Biopsychosocial factors in body dissatisfaction and disordered eating attitudes amongst preadolescent girls: cross-sectional and longitudinal perspectives

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Abstract

Research into the antecedents of disordered eating attitudes and body dissatisfaction in preadolescent girls is lacking, despite the physical and psychological developmental risks these phenomena pose. In response, two separate studies of school-based samples of young girls were undertaken, investigating a range of biopsychosocial risk factors using longitudinal and cross-sectional methodologies.

Study 1 examined prospective predictors of disordered eating attitudes and body dissatisfaction. 138 girls completed measures of adiposity, perfectionism, anxiety, body dissatisfaction and disordered eating attitudes at 7 to 9 years old and two years later at 9 to 11 years old. Across-time predictors of body dissatisfaction and disordered eating attitudes, adjusted for other across- and within-time relationships, were assessed using regression analyses. Initial adiposity predicted subsequent body dissatisfaction with only borderline significance when adjusted for subsequent adiposity. Initial disordered eating attitudes and perfectionism predicted subsequent disordered eating attitudes. These data suggest novel prospective factors in the pathogenesis of disordered eating and body image for young girls.

Study 2 cross-sectionally examined the utility of an adult sociocultural model of body dissatisfaction and disordered eating attitudes in young girls for the first time. According to the model, internalising an unrealistically thin ideal body increases the risk of disordered eating via body dissatisfaction, dietary restraint, and depression. 127 girls aged 7-11 years old completed measures of adiposity, thin-ideal internalisation, body dissatisfaction, dieting, depression, and disordered eating attitudes. Thin-ideal internalisation predicted disordered eating attitudes indirectly via body dissatisfaction, dietary restraint, and depression; it also predicted disordered eating attitudes directly (a novel parameter). Exploratory path analyses showed that this revised sociocultural model fit well with the data. These data indicate a sociocultural framework of disordered eating and body dissatisfaction in adults is useful, with minor modifications, in understanding related attitudes in young girls.

Together, these studies provide a detailed picture of factors involved in the development and maintenance of body dissatisfaction and disordered eating attitudes during middle childhood. They suggest the importance of early, targeted interventions for this age group as a means to reduce girls' current and subsequent concerns about eating, shape and weight.

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Terminology

The key terms used in this thesis have been defined and operationalised in a variety of different ways across the literature. The definitions given below, therefore, are intended to clarify the way in which the terms are applied for the purposes of this research.

Subclinical / partial syndrome eating disorder

The descriptive label applied to a cluster of symptoms that meets some of the criteria for an eating disorder[1].

Eating disorder not otherwise specified

The diagnostic label applied to subclinical / partial syndrome eating disorder symptoms accompanied by significant functional impairment[1].

Eating pathology / disordered eating / disordered eating attitudes

Abnormal eating behaviour; "generic phrase that captures a broader array of disordered eating [that does] not map directly onto one of the DSM eating disorders" (Stice, et al., 2010, p. 519).

Body image evaluation

"Positive to negative appraisals of and beliefs about one's appearance" (Cash, 2004, p. 42).

Body image investment

The "cognitive-behavioural importance that [individuals] place upon their appearance" (Cash, 2004, p. 42).

Body image schemata

Cognitive generalisations about one's physical self, shape and appearance derived from past experience, which organise the processing of self-related information[2].

[1] Adapted from Stice, Ng and Shaw (2010)
[2] Adapted from Cash (2004)

Risk factor

A factor temporally preceding, and significantly associated with, the outcome variable (Jacobi, Hayward, De Zwaan, Kraemer, & Agras, 2004).

Proximal factor

Precipitating and maintaining influences on body image and eating experiences[2].

Distal factor

Historical, downstream influences on the formation of self-schemata relating to body image and eating attitudes[2].

Box and whisker plot terminology

Lower hinge	25th percentile
Upper hinge	75th percentile
Interquartile range (IQR)	upper minus lower hinge
Step	1.5 * IQR
Lower inner fence	lower hinge minus 1 step
Upper inner fence	upper hinge plus 1 step

Declaration

The material in this thesis has not previously been accepted in substance for any degree, nor is it being concurrently submitted in candidature for any other degree.

This thesis is the result of my own independent work except where otherwise indicated. Material from other sources has been acknowledged and full references are given.

I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Statement of copyright

Publications

Study 2 has been accepted for publication in January 2013. The corresponding reference is:

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Dedication

This thesis is dedicated to my children, Rebecca, Charlotte and James Evans.

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Chapter 1: General Literature Review

1.1 Introduction

Disordered eating, negative body image and obesity in youth are issues of public health concern. They pose risks to the physical and psychosocial health of children and adolescents (e.g., Griffiths, Parsons, & Hill, 2010; Lask & Bryant-Waugh, 2000; Reilly, et al., 2003; Stice & Bearman, 2001) and carry large concomitant financial and societal costs (Lobstein, Baur, & Uauy, 2004; Simon, Schmidt, & Pilling, 2005). In comparison to boys, girls are significantly more vulnerable to disordered eating and negative body image, and appear to experience overweight and obesity as more psychologically deleterious in childhood (Erickson, Robinson, Haydel, & Killen, 2000; Smolak, 2004a). Despite this, the development of young girls' relationships with eating, weight and body image remains under-researched and incompletely understood. Most previous research in this area has involved adults and adolescents, since the physical and psychosexual changes of puberty have historically been considered primary catalysts to such problems (e.g. Bruch, 1973; Steiner-Adair, 1986).

A growing body of evidence, however, indicates that the building blocks of disordered eating and body image in girls are in place during middle childhood, well before the onset of puberty (Dohnt & Tiggemann, 2006; Sands & Wardle, 2003; Schur, Sanders, & Steiner, 2000). Obesity, weight concerns, body dissatisfaction and dieting, for instance, show a steeply increased prevalence between 6 and 11 years of age (Dinsdale, Ridler, & Rutter, 2012; Shunk & Birch, 2004; Smolak, 2004b; Whitaker, Pepe, Wright, Seidel, & Dietz, 1998). We do not yet understand many of the developmental causes and consequences of these findings: longitudinal and in-depth cross sectional studies of girls' attitudes to eating, weight and body image in childhood are almost entirely lacking. The research contained in this thesis is intended to begin to address these omissions.

The aim of the research presented here was to investigate the sociocultural, psychological and physical factors involved in the development of girls' disordered eating attitudes and body dissatisfaction during middle childhood. This involved two developmental studies with two groups of girls: a sample of 7- to 9-year-olds whose body dissatisfaction and disordered eating attitudes were examined longitudinally over two years, with measurements taken two years apart; and a separate sample of 7- to 11-year-olds whose body dissatisfaction and disordered eating attitudes were investigated cross-sectionally at a single point in time.

The longitudinal study focussed upon the role of distal risk factors in the emergence of disordered eating attitudes and body dissatisfaction, including adiposity, anxiety and perfectionism. In contrast, the cross-sectional study examined the utility of a sociocultural framework of proximal factors, derived from research with adults and adolescents, in explaining young girls' expression of disordered eating attitudes and body dissatisfaction.

1.2 A Developmental Approach to Disordered Eating

Despite recent gains, there remains resistance to the idea that research into the psychopathology of eating requires a truly developmental perspective (Wertheim, Paxton, & Blaney, 2009). Whilst theories of eating disorder development historically emphasise the impact of puberty, they omit the considerations of probabilistic process, protective factors and behavioural precursors which characterise the developmental approach. Moreover, such theorising has traditionally been based upon clinically-presenting, small groups of severely ill adult females and consequent retrospective developmental data. These referent samples have been typically narrow in age and social class, and reflect selection biases of both treatment-seeking and clinical referral. As such there is growing acceptance that their eating disordered experiences do not represent the full range of severity and diversity extant in the wider population and cannot illuminate the multiple developmental pathways to disorder (Smolak, Levine, & Striegel-Moore, 1996). To a lesser extent, body image research has also evolved from a 'single-problem' perspective born of research with clinical, eating disordered samples. For years, research examined supposed sensory and perceptual deficits in anorexia nervosa to explain its concomitant body image disturbance: evidence now indicates that this disturbance is attitudinal, not perceptual, in nature (Cash & Deagle, 1997). As such, the full, rich range of body image experiences of individuals and groups outside this narrow focus have been comparatively neglected (Pruzinsky & Cash, 2004). An understanding of the developmental psychopathology of disordered eating and body dissatisfaction therefore requires:

> "a focus upon the interplay between normality and pathology [...] and an emphasis on the utilization of a developmental framework for comprehending adaptation and maladaptation across the life course" (Cicchetti, 2004; p. 1)

Within this perspective, typical and atypical development of behaviours and thoughts around eating, shape and weight are characterised as dimensional and reciprocal rather than as if they represented dichotomies of process and end-point. They are framed within the social, cognitive and emotional development of the individual, (Sroufe, 1997) considering the

"numerous familial, personality, biological and sociocultural factors" (Rosen, 1996, p. 3) that predispose certain responses (adaptive, maladaptive or both) to events and developmental challenges. Finally, and underlying the assumption of reciprocity between typical and atypical development, are considerations of equifinality and multifinality, i.e., of "origins and processes leading to common outcomes, as well as [...] processes contributing to divergence in outcomes given common origins" (Cicchetti & Rogosch, 1996, p. 598). In this way, multiple pathways exist to each point, and from each point, in the process of development (Sroufe, 1997).

