lower Body Esteem. Also, Body Dissatisfaction (Year 2) directly influenced Weight-Related Teasing (Year 2) and Body Esteem Year 3. As shown above, Body Dissatisfaction and Body Esteem were interrelated and higher levels of Body Dissatisfaction were accompanied by reports of more frequent weight teasing experiences. Further, it was apparent that Body Dissatisfaction Year 2 and Body Esteem Year 3 were of predictive value for Restrained Eating Year 3. Finally, Restrained Eating together with Body Esteem Year 3 predicted Dieting and Drive for Thinness Year 6. It is thus evident that body image and eating behaviors predicted concurrent and future eating disturbances. All paths were significant (t>2.0). The root-mean-square error of approximation (RMSEA) was employed as an overall model fit index (Steiger, 1990). The RMSEA (0.056) of the Original Model indicates a good fit.
Figure 10. Original model of the development of Body dissatisfaction and Restrained Eating. Standardized solution.

N=358. Chi-square (df=10) = 21.18, p<.02, RMSEA = .056
The Original Model compared with an Alternative model including Year-1 data on restrained eating behavior among girls ages 11, 13, and 15 (Year 1).

The Alternative Model achieved an RMSEA of 0.043 demonstrating close fit (Figure 11). The r-square value of Body Esteem (Year 1) increased from 0.11 to 0.36, indicating that Restrained Eating (Year 1) was a better predictor of Body Esteem than was BMI. In addition, the r-square value of Body Dissatisfaction Year 2 increased from 0.35 to 0.45 and that of Restrained Eating Year 3 from 0.42 to 0.57. Weight-Related Teasing did not remain as a predictor variable and as a consequence, the path from Body Dissatisfaction Year 2 to Restrained Eating Year 3 became non-significant. Dieting Year 6 was excluded from the Alternative model since the proportion of explained variance was similar to that of Drive for Thinness. The proportion of explained variance for Drive for Thinness Year 6 remained similar to that of the Original Model (37% vs. 36%).

The overall fit measures indicate that the Original Model and the Alternative Model both were of good fit. Thus, none of the models for the prediction of Body Dissatisfaction and Disturbed Eating could be rejected, rather both models should be taken into consideration in future research.
Figure 11. Alternative model of the development of Body Dissatisfaction and Restrained Eating. Standardized solution.
N=358. Chi-square (df=9) = 14.90, p<.094, RMSEA = .043.
Discussion

General discussion

Development of disturbed eating

Significant increases in dieting attempts occurred mainly between the ages 9 and 13 (Study I). Research on 9–13-year-olds (Gardner, Stark, Friedman, & Jackson, 2000) has found that not only eating disorder scores per se but also increases in those scores served as powerful predictors of later eating disorder scores. Our findings suggest that the frequencies of dieting attempts are fairly stable over the time period from 14 to 17 years. These results agree well with previous work in this area (Calam & Waller, 1998; Graber et al., 1994; Kotler et al., 2001). For instance, an 8-year study of girls at 14, 16, and 22 years (Graber & Brooks-Gunn, 2001) demonstrated that the rate of eating problems was fairly stable across the three assessments.

It is important to note that Studies I and II differ in the wording of the questions about dieting behavior. A higher incidence of dieting may be attributed to the fact that participants in Study II were asked the question "Have you ever tried to lose weight?" as compared to "Are you trying to lose weight today?" in Study I. An examination of 13-year-olds at the second assessment in Study I (i.e. 14-year olds, 1996, Main Cohort, Table 1) and girls in Grade 8 in Study II (mainly the same girls), revealed that 47.7% stated that they had ever tried to lose weight (Study II) but 34.5% reported that they were currently trying to lose weight (Study I). Similarly, Halvarsson and colleagues (2000) found a higher
incidence of ever dieting (21%) among 7-year-olds which contrasts with the much lower incidence of current dieting (5.5–6.5%) among 7-year-olds in Study I. Since the formulation covers a longer time period, the reported figures should be higher. The similarity of reports of dieting in 1995 and 1999 (Study I, Figure 1) indicates that the assessment of current dieting may be more reliable than retrospective reports among 7-year-old girls.

It was assumed that the Societal Cohort (1999) would report higher frequencies of the wish to be thinner and dieting, or more disturbed eating attitudes than the Main Cohort (1995). This expectation was based on the notion that the sociocultural pressure to be thin appears to have increased successively over the years (Lindeman, 1999). However, among the 7-year-olds in 1995, a significantly higher proportion expressed a current wish to be thinner compared to 7-year-olds in 1999. This is likely to reflect unreliable reporting in this young age group, which has been indicated earlier by Halvarsson et al. (2000). Also, with regard to the number of girls scoring ≥ 15 on the ChEAT (“high-risk” group), a significant 5.2% reduction was found among the 7-year-olds between 1995 and 1999.

Some scholars (Collins, 1991; Rolland, 1997; Sasson, 1995) have raised doubts regarding the validity of the ChEAT (used in Studies I and III) when used with very young children. In research performed by Rolland and co-workers (1997), 28% of girls in Grade 3 (age 8 years) as compared to 3–14% of girls in Grades 4–6 (age 9–12 years) scored above the screening cut-off for eating disorders. In Study I, 7.4% of the 7-year-old girls in the Main Cohort as opposed to 2.4–5.1% of 9–13-year-old girls scored above the cut-off for eating disturbances. In a longitudinal study of boys and girls ages 9 through 14 (Gardner, Stark, Friedman, & Jackson, 2000), only 1.6% displayed ChEAT scores that exceeded the cut-off for eating disorders. In Study I, the average percentage of 9–13-year-old girls at risk for eating disturbances were 3.9% and 5.5% in the Main Cohort and in the Societal Cohort, respectively. It should be noted that in 1999, 6% of 11-year-old girls and 13% of 15-year-old girls were “at risk” of developing an eating disorder. Although the percentages of children “at risk” are not readily translated between the studies, the pattern of results, suggesting that young girls report surprisingly high ChEAT
scores, are similar in Study I and in previous research (Rolland et al., 1997).

The cut-offs used in the studies are not fully comparable. Rolland et al. (1997) and Gardner et al. (2000) used the original cut-off of 20. However, in Study I the cut-off was set at 15. The lower cut-off in Study I was motivated by the exclusion of two items and as a consequence, a loss of six possible points. The higher proportion of high risk girls in 1995 compared to 1999 in Study I supports the doubts that have been raised whether girls at this age fully understand the questions of the ChEAT (Rolland, 1997; Sasson, 1995). We tried to reduce such difficulties by conducting structured individual interviews with the girls and by training the research assistants thoroughly in the interview procedure.

The hypothesized increase in sociocultural pressure to be thin between 1995 and 1999 was evident solely among the groups of 11-year old girls. The period around the age of 11 is in many respects a sensitive developmental phase (Biro, McMahon, Striegel-Moore, Crawford, Obarzanek, Morrison, Barton, & Falkner, 2001). Girls are challenged to accommodate to physical changes in a cultural context that favor a prepubertal body structure over the fully mature body, they are breaking some of the childhood ties to the parents, and psychosocial influences are becoming increasingly important (Attie & Brooks-Gunn, 1989). Two thirds of adolescent girls with psychiatric disorders have been reported to experience their onset before the age of 10 (Graham & Rutter, 1985). Hence, within a developmental perspective, it is not unlikely that an increase of the pressure to be thin between 1995 and 1999, should be more clearly reflected among the 11-year olds than among the remaining age groups.

In Study II, the Australian Grade 7 girls displayed less Body Dissatisfaction than Australian and Swedish girls in Grade 8. Australian and Swedish 8 graders were dissatisfied with their bodies to a similar degree, but Australian girls in Grade 8 were more prone than Swedish girls in Grade 8 to take action in terms of dieting attempts. The two age groups of Australian girls did not differ from each other, but both samples reported that they had been teased more often than did the Swedish girls. One may speculate whether this difference relates to culturally bound attributions in the weight teasing questionnaire or whether Australian girls are exposed to a socially more competitive climate.
Perhaps obesity is denigrated to a greater extent in Australia than in Sweden. These issues are unclear because little research has been conducted cross-culturally in the area of risk factors and particularly regarding the role of weight-related teasing (Thompson & Smolak, 2001).

As evidenced above, there was a slight trend for the older Australian girls to have higher levels of eating disturbance, particularly in the realm of restraint (DEBQ-R and EDI-Drive for Thinness), as compared to the younger Australian girls and the Swedish sample. The descriptive data on dieting behavior in Study II are similar to results from other samples of Swedish (Grade 8: 47.7%) and Australian (Grade 7: 38% and Grade 8: 59.1%) adolescents. Edlund (1999) found that 50.2% of 12-14-year-old Swedish girls had tried to lose weight. In Australia, other studies have shown that between 46% and 52% of high school girls reported that they had dieted (Muir, Wertheim & Paxton, 1999; Paxton et al., 1991; Wertheim et al., 1992). A U.S. study has demonstrated that 66% of middle school girls had tried to lose weight in the last year (Shisslak et al., 1998). In a study of 5,882 9th-12th grade girls, Serdula and researchers (1993) reported that 42.5% of the 9th graders were currently trying to lose weight. Thus, the level of self-reported dieting in Swedish and Australian girls roughly parallel data on dieting behavior in U.S. samples. The differences in prevalence between the studies may be a reflection of the wording of the questions. According to earlier reasoning, retrospective questions are likely to generate larger proportions of girls reporting dieting attempts as compared to questions about current dieting.