With these transferable developmental principles in mind, why might one specifically choose to examine eating disorders and body dissatisfaction from a developmental perspective? According to Smolak, Levine & Striegel-Moore (1996) three key features of eating disorders suggest that they require a developmental perspective. First, eating disorders are typically diagnosed at predictable ages and developmental stages: anorexia nervosa at around 14 years, bulimia nervosa at 18 years (Fairburn & Harrison, 2003). This suggests that the preceding developmental process, and its interaction with developmental challenges that arise at these points in adolescence, may be of aetiological significance. Second, eating disordered symptoms and behaviours, including body dissatisfaction, are prevalent in non-clinical populations, suggesting they are at least partially grounded in normal functioning (Williamson, Gleaves, & Stewart, 2005). Third, female gender is a risk factor for both the symptoms and the disorders themselves. Since there is no biological reason for more women to develop disordered eating and body dissatisfaction than men, it would seem that the gendered experience of development carries greater risks of these phenomena for females (Calogero, Davis, & Thompson, 2005). These particular developmental features of disordered eating will be explored in greater depth in subsection 1.5, in which the population and methods suitable to the research question are justified.

There are several methodological implications of these principles for understanding the pathogenesis of eating disorders. To examine potential reciprocity between typical and atypical development, researchers should capture naturally occurring heterogeneity in symptom frequency, severity and ontogeny in community-based, young populations. This work should span developmental stages to enable structural and conceptual comparisons at different points of adaptation and maladaptation. To examine disordered eating development as it proceeds, there is a need for prospective research to follow the development of eating attitudes and behaviours over time, alongside their putative aetiological factors. Prospective studies should begin as far as possible 'downstream' in the developmental process, ideally

focusing upon phenomena before, and during, their emergence. To identify proximal factors in disordered eating and body dissatisfaction development, there is also a need for fine-grained cross-sectional research which examines inter-individual variation in risk factors and their interactions. Importantly, the same factors may have influences both proximally and distally, and their mechanisms may differ depending on the timescale and context in which they act. For both prospective and longitudinal research, typically developing young children therefore comprise a likely study population, an approach which remains vastly underused (Smolak, 1996). In section 1.3, however, I explore the reasons why the use of these populations and indeed the developmental perspective on disordered eating has met with resistance.

1.3 The Categorical Model of Disordered Eating

Two enduring assumptions underpin traditional psychiatric conceptualisations of eating disorders: first, that they are rare, dangerous and rather hard to treat, and second, that they present as acute 'adolescent problems'. Superficially at least, the epidemiological data relating to full-syndrome eating disorders receiving treatment in secondary care support these. Clinically-disordered eating is indeed rarely diagnosed and its prognosis for recovery and survival remains bleak (Peebles, Hardy, Wilson, & Lock, 2010). From this, it has been widely asserted that disordered eating represents a qualitatively distinct disease state that is fundamentally discontinuous with normality. Second, diagnosis frequently coincides with the adolescent period, which has led some theorists to place the presumptive origins of the pathology in puberty itself (Sands, Tricker, Sherman, Armatas, & Maschette, 1997). Consequently, it has been asserted that the key antecedents and constructs of disordered eating can only be meaningfully researched once puberty has begun, or is imminent (Crisp, 1980). From these two assertions, one might conclude that any non-clinical population, including ones of children, cannot contribute to our understanding of these phenomena. One might also conclude that the study of these phenomena in childhood populations commits a fundamental deductive fallacy since they cannot arise *unless they do so for different reasons and with different causes* without the onset of puberty.

1.3.1 Fundamental discontinuities? The interplay between normality and pathology.

The conventions by which eating disorders are diagnosed are both represented and reinforced by a prevailing neo-Kraepelinian approach, which has its roots in a somatic (medical) model of psychopathology. This approach is operationalised in the form of the current diagnostic criteria and categories (DSM-IV 307, ICD-10 F50). The various diagnostic categories imply clear boundaries between psychopathological and non-psychopathological states on the basis of various cut-off points for the frequency and duration of specific behaviours, and for the extent of weight loss proportionate to height and age. The criteria also highlight the medical settings in which most eating disorder research has been conducted, emphasising physical features of the disorder (such as amenorrhea of a prescribed duration) rather than psychosocial symptoms (Grave, Calugi, & Marchesini, 2008). As is the case with the majority of current psychiatric diagnostic criteria, and for reasons of both pragmatism and politics, they are based upon expert clinical consensus as opposed to empirical findings.

Also in keeping with the categorical model of psychopathology, individuals with eating disorders have been represented in the literature in ambivalent terms of 'otherness'. Gordon (2000) suggests that eating disorders simultaneously elicit repugnance and awe because they represent clear deviations from normality but also draw upon behaviours that are highly culturally valued. This tendency is most pronounced in the case of anorexia nervosa, whose shocking aesthetic underscores its divergence from normal functioning, but whose doctrine of self-denial and body consciousness very much reflects contemporary Western concerns. Here, the celebrated clinician Hilde Bruch describes anorexia nervosa in almost aspirational terms:

> "A disease that selectively befalls the young, rich and beautiful [...] is affecting the daughters of well-to-do, educated and successful families [...]" (Bruch, 1973, p. 11)
>
> "[Bulimics] make an exhibitionistic display of their lack of control ... in contrast to the discipline of the true anorexics. [...] Though relatively uninvolved, they expect to share in the prestige of anorexia nervosa" (Bruch, 1985, p. 12)

As exemplified above, the separate diagnostic categories have also, traditionally, been conceptualised in terms of their divergence from one-another for the sake of differential diagnosis. This implies clear boundaries between the diagnostic labels on the assumption that the categories comprise "valid, discrete entities, demarcated by firm boundaries between one another and normality and separated by 'zones of rarity.'" (Wilfley, Bishop, Wilson, &

Agras, 2007, p. 2). In summary, psychiatric conventions of categorising and constructing disordered eating appear to actively constrain against considering the reciprocal relationship between normality and pathology (Cicchetti, 2004) that is the cornerstone of the developmental perspective. The majority of previous research into disordered eating has taken place within and around these conceptual constraints, but only recently has their fundamental validity been examined.

1.3.2 Limitations of the categorical model.

Several recent critical reviews preceding the publication of the DSM-V have provided opportunities to examine the fit of the categorical model to research data on the prevalence, stability and temporal progression of eating disorders (e.g. Devlin, Goldfein, & Dobrow, 2003; Fairburn, et al., 2007; Grave, et al., 2008; Keel & Striegel-Moore, 2009; Wilfley, et al., 2007; Williamson, et al., 2005). A number of central criticisms arose which call into question the value of the current approach. For one, the current criteria exhibit low discriminant validity: they do not reliably distinguish patients with one eating disorder from patients with another, due to overlapping criteria (Grilo, Devlin, Cachelin, & Yanovski, 1997). Moreover, the vast majority of diagnoses fall under eating disorders not otherwise specified (EDNOS), the ostensibly 'residual' category, which further indicates the inadequacy of the 'main' categories to the heterogeneity extant within eating disordered populations (Fairburn & Bohn, 2005; Keel & Striegel-Moore, 2009; Peebles, et al., 2010). Given these conclusions, it is unsurprising that substantial longitudinal crossover has also been reported, in which individuals transition between two or more categories during the course of their illness (Peterson, et al., 2011; Wilfley, et al., 2007). Finally, a number of diagnostically defining symptoms have been shown to lack clinical utility or prognostic relevance, and may be actively unhelpful in identifying the nature of an individual's eating disturbance: this applies specifically to the requirement for amenorrhea and the binge-purging subtypes within the anorexia nervosa category (Grave, et al., 2008).

From a developmental perspective, a particularly pressing concern is the fact that the stipulated diagnostic cut-offs – the points of dichotomy at which an individual's eating is judged to deviate, or not deviate, from normality – have no empirical basis (Wilfley, et al., 2007). For example, Mond et al. (2006) found that women experiencing one binge-purge cycle per week for three months did not differ from women experiencing two per week in terms of psychological distress and prognosis, although only the latter group technically met the criteria for full BN. Similar issues of non-sensitivity arise with the weight-loss cut off in

AN (Andersen, Bowers, & Watson, 2001) and the frequency of binging for binge eating disorder (Striegel-Moore, Dohm, et al., 2000). Overall, these findings strongly suggest that the very criteria that purport to distinguish normality from pathology may be systematically unfit to do so. The diagnostic criteria for anorexia nervosa and bulimia nervosa set the bar for impairment at such a high level (of severity and frequency) that EDNOS cases proliferate and many individuals experiencing significant and heterogeneous sub-clinical impairments in these areas may be left unclassified and uncounted (Peebles, et al., 2010). To evaluate the degree to which these consequences may apply, and the extent to which the lines between normality and pathology blur, it is worth examining the prevalence of disordered eating symptoms in populations not currently judged, under the current diagnostic system, to be of clinical relevance.

1.4 Disordered Eating in Non-clinical Populations

Sub-clinical or partial syndrome disordered eating has been defined as "a cluster of symptoms that meets some of the criteria for an eating disorder, but not enough symptoms are present for full diagnosis" (Stice, et al., 2010, p. 519). Community epidemiological data point to the presence of sub-clinical and partial syndrome disordered eating at more than double the prevalence of full clinical syndromes (Shisslak, Crago, & Estes, 1995). Such syndromes 'fly under the diagnostic radar' despite considerable concomitant functional and psychological impairment (Patton, Selzer, Coffey, Carlin, & Wolfe, 1999; Peebles, et al., 2010). Young females, the population at highest risk of clinically disordered eating, show a commensurately high incidence and prevalence of its subclinical variants, amongst early adolescents (French, Story, Downes, Resnick, & Blum, 1995; Patton, et al., 1999) and college students (Heatherton, Mahamedi, Striepe, Field, & Keel, 1997). Comparisons of individuals with clinical versus sub-clinical variants of disordered eating indicate that they share similar risk factors (Stein, et al., 1997), psychological (Dancyger & Garfinkel, 1995) and physiological correlates (Peebles, et al., 2010).