Modeling

The primary purpose of Study II was to estimate the predictive value of data on BMI and Weight-Related Teasing in relation to Body Dissatisfaction and Eating Disturbance. This was done in order to test the replicability of earlier U.S. findings (e.g., Thompson et al., 1995) in Sweden and Australia. Thompson and colleagues (1995) attempted to clarify the relationships among obesity, weight-related teasing, body image, psychological function, and eating disturbance by two cross-sectional covariance structural models and by a longitudinal path analysis. The path analyses in Study II were similar in most respects for the three
samples. The findings of Study II clearly replicate those obtained with U.S. samples (Thompson et al., 1995), indicating that BMI is a risk factor for being teased about weight and appearance. In accordance with the U.S. data (Thompson et al., 1995), there was also a strong effect of weight-related teasing on body dissatisfaction in Study II. Thompson and researchers (1995) demonstrated that overweight status did not affect body image independently of other variables in the model. Rather, the influence was mediated via negative verbal feedback. Likewise, in Study II it was clear that negative feedback about one's body is important as it was demonstrated to partially mediate the relationship between weight status (BMI) and body dissatisfaction in two different countries. This mediation is not “true” mediation per se according to the definitions by Kraemer and co-workers (2001) as Study II is cross-sectional and temporal precedence is not established. Despite this, it is interesting to compare the results with those of Wertheim and colleagues (2001) who showed that for Australian girls in Grades 8 and 10 but not in Grade 7, concurrent teasing was related to body dissatisfaction. Across the three samples in Study II, body dissatisfaction consistently predicted disturbance eating. This pattern has been demonstrated in the U.S. (Thompson et al., 1995; van den Berg, 2002b) as well as in Australia (van den Berg, 2002a; Wertheim et al., 2001). Wertheim and co-workers (2001) found that for Grade 7 girls, Body Dissatisfaction predicted Restrictive Eating one year later. In another cross-sectional study, van den Berg and co-workers (2002) found that BMI directly influenced Teasing, which in turn directly influenced Body Dissatisfaction. Further, Body Dissatisfaction had an influence on global psychological functioning and Restrained Eating. In Study II, Australian girls in Grade 7 deviated from Australian and Swedish girls in Grade 8 by the evidence of additional paths indicating that Weight-Related Teasing partly mediated between BMI and Drive for Thinness. Overall, the results indicate that BMI and Weight-Related Teasing predict Body Dissatisfaction and Eating Disturbance to various degrees depending on grade or possibly developmental level.

By means of path modelling, BMI, Weight-Related Teasing, and Body Dissatisfaction predicted Restrained Eating for 9- and 11-year-old girls in Study III. Interestingly, for the group of 7-year-olds, Weight-Related Teasing mediated between BMI and Restrained Eating Year 3. A similar pattern was found by
Wertheim and colleagues (2001), indicating that BMI influenced concurrent Weight Teasing that in turn predicted Bulimia one year later. Further, Restrained Eating practices at assessment 3 (Study III) predicted Dieting three years later when the girls became 12 years. For girls who were 9 years old at baseline, Weight-Related Teasing partially mediated between BMI and Body Dissatisfaction. Concurrent Body Dissatisfaction was associated with Restrained Eating Year 3 when the girls were 11 years of age. Further, both Restrained Eating and Body Dissatisfaction predicted Dieting three years later as the girls became 14 years old. Thus, Restrained Eating and Body Dissatisfaction Year 3 were overlapping risk factors for Dieting Year 6 (Kraemer et al., 2001). In parallel to the present results, Gardner and colleagues (2000) reported that low body esteem became a risk factor around age 9 and body judgements reflected by current and ideal sizes at ages 11 and 12. The two-year follow-up indicated that weight, height, teasing, body dissatisfaction, and eating scores predicted subsequent eating scores in 6–14-year old children (Gardner et al., 2000).

There is little longitudinal research on risk factors for eating problems among young children (Kotler et al., 2001; Ricciardelli & McCabe, 2001; Stice et al., 1999). Close examination of the importance of specific risk factors and how these may vary depending on developmental level is warranted (Attie & Brooks-Gunn, 1989; Wertheim et al., 2001). Wertheim and colleagues (2001) observed differences between path models in three age groups (Grades, 7, 8, and 10). Similarly, we found variations between age groups in the importance of Weight-Related Teasing and also whether Restrained Eating alone or accompanied by Body Dissatisfaction predicted Dieting. In order to tailor preventive efforts to individuals and to find the most suitable timing for the implementation of preventive programs, more risk factor research is needed concerning separate age groups.