Taken together, these findings indicate that disordered eating phenomena occur amongst non-clinical populations with lesser severity but considerably greater prevalence. Moreover, the phenomena share key features and covariates in both clinical and non-clinical contexts, indicating their ontogenetic similarity. Such data strongly undermine the assertion that clinical eating disorders represent firm categorical deviations from normality, and instead point towards continuous distributions of the various disordered eating phenomena. Such a

model allows for symptom overlap between the different disorders, and between pathological and non-pathological states. In other words, non-clinical, sub-clinical and clinical populations are held to differ on eating disorder behaviours and cognitive patterns (dietary restraint, compensatory behaviours etc.) in primarily quantitative terms (Bulik, Sullivan, & Kendler, 2000; Stice & Agras, 1998). As such, disordered eating of clinical significance might be helpfully understood as the far end of various continua of specific behavioural and cognitive domains.

My conclusions are in keeping with multiple recent reviews that support an at-least partially dimensional conceptualisation of disordered eating (Gleaves, Brown, & Warren, 2004; Wade, Bergin, Martin, Gillespie, & Fairburn, 2006; Walsh & Sysko, 2009; Wilfley, et al., 2007; Williamson, et al., 2005). Support for this perspective also comes from cognitive behavioural conceptualisations of eating disorder development (Fairburn, Shafran, & Cooper, 1999) and from multivariate analyses of eating disorder symptom data across diagnostic boundaries (Lowe, et al., 1996; Tylka & Subich, 1999). The significance of the conclusions of these reviews cannot be over-stated, but nor can the challenge they pose. This challenge exists, mainly, because of:

> "the reification of the [diagnostic] criteria by both clinicians and researchers [which] hinder[s] investigation of the etiology of eating disorders, because researchers tend to study what is defined. Thus valuable information is not collected" (Wilfley, et al., 2007, p. 129)

A consequence of this 'reification' is the conceptual ambiguity in which non or sub-clinical eating disorder phenomena are left. They have typically been studied as potential prodromal syndromes for subsequent clinically disordered eating (e.g. Stice, et al., 2010), yet only a small minority will ever evolve to that extent. They have less frequently been studied for their own sakes, in order to characterise their interrelationships, consequences and antecedents. In this respect, the field of body image research has made considerably greater strides, and the integration of phenomena with their wider sociocultural context has been notably more successful (Gordon, 2000). This is almost certainly because body image has, in recent years, been explicitly reconceptualised as an inclusive, multidimensional and primarily non-pathological construct with some, specific, applications to clinical disorders: as such it has not become fully conflated with the medical model of psychopathology (Pruzinsky & Cash, 2004). In contrast, as it stands, the experiences of the majority of the individuals who report non- or sub-clinical eating disorder phenomena (i.e. the majority on the continuum)

have received inadequate research attention, because their experiences are not widely recognised as a) important or b) continuous with the clinical extremes.

I have not intended to argue, of course, that categorical and dimensional conceptualisations of eating disorders are either dichotomous or mutually exclusive. Wilfley et al (2007) point out that the two can and should be integrated to reflect current epigenetic understandings of disease, such as the threshold model (e.g. Kendler, et al., 1991). I emphasise the dimensional perspective since it is helpful from a developmental perspective – *and not inconsistent with epidemiological data* – to consider the full spectrum of behaviours and cognitions, regardless of strictly clinical significance. Moreover, distributions of phenomena must, of course, not be assumed to be normal. However, to conclude, evidence does support the premise that eating disorder characteristics "merge both into one another and into normality" (Wilfley, et al., 2007, p. 2).

1.5 Applying the Developmental Perspective to Disordered Eating

Thus far, I have described the developmental perspective on eating psychopathology, explored the reasons why the categorical model does not fit well with this perspective, and suggested that continua must form part of an evidentially-based alternative approach. In this section, I examine in more detail the implications and applications of the developmental perspective in constructing an understanding of disordered eating. In doing so, I frame the research agenda for the remainder of the thesis. I contend that research with non-clinical populations of children provides a valuable opportunity to clarifying the developmental underpinnings of disordered eating phenomena, allowing a consideration of multiple pathways through the developmental process.

1.5.1 Why choose a non-clinical population?

There are several key reasons why non-clinical experiences of eating disorder phenomena are important to a developmental understanding of disordered eating. The first reason is that these populations exhibit phenomena across the spectrum of severity, enabling scrutiny of the full range of paths to and through eating behaviour and cognitions. Second, and relatedly, general population groups are socio-demographically diverse in comparison with clinical populations, which are unrepresentatively homogeneous in terms of socioeconomic status, race, age and symptomology (a problem whose research effects are often exacerbated by the selective recruitment of participants with anorexia nervosa and

bulimia nervosa, but not EDNOS). As such, one observes novel relationships between eating disorder phenomena and socio-demographic variables in non-clinical groups. The comments of Bruch (1973, 1985) – as quoted in section 1.3.1 – illustrate the potential biases inherent in relying on clinical impression. She, and her contemporaries, asserted that eating disorders disproportionately affected girls of high socioeconomic status on the basis of highly selective evidence (e.g. Crisp, Palmer, & Kalucy, 1976; Kendell, Halla, Hailey, & Babigian, 1973) to the extent that the relationship was almost declared a foregone conclusion by the mid-1980s (Szmukler, 1985). Only after a series of large non-clinical general population studies found a null, or inverse relationship (e.g. Story, French, Resnick, & Blum, 1995), did a methodological review warning of the "powerful influence of clinical impression and sources of bias in referral procedures" (Gard & Freeman, 1996, p. 1) debunk the myth. To summarise, working with general population samples 'in situ' removes many of the sources of bias inherent in recruiting clinical populations. From a developmental perspective, this means that the contributions of familial, personality, biological and sociocultural factors to eating disorder phenomena might be more readily elucidated.

Third, cross-sectional research points to potential ways in which the nature and structure of non-clinical eating disorder phenomena might qualitatively differ from clinical experiences in informative ways, i.e. "the nosology for eating disorders [...] may not capture the natural clustering of eating-related pathology as it occurs in general population samples" (Bulik, et al., 2000, p. 886). Drawing such contrasts enables a consideration of how and why phenomena are organised in particular ways, with reference to their underlying patterns of adaptation and maladaptation. It may even enable the integration of categorical and dimensional components corresponding to differences of type found alongside, or embedded within, differences of quantity.

Fourth, the heterogeneity of eating disorder phenomena as experienced by non-clinical populations is of considerable developmental interest in itself, even when its relationship to clinically disordered eating is set aside. Its cross-sectional investigation may potentially shed light on the origins of a broad range of common non- or sub-clinical issues around eating regulation and weight, from overweight and weight cycling to chronic dieting. Such diverse issues, which have distinct points of divergence, nevertheless share some of the same cognitive underpinnings and risk factors (Haines & Neumark-Sztainer, 2006). Individual differences in the way these common underpinnings become manifest are influenced by a range of contextual factors amongst which adaptation to developmental stage

may be key (Rosen, 1996). This premise in particular, lends itself to longitudinal examination.

To summarise, an early prospective consideration of the full range of disordered eating phenomena can inform our understanding of the interaction between development, various risk, protective and contextual factors, and their functional implications. Since many people walk the roads towards eating disturbance to some extent (via extreme dieting, body dissatisfaction or loss of control eating, for example) but few reach the point of clinical diagnosis, a developmental approach allows considerations of equifinality and multifinality. A strictly categorical approach to eating disorders is singularly unhelpful in elucidating developmental processes, beginning - as it does - at the end. Similarly, by definition, clinical populations can tell us very little about variables that contribute to individual or high-risk group resilience to pathological outcomes (Austin, 2000). A non-clinical prospective approach, therefore, also allows examination of developmental processes, such as family functioning, without the potentially confounding effect of an 'extreme' outcome already in place. High levels of familial expressed emotion, for instance, have been hypothesised to contribute to the development of disordered eating on the basis of mealtime observations with AN patients and their families (Minuchin, Rosman, & Baker, 1978). Studies of more diverse populations, however, suggest that high expressed emotion may be incidental to the stress of having a severely ill child in the family (Wearden, Tarrier, Barrowclough, Zastowny, & Rahill, 2000). To maximise the potential developmental insights gained from non-clinical research into disordered eating, I will next consider the age and developmental stage at which it is appropriate to begin investigations.

1.5.2 Why choose a population of children?

I have previously established that a developmental understanding of disordered eating phenomena, and their putative contributory factors, requires that we assess them at their age of origin, and follow them over the developmental course. A growing body of evidence indicates that in the case of disordered eating and body image concerns this examination should start not in adolescence but in childhood (Wertheim, et al., 2009). This approach is supported by four main strands of research.

First, research with early adolescents indicates that the components of disordered eating are already in place. Dieting, loss of control eating, compensatory behaviours (including purging), weight concerns and body dissatisfaction are reported in mid-adolescent populations with the same prevalence as in adult samples (e.g., Field, Camarago, Taylor,

Berkey, & Colditz, 1999; French, Story, et al., 1995; Levine & Smolak, 2004; Stice & Agras, 1998). In prospective studies over the normal adolescence, initial levels of disordered eating attitudes are the strongest predictors of subsequent disordered eating attitudes, indicating that the developmental process itself might precede adolescence (Calam & Waller, 1998; Leon, Fulkerson, Perry, & Early-Zald, 1995; Wichstrøm, 2000). Taken together, these findings suggest that research to track the developmental trajectory of disordered eating is best begun in preadolescence (Martin, et al., 2000).