Clarification of causal chains between risk factors and disturbed eating is warranted. According to Kraemer et al., (2001), temporal precedence is established neither by the assessment of one risk factor before another nor by entering risk factors in a predetermined sequence. Studies III and IV are longitudinal and risk factors were assessed at different points in time. However, inferences about causal effects are not possible (Kraemer at al., 2001). It is important to note that the inclusion of disordered eating at the first assessment gives an indication of the presence of
correlates that are secondary to eating problems (Wichstrom, 2000). Also, it is possible to estimate to what extent a risk factor contributes to the prediction of disturbed eating over and above initial levels of eating behaviors (Wichstrom, 2000).

The addition of Restrained Eating measured at baseline increased the proportion of the explained variance of Weight-Related Teasing Year 2 for 7-year-old girls. However, the path from Weight-Related Teasing Year 2 to Restrained Eating Year 3 became non-significant. According to the definitions established by Kraemer et al. (2001), we found that BMI and Restrained Eating Year 1 were overlapping risk factors for Weight-Related Teasing Year 2 and Restrained Eating Year 3. In this analysis, Weight-Related Teasing changed from being a mediator variable to a proxy variable for Restrained Eating Year 1 as a risk factor for Restrained Eating Year 3. The results suggest that Restrained Eating is possibly a stronger risk factor for Dieting than is Weight-Related Teasing and therefore impedes the influence of Weight-Related Teasing.

For 9-year-old girls, the inclusion of Restrained Eating Year 1 resulted in some additions to the original path model. The additions were: BMI and Restrained Eating Year 1 served as overlapping risk factors for Weight-Related Teasing Year 2, and Weight-Related Teasing became a proxy for Restrained Eating Year 1 as a risk factor for Restrained Eating Year 3. As in the first model, Weight-Related Teasing partially mediated the effect of BMI Year 1 on Body Dissatisfaction Year 3.

A total of 19.2% of the girls were overweight at 9 years of age. This prevalence estimate is well in line with the figures of 18-19% reported for Swedish children around 10 years in 2001 (IOTF collated data). At age 9 (7-years old at baseline), overweight girls were more dissatisfied with their bodies compared to normal weight girls. Likewise, overweight girls in the group of 9-year-olds at baseline reported more Body Dissatisfaction at age 11 than did their normal weight counterparts. This may be related to the thin body ideal that is prevalent in society today and to the fact that children as young as 5 years are aware of these ideals (Williamson & Delin, 2001). Thus, reductions in the rates of obesity among children and adolescents seem like a viable way to prevent increases in the prevalence of weight concerns (Striegel-Moore, 2001).
The results indicate that in comparison to normal weight girls, overweight girls had been teased more about their weight at age 10. Thus, there were marked differences between girls with overweight and those with normal weight. A plausible interpretation of these results is that comments or teasing about the body have a greater impact on Body Dissatisfaction in girls at age 11 (Year 3). There is the possibility that these girls are more sensitive to sociocultural pressures for thinness than are their younger counterparts. The greater incidence of weight-related teasing among overweight girls may be a reflection of the social stigmata that is attributed to obese people. As expressed by Allon (1973, p.85), overweight individuals are “regarded and treated by other as having a physical, mental, emotional, moral, or appearance impairment”. In fact, elementary school children have been shown to perceive obesity as being worse than being handicapped or disabled (Brownell & Wadden, 1984; Hill & Silver, 1995; Richardsson, Goodman & Hastorf, 1961). Weight-Related Teasing compounds a limited part of the total culturally bound pressure an individual is exposed to, and should therefore be expanded by measures on specific peer-, familial-, and media influences (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; Thompson & Stice, 2001; van den Berg et al., 2002).

At ages 9, 11, and 14, the results demonstrate that overweight girls diet more frequently than normal weight girls. In parallel to the present results, a large scale cross-sectional study of 31,000 adolescents (Neumark-Sztainer, Story, French, Hannan, Resnick, & Blum, 1997) showed that overweight youth were more likely to express weight concerns and to engage in chronic dieting and binge eating than were their nonoverweight counterparts. A study of 9–11-year old children (Vander Wal & Thelen, 2000) demonstrated that obese children were more likely to express concerns about their weight, to exhibit more body dissatisfaction, and to diet and restrain their eating as compared to average-weight children. Hence, it was found that overweight girls reported more body dissatisfaction and engaged in more restrained eating than normal weight peers in Study III.

It has been proposed that body image dissatisfaction to some degree may be beneficial as it may conceivably lead to healthy eating behaviors (Heinberg, Thompson, & Matzon, 2002). Heinberg and co-workers (2002) hypothesize that moderate levels of distress related to weight-related appearance possibly function
as a motivating agent to adopt or continue a healthy lifestyle among individuals with above-average BMIs (Heinberg et al., 2002). The first study of the effects of body image on weight loss (Heinberg, Haythornthwaite, Rososky, McCarron, & Clarke, 2000) found that those who were most dissatisfied with their appearance lost significantly more weight than those who were more satisfied over a 15-month weight loss treatment. Although not studied in the present thesis, it is appealing to approach the connection between body image and disturbed eating behaviors from the perspective proposed by Heinberg and colleagues (2002). Perhaps overweight girls who are dissatisfied with their bodies are in a good position for changing to a healthier lifestyle. Future research needs to determine whether the hypothesis has any merit.