Second, clinically significant problems with eating, weight and shape are increasingly detected during childhood itself (Anderson, Lavender, Milnes, & Simmons, 2009). Some of these problems fall into the category of eating disorders, others are feeding disorders and many others are not positively classifiable within the current DSM-IV-TR system (Nicholls, Chater, & Lask, 2000). Although the overall prevalence of eating disorder diagnoses remains stable, eating disorders diagnosed in early childhood are becoming more frequent (Nicholls, Lynn, & Viner, 2011). This latter finding may or may not indicate that such disorders are increasing in prevalence – processes of detection and referral may simply have become more sensitive – but it underscores the importance of acquiring a baseline understanding of how typical and atypical attitudes to eating and the body manifest themselves in middle childhood. Moreover, childhood itself has become an increasingly risky time for obesity, in which secular trends indicate increases from the early 1990s up until a period of stability since 2004 (Dinsdale, et al., 2012). Understanding the childhood eating behaviours and cognitions accompanying obesity *and* the avoidance of obesity, in terms of concomitant risk factors and consequences, may inform the search for prevention strategies.

Third, complex messages about eating, weight and shape are integral parts of the cultural milieu of contemporary childhood. As culture-bound phenomena, idealising images, stigmatising schemata and contradictory attitudes towards food and the body are transmitted by parents, peers and media alike (Gordon, 2000). These transmissions occur amid an intensely obesogenic environment wherein maintaining a healthy weight conflicts directly with the availability of abundant, cheap food and an increasingly sedentary childhood lifestyle (Ebbeling, Pawlak, & Ludwig, 2002). Research indicates that children begin to be aware of these societal themes, and their inherent contradictions, from around three years of age (Dittmar, Halliwell, & Ive, 2006; Hayes & Tantleff-Dunn, 2010; Tremblay, Lovsin, Zecevic, & Larivière, 2011). Consequently, it is important to investigate and understand the developmental impact of these cultural messages on children's disordered eating attitudes and body dissatisfaction.

Finally, middle childhood (the years between 6 and 12) appears to be the stage at which multiple behavioural, cognitive and attitudinal components of a child's relationship with eating, weight and shape develop (Smolak, 2004b). This age range, also referred to as latency (Erikson, 1995) or school-age, is theoretically characterised by increasing levels of cognitive and emotional competence, self-awareness and social comparison. By 7 years old, girls can reliably report a range of their own eating behaviours, including eating in the absence of hunger as a consequence of emotional or external stimuli (Van Strien & Oosterveld, 2007). By 8 years of age, girls are knowledgeable about the meaning and methods of weight loss strategies, including dietary restraint, increased exercise and healthy food choices (Schur, et al., 2000). By the age of 8, too, many girls can accurately perceive and symbolically represent the size and shape of their physical body (Truby & Paxton, 2002). By 9 years of age, girls report dietary restraint and weight concerns in proportion to their measured BMI (Shunk & Birch, 2004). During these years, to a greater extent than over any preceding period of childhood, considerable proportions of children gain weight to the extent that they become either overweight or obese (Whitaker, et al., 1998). It is clear that many of the processes to which theorists have assigned aetiological significance in disordered eating and body dissatisfaction are underway long before adolescence.

To conclude, a compelling body of evidence points towards childhood as the origin of multiple developmental pathways through individual relationships with eating, weight and shape. Consequently, the population of research interest for inclusion in the studies was purposefully selected as the youngest within which body image and eating attitudes can be reliably measured with existing standardised instruments. To try and ensure a largely pre-menarcheal population, only girls below the age of 12 years were recruited. There remain valid concerns about using measures of disordered eating and body dissatisfaction with young children, which will be addressed in subsections 1.6 and 1.7. To balance this, there are valid concerns – highlighted by multiple previous authors – about *not* using them with populations which are sufficiently young to meet the developmental aims of these studies. Consequently, in the studies reported in this thesis I examined body image and eating attitudes in middle childhood alongside physical, psychological and sociocultural factors theoretically involved in their developmental course.

1.5.3 Why choose girls?

The studies included in this thesis focus purely upon girls. In doing so, they are in keeping with the vast majority of pre-existing research in the area. Such an approach has been adopted for multiple reasons.

First, from early childhood, girls report different body-related cognitions, emotions and perceptions to those reported by boys. About 40% of girls aged 6 to 11 years report wanting to be thinner, compared with only 25% of boys (for a review, see Ricciardelli & McCabe, 2001). From the age of 6 years, girls express greater evaluative dissatisfaction with their body shape and size than boys (Smolak, 2004a). From the age of 8, a greater proportion of girls than boys express concerns about being overweight and would greatly prefer to weigh less (Field, et al., 2001; Robinson, Chang, Haydel, & Killen, 2001). Concomitantly, far greater proportions of young boys than young girls express a wish for a larger body size (Ricciardelli & McCabe, 2001). There is evidence that girls are able to accurately identify their own body size at an earlier age than boys (7 vs 9 years; Saxton, Hill, Chadwick, & Wardle, 2009; Truby & Paxton, 2002) although other studies have found a gender difference but not an age gradient (Williamson & Delin, 2001).

Second, there is some evidence that girls report higher levels of disordered eating attitudes and behaviours than boys from the age of 8 or 9 years (Holt & Ricciardelli, 2002; Thurfjell, et al., 2004). This finding appears consistent whether self-report questionnaire or interview methods are used. Clinical eating disorders, too, are three to four times more prevalent amongst females than males of all ages, meaning that girls are at greater risk of subsequent psychopathology related to body image and eating from the age at which these disorders are first diagnosed (Hudson, Hiripi, Pope Jr, & Kessler, 2007). This disparity is seen at its most extreme with anorexia nervosa, in which the ratio of females to males approaches 10:1 (Hoek, 1991). Sub-clinical symptomology, too, is more prevalent amongst young females than males (Hoek & van Hoeken, 2003), as indeed are clinical disorders of body image (e.g., Phillips, Menard, Fay, & Weisberg, 2005). Another reason for focusing upon young girls, therefore, is the fact that they represent the population at highest risk of the negative consequences of body dissatisfaction and disordered eating attitudes, each of which represents a largely gendered pathology.

Third, from an early age girls receive powerful sociocultural messages from family, peers and media promoting an unhealthily thin, unrealistically proportioned ideal female body. Such messages "portray women as though their bodies were capable of representing them" (Fredrickson & Roberts, 1997, p. 177) and are strongly gender-specific: boys receive

far fewer of these messages, and when they do different, less unattainable physical attributes are emphasised. Moreover, boys' achievement of the ideal body is less bound-up with implications about their worth and self-discipline. As such, boys and girls experience society's construction of their body – both what it is, and what it should be – in markedly disparate ways, and girls appear to do so more negatively (Clark & Tiggemann, 2006; Thompson & Stice, 2001). This provides a compelling partial explanation for the gender disparities in body satisfaction and disordered eating mentioned previously. It also provides a strong justification for research focusing on purely on girls.

Overrepresentation of females in pathologies of body image and eating may arise because girls are differentially "acculturated to internalise an observer's perspective as a primary view of their physical selves" (Fredrickson & Roberts, 1997, p. 173). In keeping with this explanation, known as objectification theory, preadolescent girls report higher levels of awareness of the thin-ideal body than do boys (Smolak, Levine, & Thompson, 2001). Girls as young as 6 years old recognise, repeat and internalise messages that their body is a project upon which they must work, and by which they will be judged (Clark & Tiggemann, 2006; Murnen, Smolak, Mills, & Good, 2003; Wolf, 2002). A greater proportion of girls than boys from the age of 6 years report having internalised a thin-ideal body: i.e., having adopted it as a personally meaningful goal (Cusumano & Thompson, 2001; Murnen, et al., 2003). The ideal body identified by young girls also consistently corresponds to a significantly lower BMI centile to that identified by boys (Gardner, Friedman, & Jackson, 1999; Truby & Paxton, 2008; Williamson & Delin, 2001). In preadolescent girls, perceived pressure to be thin is associated with levels of body dissatisfaction, and is reported at levels consistent with those of female adolescents (Blowers, Loxton, Grady-Flesser, Occhipinti, & Dawe, 2003).

To summarise, girls are taught early on that the female body should correspond to an exacting and often contradictory set of standards. They learn that their body in its natural state is a project to be worked on and which, with enough money and self-discipline, could be perfect – if they only tried hard enough (Brumberg, 1998; Wolf, 2002). Pre-adolescent girls, unlike pre-adolescent boys, are conditioned to treat themselves as objects to be looked at and evaluated: they quickly learn and internalise the social value of reflexive, critical self-objectification. The impact of the socioculturally-transmitted thin-ideal body on girls' development is explored in greater depth in Chapter 6, subsection 6.3.

Overall, evidence suggests that personal and sociocultural constructions of girls' bodies differ from those of young boys. Girls are less satisfied with their body size and weight. They are more aware of the socially-approved unrealistically thin ideal body, and

feel more pressure to conform to it. Accordingly, they internalise the ideal and strive towards weight loss to a greater extent than boys. As such, the study of young girls' body image is of importance to researchers and clinicians alike – it represents a qualitatively distinct phenomenon, and a psychological pathogen of potential seriousness.

1.6 Disordered Eating Attitudes in Children

Having discussed how the developmental perspective might be applied to a developmental understanding of disordered eating, one must now clarify how disordered eating attitudes are operationalised in populations of children. The term disordered eating attitudes reflects a "broad array of disordered eating that do[es] not map directly onto one of the DSM-IV eating disorders'' (Stice, et al., 2010, p. 519). As such, it reflects the array of sub-clinical eating disorder phenomena whose prevalence was discussed in Section 1.4. In children, as in adolescents and adults, these attitudes and concomitant behaviours are, by definition, less serious and more common than full-threshold eating disorders (Nicholls, 2004; Nicholls, et al., 2011). Whilst only 3 in 100,000 children develop clinically disordered eating, approximately 10-20% of young and adolescent girls in school settings report levels of disordered eating attitudes that are sufficiently high to indicate a degree of pathology (Erickson & Gerstle, 2007; Smolak & Levine, 1994).