In the Original Model in Study IV, Weight-Related Teasing Year 2 partly served as a mediational variable between BMI Year 1 on the one hand, and Body Esteem (Year 3), on the other. The result suggests that a higher frequency of Weight-Related Teasing predicts less Body Dissatisfaction. This is puzzling and difficult to explain. The association with Body Dissatisfaction implies that Weight-Related Teasing is a proxy for Body Dissatisfaction in its function as a risk factor for Restrained Eating Year 3. In the present study, Weight-Related Teasing was also negatively associated to Body Esteem Year 3. This relationship is consistent with results of previous studies. Wertheim and co-workers (2001) found that Body Dissatisfaction was concurrently predicted by Weight Teasing and Thompson and colleagues (1995) showed that Time 1 Teasing predicted Time 2 Weight Dissatisfaction. Interestingly, the path from Body Dissatisfaction to Weight-Related Teasing suggests that body image biased an individual to perceive comments about the body as teasing. It has been shown that eating disorder sufferers compared to other individuals selectively attend to food, body shape, and weight-related stimuli (Faunce, 2002).

In Study IV, Body Dissatisfaction partly served as a mediator variable between BMI and Restrained Eating Year 3. Similar to results of previous research (Stice & Agras, 1998), the results of the Original Model suggest that Body Dissatisfaction Year 2 predicted Restrained Eating practices Year 3. This relationship appeared to be unstable in another study (Wertheim et al., 2001). The researchers demonstrated that Body Dissatisfaction predated later increases in Restrictive Eating for girls in Grade 7 but not in
Grades 8 and 10. Again, in Study IV, Restrained Eating together with Body Esteem Year 3 were overlapping predictors of Dieting and Drive for Thinness Year 6. Nevertheless, consistent with results from concurrent research using path models or SEM (Study II; Thompson et al., 1995; Thompson, Coovert, & Stormer, 1999; Wertheim et al., 2001), body image and earlier eating problems clearly influenced eating disturbances. In a cross-sectional study using covariance structural modeling (van den Berg et al., 2002a), the model indicated that BMI directly influenced Teasing in Australian 13-17-year-old females. Further, teasing influenced Body Dissatisfaction, which had a direct influence on Global Psychological Functioning and Restricted Eating. In contrast to our models, van den Berg and colleagues (2002a) did not demonstrate a direct path from BMI to Body Dissatisfaction.

The models (Original Model and van den Berg et al., 2002a) resemble each other regarding the proposed pathways from BMI to teasing, and from body dissatisfaction to the restriction of food intake. In a second study, van den Berg and researchers (2002b) demonstrated that BMI directly influenced body dissatisfaction and to a small degree peer teasing among U.S. college females. There was also a direct path from peer influences to restrained eating. Compared to the former study (van den Berg et al., 2002a), in the second study (2002b), the model was extended by measures of perfectionism, family and media influences that influenced social comparisons, as well as by data on global psychological functioning that influenced body dissatisfaction. Overall, the aforementioned models are not identical, but the results indeed suggest that teasing, body dissatisfaction, and previous dieting are risk factors for the development of eating disturbances.

BMI and Restrained Eating Year 1 were overlapping risk factors for Body Dissatisfaction Year 2 and Restricted Eating Year 3 in the Alternative Model. Further, Restricted Eating and Body Esteem Year 1 were found to be overlapping risk factors for Restricted Eating Year 3. BMI, Body Esteem, and Restricted Eating Year 1 jointly increased the proportion of explained variance of Body Dissatisfaction in the Alternative Model (Study IV). Body Dissatisfaction Year 2 was no longer a valid precursor of Restricted Eating Year 3, although the r-square value for Restricted Eating Year 3 increased. Instead, Body Dissatisfaction became a proxy for BMI and Restricted Eating Year 1 as risk factors for Restricted Eating Year 3. Thus, Body Dissatisfaction
did not completely lose its role as a predictor for Restrained Eating Year 3. Body Esteem Year 3 remained as a proximal predictor of Restrained Eating Year 3.

It should be noted that altogether, BMI, Restrained Eating Year 1, and Body Esteem Years 1 and 3 in the Alternative Model achieved an explained variance of 57% of Restrained Eating Year 3. The proportion of explained variance of Drive for Thinness Year 6 was lower, 36%. The same portion of explained variance (i.e. 36%) was demonstrated in Study III for girls who became 14 years Year 6 (i.e. 9 years Year 1). Our findings are in accordance with those of a Norwegian study (Wichstrøm, 2000), that reported a proportion of explained variance of 39.2% in the EAT at Time 2.