Disordered eating attitudes consist of dimensional rather than categorical phenomena. These include dieting, exercising to lose weight, over-eating, food preoccupation, and compensatory/purging behaviours (Ricciardelli & McCabe, 2001). When experienced occasionally, they can be common and non-pathological features of children's relationship with food, weight and the body. However, when experienced frequently they are prospectively associated with obesity, weight-cycling, depression and extreme weight-control behaviours (Erickson & Gerstle, 2007; Stice, 2002; Stice & Bearman, 2001). An understanding of their early developmental course, therefore, is of importance to schools and health services alike.

1.6.1 Developmental trends in disordered eating attitudes.

Observed developmental trends in disordered eating attitudes vary considerably between studies. In girls aged 12 years and over, several prospective studies report that levels of disordered eating attitudes remain stable with increasing age (e.g., Attie & Brooks-Gunn, 1989; McVey, Tweed, & Blackmore, 2004; Wlodarczyk-Bisaga & Dolan, 1996).

Several other studies report a decrease (Knez, Munjas, Petrovecki, Paucic-Kirincic, & Persic, 2006; Striegel-Moore, Schreiber, et al., 2000) and still others an increase over this period (Calam & Waller, 1998). The heterogeneity of these trends may be attributable to the influence of mediating and moderating factors. French, Perry, Leon & Fulkerson (1995) compared adolescent dieters with non-dieters in their female sample: the dieters' disordered eating attitudes increased over time whilst non-dieters' decreased. In line with these findings, Neumark-Sztainer et al. (2006) reported that adolescent girls using initial weight-control behaviours had higher levels of disordered eating five years later than girls not using these behaviours. Similarly, Stice, Marti & Durant (2011) found that body-dissatisfied, depressed and/or dieting adolescent girls showed greater increases in disordered eating over time compared to the remainder of their sample. These findings, which potentially inform research with younger girls, indicate that the 'typical' developmental course of disordered eating attitudes in girls aged 12 and over varies considerably depending upon other risk factors.

The youngest age at which disordered eating attitudes first appear is simply not known. There is some evidence of continuity between maternal reports of problematic eating behaviours of infancy, subsequent eating disturbance in childhood and eating disorder symptoms in adolescence (Kotler, Cohen, Davies, Pine, & Walsh, 2001; Martin, et al., 2000; Stice, Agras, & Hammer, 1999). A minority of girls aged 5 years and above also report intermittent fears of being overweight, food preoccupation and dietary restraint (Davison, Markey, & Birch, 2000; Ricciardelli & McCabe, 2001). The full range of disordered eating attitudes has been assessed from 7 years of age using self-report (Children's Eating Attitude Test; Maloney, McGuire, Daniels, & Specker, 1989) and interview methods (Bryant-Waugh, Cooper, Taylor, & Lask, 1996) although most published measures are suitable for children aged 10 and above (for a review, see Micali & House, 2011).

Methodological limitations, therefore, exist when seeking to determine the point at which disordered eating attitudes arise. These limitations are tied in with conceptual ambiguity around their development – when, for instance, is a child fully aware of the implications of an expressed wish to lose weight? Schur et al (2000) carried out in-depth interviews with 8- to 10-year-olds to explore key concepts in this area. Even the youngest children in their sample showed a relatively sophisticated understanding of the meaning and mechanisms of weight loss, suggesting strategies based upon dietary change, dietary restraint and exercise initiation to resolve dissatisfaction with one's body size.

The developmental course of disordered eating attitudes over middle-childhood (6 to 11 years of age) has been seldom investigated. The few existing longitudinal studies focusing upon girls of this age indicate decreased levels of disordered eating attitudes over time (Davison, Markey, & Birch, 2003; DeLeel, Hughes, Miller, Hipwell, & Theodore, 2009; Rolland, Farnhill, & Griffiths, 1997). In keeping with this, most cross-sectional studies report lower levels of disordered eating attitudes in older children within this age-group (Maloney, et al., 1989; Smolak & Levine, 1994). This trend runs counter to initial assumptions that disordered eating attitudes increase cumulatively over childhood as puberty approaches (Steiner-Adair, 1986). The observed decreases have been frequently treated as spurious or anomalous, but this does not account for the consistency with which they are observed.

To explain this trend, authors have called into question the reliability of commonly-used psychometric measures of disordered eating with children aged 7 to 9 years, suggesting that younger children mistakenly endorse items due to comprehension difficulties, which themselves decrease with age (Erickson & Gerstle, 2007; Ricciardelli & McCabe, 2001; Smolak & Levine, 1994). These criticisms have been levelled at the Children's Eating Attitude Test in particular (ChEAT, Maloney, et al., 1989). The internal reliability of the ChEAT is not, however, commensurately lower amongst younger girls when compared to older ones (Maloney, McGuire, & Daniels, 1988). This tentatively suggests that a reduction in scores with increasing age may be attributable to a genuine reduction in levels of disordered eating attitudes over time amongst school-based samples of younger children, a phenomenon which existing research does not readily explain.

1.7 Body Dissatisfaction in Children

Body image is a multidimensional construct which comprises the conscious experience of 'embodiment' and its psychological correlates. Its attitudinal components include perceptual, cognitive, emotional and behavioural elements, the most widely researched of which, in children, is body evaluation, also referred to as evaluative body satisfaction (Smolak, 2004a). Body evaluation comprises "positive-to-negative appraisals of and beliefs about one's appearance" (Cash, 2004, p. 42). It reflects the degree of congruence between one's self-perceived physical body and personally meaningful appearance ideals, and is typically expressed in terms of satisfaction or dissatisfaction therewith. Importantly, such satisfaction is deemed evaluative rather than affective or cognitive-behavioural in that it

concerns the individual's current approval of their body without reflecting the emotional salience of the evaluation. Moreover, it is conceptually distinct from investment in or concern about one's physical appearance, and also from internalisation of the thin female ideal body (Thompson, 2004). In children, evaluative body dissatisfaction is typically measured using a figure choice scale, in which the child selects the figure that they resemble (*self*), and the figure that they would ideally resemble (*ideal*), from an array of differently sized figures. Such scales focus upon considerations of size and shape in body dissatisfaction. Well-validated psychometric scales to assess evaluative body image are also commonly used, usually with a Likert-style response format (e.g., Mendelson & White, 1982). These scales provide more global measures of body dissatisfaction, asking about generalised positive or negative feelings about the body as opposed to size and shape per se.

Body dissatisfaction is very prevalent. Famously dubbed a "normative discontent", it is reliably reported by more than half of all adult and adolescent females (Rodin, Silberstein and Striegel-Moore, 1985; Smolak, 2004). A wealth of research also shows that body dissatisfaction is common in childhood, particularly amongst girls (Smolak, 2004b). In middle childhood (the years between 6 and 11) far more girls desire a thinner figure than a larger figure: Ricciardelli and McCabe's (2001) review of over 30 correlational studies puts specific estimates for the former at 28-55% and specific estimates for the latter at 4-18%, when measured using a figure choice scale. Smolak (2004a) suggests that the presence of body dissatisfaction at such an early age "indicate[s] that at least some components of disturbed eating may be internalised at fairly young ages" (p. 66).

1.7.1 Developmental trends in body dissatisfaction.

In common with disordered eating attitudes, it has been assumed, historically, that body dissatisfaction in girls developed in adolescence as a reaction against rapid pubertal weight gain (Brooks-Gunn, 1984). The epidemiological data presented previously suggest that it emerges much earlier. Specifically, studies using figure choice scales and/or using items that address weight and shape concerns, have detected body dissatisfaction at an earlier age than more global measures of appearance dissatisfaction (which show increases from baseline from around 10 years of age) (Smolak, 2004a). These data seem to suggest that concerns about adiposity are the first measurable components of body dissatisfaction to develop (Smolak, 2004a). However, as with eating attitudes, there is ongoing debate about the age at which the cognitive prerequisites for evaluative body dissatisfaction, as understood

in adults, are present. Smolak (2004b) contends that these prerequisites include the child's ability to:

> "assess her/his own body, ha[ve] an ideal to which to compare her/his body, and … [make] such a comparison. […] perhaps the ideal needs to be internalized before meaningful body dissatisfaction will develop" (p. 16)

The child's ability to accurately assess their body size is a matter of particular dispute: some studies using figure-choice scales indicate that perceptual accuracy – as assessed using the relationship between the child's known BMI and the approximate size of their 'self' figure – is only evident from a minimum of 8 or 9 years of age (Truby & Paxton, 2002). Conversely, authors using alternative methodologies such as subjective-equality detection – involving a projection of an incrementally-distorted image of the child's own body (Gardner, Friedman, Stark, & Jackson, 1999) – claim to reveal size-related perceptual accuracy from the age of 6. The aforementioned images, however, were simply distorted by Gardner et al (1999) along the horizontal plane, a distortion which does not accurately mirror the visual effect of increased adiposity. A consensus is lacking, and the research tools remain unsatisfactory, but the accuracy of children's body size perception, and the factors that may influence accuracy such as weight status, has emerged as an important area of research in and of itself (Standley, Sullivan, & Wardle, 2009).

The developmental trajectory of body dissatisfaction through middle childhood is similarly ambiguous. Some longitudinal studies indicate that body dissatisfaction increases through middle childhood (Clark & Tiggemann, 2008; Gardner, Stark, Friedman, & Jackson, 2000) although others have not detected a trend in age (Dohnt & Tiggemann, 2006; Harrison & Hefner, 2006; McCabe, Ricciardelli, & Holt, 2005) and still others report a decrease (Davison, et al., 2003). To complicate this further, multiple cross sectional studies indicate that older girls in middle childhood report greater body dissatisfaction than younger girls (e.g., Allen, Byme, Mc.Lean, & Davis, 2008; Rolland, et al., 1997). During and after adolescence, increased body dissatisfaction with age in girls is found far more consistently (Levine & Smolak, 2004). This raises interesting questions about the nature of the developmental dynamics of body dissatisfaction before and after puberty. It is probable that many of the same variables are implicated at both time points (Smolak, 2004b). However, their relative importance and the consistency with which they affect every individual in the group may vary with age, developmental stage and pre-existing vulnerability. To develop these probabilistic theories further, one must consider what is already known, and theorised,

about the developmental processes by which body dissatisfaction and disordered eating attitudes arise.

1.8 Developmental Processes

Previous research suggests, then, that girls' disturbances of body image and eating – which were formerly characterised as problems of adolescence – frequently originate well before puberty (Sands, et al., 1997). The process by which these phenomena are differentially experienced and expressed remains unclear: specifically, it is not known why certain groups of children are most vulnerable to body dissatisfaction and disordered eating attitudes (Hoek, 1991). Identification of pertinent developmental risk factors and elucidation of the interrelationships between them should highlight pathways of particular risk and resilience during middle childhood. The individual risk factors which are operationalised in the studies that feature in this thesis are discussed in detail in Chapters 2 and 6 respectively. However, this penultimate section provides a summary of the processes by which disordered eating and body dissatisfaction are theorised to develop, within a broadly biopsychosocial framework. First, however, it is necessary to blur the boundaries between variables which have hitherto been presented as if dissociable.

1.8.1 Why consider disordered eating, body dissatisfaction and adiposity together?

Critical amongst the risk factors for disordered eating and body dissatisfaction may be a child's level of adiposity. The secular explosion of overweight and obesity amongst children (National Health Service Information Centre, 2010) poses considerable risks for children's physical health (Ebbeling, et al., 2002) but also their psychological wellbeing, particularly for girls (Erickson, et al., 2000). Indeed, the development of disordered eating and body dissatisfaction might reasonably be considered together with overweight and obesity in girls for several reasons. As previously established, all of these phenomena typically begin to develop over middle childhood (Wertheim, et al., 2009; Whitaker, et al., 1998). Second, they relate to one another in interesting and informative ways (Smolak, 2009): adiposity predicts body dissatisfaction, and body dissatisfaction predicts disordered eating, but adiposity does not consistently predict disordered eating (Stice, 2002). Third, they also share many of the same risk factors, and also many of the same correlates and

consequences. Fourth, they involve similar behavioural and cognitive components, at various points on the frequency and severity continua.

1.8.2 Developmental accounts of eating attitudes and body image.

A developmental account of disordered eating and body dissatisfaction must explain developmental variations in the meaning of risk and protective factors across the spectrum of experiences. Within this framework, formative experiences occur within triadic reciprocal interactions:

> "[they] unfold as person-environment transactions and occur in the contexts of individuals' cognitive, social, emotional and physical development"

(Cash, 2004, p.40). It is postulated that these interactions give rise to fundamental *body schemata* (Altabe & Thompson, 1996) that shape body image and eating behaviours and cognitions.

In this context, distal factors ("past events, attitudes and experiences that predispose or influence how people come to think, feel and act in relation to their body") have been distinguished from proximal factors ("precipitating and maintaining influences on body image experiences") that shape the development of body image (Cash, 2004, p. 38). The implied dichotomy is necessarily false as proximal influences become distal influences with time. For example, some variables – such as depression – may operate upon body image or disordered eating on both levels.

1.8.2.1 Early feeding.

Generally speaking, factors that shape the development of schemata include sociocultural influences, physical characteristics (and changes therein) and personality variables. The predominant developmental accounts of body image and disordered eating hold that social learning (children's variable engagement with, and response to, their social environment) drives the process and the probabilistic importance of each of these factors (e.g., Wardle, 1995). This process begins in infancy, in which breastfed babies initiate and terminate the majority of feeds whilst the mothers of bottle-fed babies do so instead (Wright, Fawcett, & Crow, 1980). Breastfed infants seem to respond to this early experience of feeding autonomy with subsequent superior self-regulation of intake and greater responsiveness to internal sensations of hunger and satiety than bottle-fed babies (Li, Fein, & Grummer-Strawn, 2010). Initial experiences of dyadic feeding, therefore, provide early

examples of social learning informing feeding behaviour through physiological (appetite regulation) but also social (maternal-infant control) mechanisms.

Mothers of children who were bottle-fed go on to exert greater control over their children's dietary intake during weaning and throughout their subsequent early childhood than mothers of children who were breastfed (Fisher, Birch, Smiciklas-Wright, & Picciano, 2000). When high levels of caregiver control of intake continue through early childhood, this predicts both increased weight gain, obesity and increased *ad libitum* overeating in the child (Arenz, Ruckerl, Koletzko, & von Kries, 2004; Birch, Fisher, & Davison, 2003; Fisher & Birch, 2002). However, parental and peer modelling of eating behaviour also communicates and shapes preferences and intake (Brown & Ogden, 2004), and the extent of this influence increases with age whilst the effect of early dyadic feeding decreases. Moreover, social influence quickly extends to encompass social norms and ideals about body shape and size as a consequence of specific eating behaviours, including explicit behavioural strategies to achieve desired outcomes.

1.8.2.2 Social and physical influences.

Physical attributes – specifically adiposity – appear to interact with sociocultural influences from around 3 years of age. Initially, children socially mirror attitudes involved in judging the physical attributes of other people. In Western countries, fat stigmatism, "the relative devaluation of an overweight figure size" is evident by three years of age and is, interestingly, most apparent amongst children who are already overweight (Cramer & Steinwert, 1998, p.430). By four or five years of age, children regard a hypothetical overweight playmate more negatively than one of typical or lower than typical weight (Musher-Eizenman, Holub, Miller, Goldstein, & Edwards-Leeper, 2004). It seems, therefore, that messages about the social acceptability of elevated adiposity, and its interpersonal consequences, are internalized in the preschool years. Children then act upon these messages and learn from the consequences to refine and further internalise predominant eating and body image beliefs, perceptions and behaviours (Clark & Tiggemann, 2008).

By the time they begin school, children also begin to understand and even to try out strategies by which weight-based appearance standards might be attained, such as dietary restriction and exercise (Davison, et al., 2003; Schur, et al., 2000). Examples of such strategies are well publicised and reinforced by current public health campaigns to reduce obesity, some of them stigmatizing in and of themselves (O'Dea, 2005). At this early point, children learn from, and seek out, information from external sources (peers, parents, media)

about physical characteristics and food-related behaviours of high social value. They also learn the implications of these characteristics: what their possession (or lack thereof) implies about the owner's character, health and eating behaviour (Cash, 2004). By the age of 6, children are highly aware of the social value placed on thinness – and the reduced social capital afforded to the overweight – and begin to extrapolate its consequences for individuals i.e. success, attractiveness or otherwise (Murnen, et al., 2003). Integral within these appearance standards are gender expectations, linking successful masculinity and femininity with specific physical attributes, and emphasising the primacy of objectively-determined attractiveness in the female gender role (Franzoi, 1995; Murnen, et al., 2003). Children observe, in fact and fiction, that women who deviate from these standards – particularly in terms of adiposity – experience more negative consequences than men (Baker-Sperry & Grauerholz, 2003; Gortmaker, Must, Perrin, Sobol, & Dietz, 1993). As such, children learn and perhaps even personally experience the social benefits of meeting societal standards of appearance, and the costs of failing to meet them.

A group at particular risk of body dissatisfaction is overweight girls, who report experiencing more negative attitudes towards their weight and shape than boys or non-overweight girls from age 5 (Davison, et al., 2000; Williamson & Delin, 2001). Even at this early age, they consistently receive negative weight-related feedback from peers, parents and authority figures (e.g. doctors) that can have a long-lasting influence on their eating and body image schemata (Edmunds, 2005; Hayden-Wade, et al., 2005; Lumeng, et al., 2010). Overweight children also report perceiving external scrutiny and efforts to control their food choices, portion size and physical activity, which frequently coheres with the greater maternal control of eating they experienced in early life. These experiences seem to contribute to elevated levels of loss of control eating, elevated dietary restraint, perceived pressure to be thin and thin-ideal internalisation in this group (Faith, Leone, Ayers, Heo, & Pietrobelli, 2002; Moens, Braet, & Soetens, 2007).

Despite generally underestimating their own degree of overweight (Saxton, et al., 2009), overweight children are aware of being larger than their peers and report a greater divergence between their 'self' and 'ideal' figures than non-overweight children (Smolak, 2004b). A significant subgroup of overweight girls comes to persistently negatively evaluate their own size, shape and self-worth in comparison to appearance standards; the earlier the onset of elevated adiposity, the more intransigent this appears to be (Smolak, 2004a). Stigmatisation may be further exacerbated by peers' attribution beliefs about the causes of overweight: many take at face value the social message that idealised appearance standards

are attainable by all, given enough effort (Tiggemann & Anesbury, 2000). Taken together, the social experiences of overweight girls are likely to contribute to enduring negative body attitudes and schemata, and may contribute to risky weight loss strategies and other disordered eating symptoms in middle childhood. However, individual psychological factors also appear to have a role in this developmental process.