In line with results from other prospective studies (Calam & Waller, 1998; Leon et al., 1995; Wertheim et al., 2001), the present results support the conclusion that dieting and other weight control behaviors predict future eating disturbances. Predictors of disordered eating have been shown to have limited predictive power when controls for initial eating behaviors were added to the analysis (Wichstrøm, 2000). Weight-Related Teasing did not contribute significantly to the pathways in the Alternative Model when initial data on Restrained Eating was controlled for. Hence, comparison of the Original and the Alternative Models demonstrated that it might be misleading to consider the predictive value of potential risk factors in isolation from previously established eating behaviors. Therefore, it is important to further examine the ways in which novel as well as well established variables may act as risk factors between prior and later restrictive eating habits (Kraemer et al., 2001).
Methodological discussion

Studies I, III, and IV employed an accelerated multi-cohort design comparing different age groups over time. The main advantage of this design is the simultaneous assessment of a number of groups at regular time intervals. Multiple observations lend the ability to compare the same individual at different points of time. These groups vary in age when included, which enables the study of developmental processes (Kazdin, 1998, pp.185–187). Another advantage is the fact that a longer time-span can be studied in a way that requires less time than if a single age group is followed during an extended period of time. However, the procedure of combining 11, 13, 15 year old girls into one group may have resulted in a less precise model of the development of dieting as compared to if separate analyses had been performed for each age group. Wertheim, Koerner, and Paxton (2001) proposed that more age-specific models would be found if the data were analysed by developmental levels.

A further strength of Studies I, III, and IV lies in the sample size. The samples in the present studies were recruited by stratified random selection and consisted of between 244 and 1700 girls. These relatively large sample sizes and the recruitment procedure suggest limited threats to external validity. On the other hand, a limitation of the generalizability of the present findings is the relatively large number of non-participants. Conducting longitudinal studies is difficult with regard to dropout over time. The McKnight investigators (2003) reported that students available at 1, 2, and 3 years for follow-up were 80%, 66%, and 60% at the California site and 79%, 69%, and 60% at the Arizona site. Overall, the relatively large dropout rates of the present study suggest that the results must be interpreted with caution. It is understandable that girls as well as their parents hesitate to make a commitment to a 7-year longitudinal study. In order to shed some light on the possible influence of the attrition, 3-year participants (Main Cohort 1995-1997) and girls participating Year 1 only were compared with respect to eating attitudes. There were no significant differences with regard to eating attitudes in any of the age groups (Wertheim et al., 2001).
There are advantages of using structured questionnaires in that a large set of data is readily available for quantitative analyses. However, the sole reliance on self-report data raises some questions regarding the validity of the findings. However, the main study incorporates reports by parents and teachers regarding the participating girls. This will allow comparison between observers in future studies.

A potential shortcoming of Study III is the fact that the body silhouette scale (Maus et al., 1987) is not a widely used instrument, limiting the possibilities to make direct comparisons with other studies incorporating figure rating scales. Unlike most other figure rating scales consisting of 7–9 figures, the present scale includes only 5 body silhouettes. Swedish data collected with this scale (Edlund, 1994; 1996; 1998; Alvarsson, Lunner, & Sjödén, 2000) are consistent with those of other studies (Collins, 1991; Tiggemann & Wilson-Barrett, 1998; Truby & Paxton, 2002) indicating that girls prefer a smaller ideal body shape than their current shape. A study by Williamson and Delin (2001) used a figural rating scale with five pictures ranging in size from very thin to fat. The researchers found that 5–10-year old children accurately identified their body size and that girls expressed greater body dissatisfaction than boys as reflected by the difference between the child’s ideal and current body figure selections (Williamson & Delin, 2001). According to the study by Williamson and Delin (2001), there are no obvious differences between a scale of only 5 figures and scales of 7–9 figures regarding reported body dissatisfaction in children. Thus, the body silhouettes scale used in Study III appear to be adequate for assessment of body image among young children.

It was considered important to fit the instruments to the sample in Study IV in order to prepare reasonably good conditions for the subsequent structural equation analyses. However, there were obvious problems associated with this construction of new scales. At present, path analyses and covariance structure modeling (CSM) investigations are rare. Van den Berg and colleagues (2002b) reported problems with the variables considered for CSM analysis. The researchers performed confirmatory factor analyses to find better indicators of constructs crucial for their analyses. Items from the CFA were formed into parcels that were used as indicators of the latent variables. After additional modifications van den Berg et al. (2002) demonstrated a measurement model that
demonstrated adequate fit. Also, there are few studies utilizing structural equation modeling (SEM). Those that exist employ different measures or conducted CFA s to derive more suitable constructs. Second, in Study IV, Restrained Eating Year 1 and 3 partly included different items (see Appendix). Restrained Eating Year 1 barely reached an acceptable level of fit, but Restrained Eating Year 3 was of adequate fit. Perhaps the questions better suited the girls Year 3 as they grew older or maybe the items were perceived as more familiar at the third assessment. The present differences in the items included in some scales poses a threat to comparisons within the study. As a consequence, results related to Restrained Eating Year 1 should be interpreted with extra caution. For instance, Weight-Related Teasing did not remain as a risk factor for Restrained Eating Year 3 when Restrained Eating Year 1 was added to the model. This association may be related to the divergence of items in Restrained Eating Years 1 and 3. It is possible that if a few items differ between scales within a study, the effect on the final results may not be of vital importance. If there are differences in scales between studies it may cause problems of determining what scale that deviates the most.

Body Dissatisfaction appeared to be the least appropriate scale suggesting that some other measures would have been more valid for this sample. The inclusion of the scales that barely reached an acceptable level of fit (Restrained Eating Year 1, Body Dissatisfaction Year 2, and Dieting Year 6) in the present analyses was motivated by the assumption that potential risk factors with weaker constructs may underestimate significant relationships in the models. Hence, the risk of overestimating relationships does not seem probable.

Finally, since the study employs a longitudinal design, temporal precedence of variables may be surmised in the models in Studies III and IV.
Conclusions

I The proposed conceptual model for the development of disturbed eating in girls received partial support. With some exceptions, BMI predicted Weight-Related Teasing; and Weight-Related Teasing influenced Body Image which in turn, predicted Restrained Eating. The model was found to be applicable, cross-culturally, in samples from Australia and Sweden.

II The role of Weight-Related Teasing as a risk factor for Body Dissatisfaction and Disturbed Eating seemed to vary between age groups, and depending upon whether baseline data on Restrained Eating were included or not. Weight-Related Teasing should be considered a risk factor in the realm of socioculturally induced peer pressure on the individual.

III The prevalence of dieting behaviors increased mainly between the ages 9 and 13. Also, earlier restrained eating predict the emergence and/or maintenance of disturbed eating during adolescence. This illustrates that special attention should be payed to those girls who report increases of disturbed eating at repeated periodic assessments.
In summary, the findings demonstrate the importance of risk factor research and of the use of prospective designs to advance the understanding of the etiology of body dissatisfaction and disturbed eating in girls. Future research should systematically investigate parameters such as the influence of the initial level of the outcome variable and developmental level or age of included samples.
Implications and future directions

Implications for school health care

Definite increases in the proportion in dieting attempts occurred between the ages 9 and 13. A simple diagnostic question about current dieting, repeated over the school years, may identify girls who are at risk of developing a disordered eating pattern. This procedure will certainly result in the identification of false positives, but repeated assessment should reduce these. Considering the potential effect of weight-related teasing on body image and restrained eating, it is important to give special attention to this dimension of teasing when working with programs to prevent bullying and teasing in general. Preventive efforts and discouragement of child and adolescent dieting should be of top public health priority in order to delay or even stop the increase levels of body dissatisfaction, dieting, and obesity.

Suggestions for future research on risk factors

Future studies should emphasize the identification of specific risk and protective factors (Shisslak et al. 1998) that can be effectively modified and targeted in prevention programs (Phelps, Johnston & Augustyniak, 1999). Further, research should focus on distinguishing those precursors that are the strongest predictors for the development of dieting and eating disturbances and how these variables interact (Phelps et al., 1999). Also, since dieting behaviors are at least moderately stable by late adolescence (Callam & Waller, 1998; Kotler et al., 2001), it is of importance to examine predictors of dieting behaviors in childhood and early adolescence. The findings that Weight-Related Teasing and BMI predicted Restrained Eating for the Australian girls in Grade 7 (Study II), and that BMI and Weight-Related Teasing predicted Body Dissatisfaction in 9-year-old Swedish girls (Study III), suggest that it may be an oversimplification to search for a uniform model across all cultural environments and developmental levels. Future studies should examine teasing as well as active
encouragement to lose weight or other social pressures that might serve as mediating variables.

Given the available data suggesting a causal role for body image in producing eating disturbance (Thompson, H einberg, A ltabe, & T antleff-D unn, 1999), it is essential that treatment and prevention programs begin to address methods to reduce the negative social stigmata and its correlates (i.e., negative feedback in the form of teasing) that accompany obesity. Such activism appears to be needed in the USA, but also in other countries, such as Sweden and A ustralia.
Acknowledgement

I wish to express my deepest gratitude to everyone who have supported me in many ways during these educative and peculiar years. In particular, I want to thank:

**The Girls** who participated in the studies, their parents, teachers, and school-nurses. Without you, this research would never have been possible to accomplish.