1.8.2.3 The role of psychological factors.

With or without elevated adiposity, certain individual psychological factors – including affect and temperament – may potentiate risk in girls vulnerable to disordered eating and body dissatisfaction or may, conversely, mitigate risk. These factors have received less research attention in preadolescents than in clinical or non-clinical adult populations. Psychological factors contribute not only to the salience and nature of the schemata underlying body image and eating attitudes, but also to the proximal mechanisms which shape their day-to-day implications for behaviour and function. Enduringly high self-esteem in obese children over middle to late childhood, for example, provides a buffer against the sadness, loneliness, and nervousness associated with declines in self-esteem over this period (Strauss, 2000). Proximally, high self-esteem may enable adaptive coping mechanisms such as positive self-talk when faced with situations of body image threat (Cash, 2004).

Childhood perfectionism, in contrast, may motivate avoidant or appearance-fixing coping strategies in the face of body image threat. Perfectionism typically involves the pursuit of highly demanding goals and a fear of catastrophic consequences if they are not achieved. This can involve adopting rigid and unrealistic weight, shape and attractiveness schemata – often based around an excessively thin ideal body – the pursuit and attainment of which is of primary self-evaluative importance. When a disparity between a schema and reality arises, in terms of eating behaviour, weight or shape, the perfectionist is likely to self-punitively intensify their efforts to achieve their goal: in this way they negatively reinforce and escalate their original body image concerns (Flett, Hewitt, Oliver, & Macdonald, 2002). As such, perfectionistic girls may be particularly vulnerable to internalising and pursuing exacting and possibly unrealistic standards of attractiveness and thinness, whilst the self-evaluative consequences of 'failing' to reach these standards may be particularly severe (Hewitt, Flett, & Ediger, 1995; Shafran, Cooper, & Fairburn, 2002). Perfectionism is frequently also associated with the tendency to make social comparisons with peers' behaviour or appearance, which itself mediates the developmental path between internalising

a thin ideal figure and experiencing body dissatisfaction as a consequence of it (Blowers, et al., 2003). Finally, an individual's extant background level of body dissatisfaction – and its underlying schemata – constitutes a psychological factor contributing to increased risk of disordered eating behaviour to cope with body image stress. Indeed, there is some evidence of this relationship in young girls, although previous studies have not controlled for initial levels of disordered eating (Davison, et al., 2003).

To conclude, then, the developmental process that underpins eating behaviour and body image is theorised to be one in which the child's active interaction with their social and cultural context constructs schemata of varying flexibility within the frameworks of which subsequent development occurs. As such, multiple factors can contribute to pathways of variable risk and resilience, and the meaning of these factors may evolve with development itself. I have sought to demonstrate the need to consider factors in both proximal and distal terms, as components of schemata themselves but also as potentiators of everyday behaviour around food and the body. A significant proportion of the developmental process I have described thus far originates in studies with infants, very young children or adolescent groups; many of its key ideas remain empirically unexamined. Despite the physical, cognitive, social and behavioural advances children make in middle childhood, we still only vaguely understand the developmental dynamics of adiposity, body dissatisfaction and levels of disordered eating attitudes. In this final section, I summarise the purposes of the two main studies included in this thesis, one longitudinal and one cross-sectional.

1.9 The Present Studies: Aims, Purposes and Relationships

The overarching aim of these studies was to elucidate the sociocultural and psychological context in which body dissatisfaction, disordered eating attitudes and adiposity develop and operate in a school-based sample of girls aged 7 to 11 years (Smolak, et al., 1996). Such insights are needed given the threat posed by these phenomena to girls' health, wellbeing, and development. As indicated in subsection 1.1, the present research involved two components: a two-year longitudinal study and an in-depth cross sectional study. The former study was intended to examine the progress of the outcome variables over time, whilst in the latter I sought to investigate in greater detail factors influencing outcome variables in the 'here and now'.

1.9.1 Longitudinal.

As the evidence and argument presented previously suggests, longitudinal research into the aetiology of disordered eating attitudes and body dissatisfaction is necessary to detect downstream effects of particular behaviours and cognitions that may have predictive utility. In short, this study sought to tap into the developmental process as it happened over the course of two years in a group of 7- to 11-year-old schoolgirls, enabling the recognition and examination of change in eating attitudes and body image 'across time' in the context of its putative causes. It was, of course, not possible or indeed desirable to cover all the contributory factors that have been proposed in the literature, which range from early attachment to sexual abuse to genetics. Included were the main personality, physical and psychological factors with construct validity in this young age group, for which there was prospective evidence of a distal causal relationship and whose investigation was ethically acceptable within a preadolescent population.

1.9.2 Cross-sectional.

To complement the longitudinal work, the cross-sectional study focused on a similarly-aged group of schoolgirls and sought to examine 'within-time' relationships sociocultural variables with physical and psychological factors. As a starting framework, the sociocultural model of eating disturbance was used (Stice, 1994; Stice & Agras, 1998) given limited evidence that many of the model's component relationships between variables may exist in adolescent and preadolescent samples. The data gathered in the cross-sectional study were examined for the extent to which the model provided a well-fitting summary of relationships. An understanding of these within-time relationships is important to discern the nature of "generally held attitudes and beliefs [that] may contribute to future concerns" (Schur, Sanders & Steiner, 2003, p. 80 - 81).

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Chapter 2: Study 1 Introduction

2.1 Introduction

As proposed in Chapter 1, a developmental understanding of girls' disordered eating attitudes and body dissatisfaction requires their prospective assessment in pre-pubertal populations, alongside their putative causal risk factors (Sinton & Birch, 2005; Stice, 2002). Such research should seek to discern the nature and components of these risk factors, their interrelationships and their changes over time. Most previous studies of children's eating attitudes have been cross-sectional in design. Only a few longitudinal studies have been conducted and they mainly focus on early adolescence. They show the strongest predictor of subsequent disordered eating to be previous disordered eating (Leon, et al., 1995; Wichstrøm, 2000). These findings can be interpreted in a number of different ways. First, they might suggest overall stability of eating attitudes *within individuals* during adolescence. This implies that the development of eating attitudes has already occurred previous to the study. Second, they might suggest that some influential risk factors have been missing from previous study models, or that the extant factors were not operationalised optimally. Finally, they suggest that strong 'within-time' associations may be statistically obscuring significant effects.

The purpose of the current study was to address the gaps left by previous work by prospectively following a younger population, which had a greater chance of capturing the developmental processes of eating disorders and body dissatisfaction at work. A two-year timescale was chosen to allow substantial developmental progress to occur and, given this timescale, I elected to focus upon trait-like predictors as opposed to more proximal variables. Since componential models of the long-term development of these phenomena in children are lacking, I selected individual predictor variables for which there was a) a strong theoretical aetiological rationale, b) evidence of association with eating attitudes / body dissatisfaction in children (ideally prospective, but most usually cross-sectional) and c) evidence of a prospective relationship in young adolescents. In addition, given a consensus that disordered eating attitudes become manifest "only in the context of a broad spectrum of personality dynamics" (Strober, 1983, p194; cited in Strober & Humphrey, 1987), I focused on physical and personality/temperament variables since they remain particularly neglected by the current literature (Smolak, 2004a). The chosen risk factors were adiposity, body dissatisfaction, anxiety and perfectionism. The working definition of a risk factor is presented in the Foreword.

2.2 Previous Longitudinal Research into Risk Factors in Children

Existing longitudinal studies of eating attitudes in children are scarce. An important and hitherto neglected limitation of previous research is authors' omission of initial levels of the outcome (path B) *and* subsequent levels of the putative predictor (path A, Fig 2.2) from their prediction models. Moreover, some authors have also failed to take account of the within-time relationships between predictor and outcome shown in paths C and D of Figure 2.1.

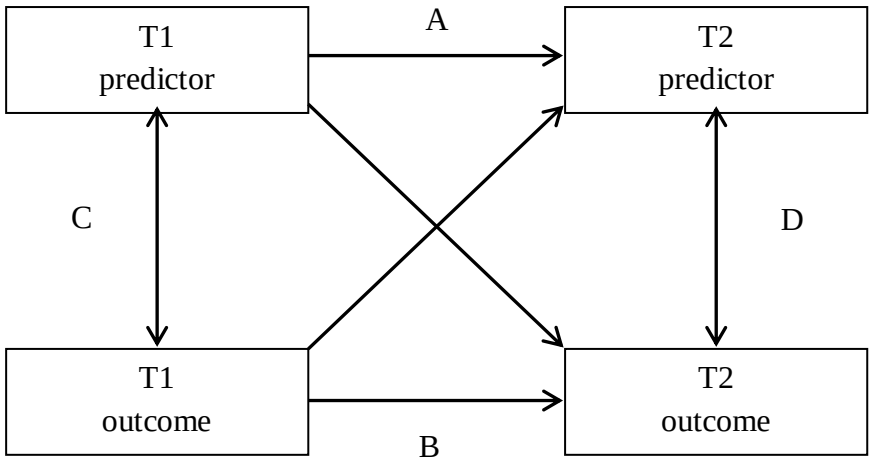

Figure 2.1 Example framework of outcome-predictor relationships within, and across, Time 1 (T1) and Time 2 (T2)

When such statistical controls are put in place, this helps reduce the risk of a spurious across-time relationship being observed between the predictor and outcome, since other sources of variance in the Time 2 (T2) outcome variable are incorporated into the predictive model. Hitherto 'significant' effects, such as those described in previous studies, may no longer show significance upon the introduction of other feasible pathways through which the apparent relationship might arise. A necessary caveat is that data derived from two points in time remain suboptimal for drawing anything but the most cautious of causal inferences (MacCallum & Austin, 2000).