Klara Halvarsson Edlund, for being my exceptionally talented and admirable friend and closest co-driver during this strange, difficult, enjoyable, and strengthening period of our lives. In no possible way, I would have done this alone. Never forget that you are extraordinary!

Per-Olow Sjöden, my supervisor. Your vast scientific knowledge will stick to my memory for many years. I would like to express my sincere gratitude for your perspicacious commitment with which you start working with yet another odd manuscript.

Kevin Thompson, my prominent supervisor in the States. Thanks for an outstanding year overseas. Your enthusiasm for Body Image research was truly innovative and inspiring! You definitely helped me to find my track within research. I am grateful for your initiative to the cross-cultural study. I’d like to thank Eleanor Wertheim, Susan Paxton, and Fiona McDonald for fruitful collaboration.

Marita McCabe, my and Klara’s support in Australia. Your kindness, skills, and deep engagement in research have encouraged me to pursue this work. I know that I promised to get finished a lot earlier, but...

Josefin Westerberg, for being supportive, questioning, and a very good friend during this overwhelming project. We worked particularly close during the third assessment. You were pregnant and I commuted from Stockholm, but we were a hell of a team. Thanks for being you.

Frida Anteson, for your engagement and positive spirit, and for bringing this ship to shore. You have a gift that I envy you. You know how to bring order in chaos, I, somehow, tend to create more chaos.

The IDA project advisors, Bo Larsson, Mehari Gebre-Medhin, Claes Norring, and Birgitta Edlund for planning and starting the project. Thanks for laying a good foundation.

IDA research assistants, for all the paperwork, interviews, and classroom assessments. You’ve done a very important work within the project.

Åsa Fichtel, for sharing many laughs, little and more serious matters throughout the years. During this last period you’ve been marvellous! At hard times, you helped me to take a deep breath, to reconsider my coping and to get into “it” again. I appreciate that a lot.

My fellow colleagues at the department for advice, encouragement, and nice chats. I especially would like to mention Lena-Marie Petersson for inspiration...
and for an extra push forward at this final stage. Also, Per Lindberg and Anne Söderlund for kindness and for proposing invaluable advice about the main thread of the thesis. Majbritt Sundelin, Martin Tauman, Kjell Wetterholm, and the administrative staff for valuable administrative support during my studies. I wish to express my gratitude to the Faculty of Social Sciences, Uppsala university, The Bank of Sweden Tercentenary Foundation, the Vardal Foundation, and the Wallenberg Foundation for the financial support during my work.

Catharina Tham, for the tremendously nice and professionally made cover design and for invaluable advice regarding the Garamond and Rotis. Finally, they became my friends.

Torkel Mattsson for showing me the world of gymnastics which, kind of, gave me the interest for body image. Thanks for being relaxed about weight and appearance within a very body-focused sport! Thanks to Salta Siljar and Lenny Kravitz for keeping me awake during endless nights of writing.

Pia Printz, my dearest friend for almost 25 years. I’m greatful for your friendship and support, for all the wonderful memories, and for hanging around despite times when I’m hopelessly lost in my own sphere of daily life. You are the best!

Inger, my mother-in-law. Thank you for always being so nice and helpful. Thank you for many delicious dinners and for invaluable support with the children.

My Mother, Margareta for always believing in me, for giving me freedom to discover the world in my own strange ways, and for all the support and love I have had in my life.

My Father, Sven-Eric for support, help, and encouragement. Thank you for showing me that stubborness pays off. I would never have survived within the academia without it.

Thomas, my extraordinary brilliant brother who has been a wonderful model for me, in life and within the Ph.D education.

Stefan, my other brother who always have been someone special, someone I have looked up to, especially within the field of sports. Your little sister would like to thank you both for all the love, encouragement, and understanding you have given to me.

Alba and Aston, my wonderful children. You bring joy and happiness into my life. At times when the dissertation gets such blown-up proportions, it’s a relief to laugh and make mischief with you. Thanks for giving me your endless love.

Jerk, my beloved. You are truly special. I thank you for unmistakable support, love, caring, and patience beyond understanding. Sometimes you have “misled” me to think that you didn’t mind to do all the duties and parenting. It was an invaluable coping strategy (I chose to believe you) and a sign of generosity of heroic proportions. I LOVE YOU.

Uppsala in April, 2003
Katariina
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A doctoral dissertation from the Faculty of Social Sciences, Uppsala University, is either a monograph or, as in this case, a summary of a number of papers. A few copies of the complete dissertation are kept at major Swedish research libraries, while the summary alone is distributed internationally through the series Comprehensive Summaries of Uppsala Dissertations from the Faculty of Social Sciences. (Prior to July 1985, the series was published under the title “Abstracts of Uppsala Dissertations from the Faculty of Social Sciences”.)