Given the limitations discussed previously, discerning causal risk factors on the basis of previous research with children is difficult. Gardner et al (2000), for instance, measured eating attitudes at each of 3 annual measurement occasions but used different psychometric tests at different ages. It is not at all clear whether Gardner et al controlled for baseline disordered eating attitudes. Davison et al (2003) and Shunk & Birch (2004) assessed their sample aged 5, 7 and 9 years but only examined eating pathology at 9, despite purporting to

predict it. Keel, Fulkerson & Leon (1997) report, in both article and abstract, the relationship between Time 1 (T1) predictors and T2 eating attitudes without controlling for T1 eating attitudes; at the end of their Results they briefly mention that the inclusion of T1 eating attitudes in the model eliminated all other significant predictive relationships for girls. Field et al (1999) did not report the baseline prevalence of purging behaviours whose 1 year onset they sought to predict, although this error is rectified in Field et al (2001). Whilst Dohnt & Tiggemann (2006) controlled for T1 body dissatisfaction when examining T1 predictors of T2 body dissatisfaction, they did not also control for the across-time relationship of the T2 predictor with itself. Similarly, Clark & Tiggemann (2006) and Allen, Byrne, McClean & Davis (2008) controlled for T1 body dissatisfaction when assessing T1 predictors of T2 body dissatisfaction one year later but, again, did not include T1 levels of predictors in the model.

These previous findings necessarily provide only a partial picture of the developmental trajectories of body dissatisfaction and disordered eating attitudes. This notwithstanding, the remainder of this chapter presents a theoretical and empirical justification for the risk factors selected for inclusion this study. The dearth of evidence in this area means that I periodically draw on evidence from longitudinal studies with young adolescents, or rely on cross sectional data with children: there are too many gaps in the existing literature for this to be avoided.

2.3 Adiposity & Body Dissatisfaction

Body mass index (BMI) is a measure of weight in relation to height (calculated by dividing an individual's weight (kg) by height $(m)^2$). It is used as in indirect measure of adiposity in both children and adults. From five years of age, BMI is associated with evaluative body dissatisfaction, particularly amongst girls, and the strength of this association increases with age (Davison et al. 2003; Smolak, 2004; Stice and Shaw, 2000). Smolak suggests that this relationship increases in strength due to the development with age of a thinness schema, a "cognitive structure integrating thin-ideal, body dissatisfaction, and weight control techniques [which] may be less consolidated in younger children than in adolescents" (2004b; p. 20). For girls with increased adiposity, age is theorised to bring with it a heightened awareness of the disparity between their body and the ideal body, which gives rise both to body dissatisfaction and the motivation to utilise weight control techniques. In support of this, there is good evidence that initial and increased adiposity predicts subsequent body dissatisfaction over the course of middle childhood (Allen, et al., 2008; Shunk & Birch,

2004; Sinton & Birch, 2005). Similarly, adiposity appears to longitudinally predict some of the components of disordered eating such as dietary restraint (Salling, Ricciardelli, & McCabe, 2005; Shunk & Birch, 2004) and weight concerns (Davison, et al., 2003).

Evidence linking adiposity to disordered eating itself, however, is somewhat mixed. Overweight girls report significantly higher levels of disordered eating than non-overweight girls (Ranzenhofer, et al., 2008; Tanofsky-Kraff, Faden, Yanovski, Wilfley, & Yanovski, 2005; Thomas, Ricciardelli, & Williams, 2000; Vander Wal & Thomas, 2004) and some studies have found that adiposity predicts later disordered eating (Gardner, et al., 2000; Keel, et al., 1997). However, others have failed to detect this relationship (Allen, et al., 2008; Davison, et al., 2003). The observed inconsistencies may be explained by the finding that body dissatisfaction fully or partially mediates the relationship between adiposity and disordered eating (Stice, 2002; Stice & Shaw, 2002). This is commensurate with the development of the proposed thinness schema, since the extent to which weight control techniques are attempted is likely contingent on the degree of body dissatisfaction experienced.

Within this framework, body dissatisfaction prospectively predicts disordered eating attitudes and behaviours in adults and adolescents (for a review, see Stice, 2002). Relatively few studies to date have examined this relationship in children. Both Davison, Markey & Birch (2003) and Gardner, Stark, Friedman & Jackson (2000) found that body esteem at age 5 or 6 years predicted subsequent disordered eating attitudes, but Garner et al also found that evaluative body dissatisfaction did not prospectively predict eating attitudes until 11 years of age. The literature with adults and adolescents, in contrast, conclusively indicates that body dissatisfaction contributes to both the onset and maintenance of eating pathology. Since early body dissatisfaction is integral to the development of the hypothesised thinness schema, and given the sparseness and inconsistency of existing findings with children, this study sought to clarify whether the relationship observed in adults can be detected over early childhood.

Finally, predictors of change in girls' adiposity itself might be considered, despite the relative stability of BMI over time during childhood (Davison & Birch, 2001). A scenario that has been seldom investigated, is whether body dissatisfaction gives rise to changes in girls' BMI over time. Since a subjective dissatisfaction with one's body, particularly its size and shape, provides a powerful motivational rationale for attempting BMI change, it is premature to conclude that the causal relationship is unidirectional. Tentative support for this premise comes from data which suggest that children's previously reported dieting counter intuitively predicts subsequently greater increases in BMI (Tanofsky-Kraff, et al., 2006). As

such, both directions of across-time relationship were examined in the analysis of these study data.

2.4 Anxiety

Trait anxiety may be defined as "an enduring tendency to react to many situations with anxiety and fear" (Reiss, 1997; p.202). It is distinct from state anxiety in that it constitutes a broad, multidimensional predisposition which remains relatively stable across time and arises predictably in response to subjectively threat-provoking stimuli (Endler & Kocovski, 2001). In children, anxiety is reliably associated with depression, although the two remain conceptually distinct (Muris, Merckelbach, Ollendick, King, & Bogie, 2002). Anxiety is more prevalent than depression amongst children and arises at an earlier age; the former may constitute a necessary antecedent condition for the latter (Cartwright-Hatton, McNichol, & Doubleday, 2006). Within the tripartite model, anxiety and depression are both characterised by elevated negative affect, a "broad general factor of emotional distress that includes moods such as fear, sadness, anger, and guilt" (Joiner, Catanzaro, & Laurent, 1996; p.401) but differentiated by their inclusion of, respectively, physiological hyperarousal and low positive affect.

Anxiety is associated with clinical and subclinical disordered eating attitudes in adult and adolescent females (Baranowksi, Jorga, Djordjevic, Marinkovic, & Hetherington, 2003; Halmi, et al., 2000). It is also reliably associated with loss of control eating, emotional eating, eating disorder symptoms and concerns about eating, shape and weight in preadolescents and adolescents (Eddy, et al., 2007; Goossens, Braet, Van Vlierberghe, & Mels, 2009; Silberg & Bulik, 2005). There is strong evidence that negative affect predicts subsequent disordered eating in childhood (Field, et al., 1999; Leon, Fulkerson, Perry, Keel, & Klump, 1999). Positive prospective studies of anxiety on its own, however, have been hitherto limited to adults and adolescents (Lewinsohn, Striegel-Moore, & Seeley, 2000). Moreover, the specific role of each of the multiple dimensions of anxiety has not been fully explored.

There are, however, strong theoretical bases on which to posit a longitudinal relationship between anxiety and the early development of disordered eating attitudes. First, a key causal model of disordered eating proposes that the presence of negative affect (and *not* the absence of positive affect) is integral to eating disorder pathogenesis (Stice, Marti, & Durant, 2011). Negative affect is hypothesised to mediate the relationship between body

dissatisfaction and eating pathology, forming one of the pathways in the 'dual pathway' model (Stice & Shaw, 2002). Second, and looking specifically at dimensions of anxiety, both social anxiety and obsessive-compulsive tendencies are particularly prominent in the diagnostic histories of women with clinical and subclinical disordered eating (Anderluh, Tchanturia, Rabe-Hesketh, & Treasure, 2003; Halmi, et al., 2000; Halmi, et al., 2005; Kaye, 2004).

It is likely that anxiety serves as a more adequate proxy for negative affect over time in children than does depression; indeed, anxiety may even be a necessary developmental precursor to childhood depression (Cartwright-Hatton, et al., 2006; Cole, Peeke, Martin, Truglio, & Seroczynski, 1998). Whilst scores on measures of depressive symptoms in young, non-clinical children are rather unstable over time (Cole & Martin, 2005), trait anxiety shows a greater level of longitudinal stability (Cartwright-Hatton, et al., 2006). Consequently, it is feasible that negative affect acting alone constitutes a distal risk factor for psychopathology whilst the combination of negative affect and low positive affect seen in depression acts as a proximal risk factor and 'acute state' in eating disorder pathogenesis (Lonigan, Phillips, & Hooe, 2003). In addition, disordered eating attitudes and behaviours may themselves contribute to the pathogenesis and maintenance of anxiety by negatively reinforcing avoidant and ritualistic coping strategies within, and beyond, the domains of eating, weight and shape (Stice & Bearman, 2001). To complicate matters further, anxiety is also closely related to perfectionism in children (Flett, Hewitt, Boucher, Davidson, & Munro, 1997; Hewitt, et al., 2002), and the two may combine to form a potent psychological pathogen in the development of disordered eating (Bardone-Cone, et al., 2007).

2.5 Perfectionism

Of all personality traits implicated in the development of disordered eating attitudes, perfectionism has received perhaps the most attention (Bardone-Cone, et al., 2007). Despite this, it has received little truly developmental scrutiny; most studies have involved clinical groups or late adolescents. Perfectionism is the tendency to set and strive to attain extremely and often unattainably high standards, generally accompanied by overly-critical self-evaluation. It is reliably associated with both clinical and sub-clinical eating pathology (Bastiani, Rao, Weltzin and Kaye, 1995; Halmi, Sunday, Strober, Kaplan, Woodside, Fichter et al. 2000; Klibert, Langrichsen-Rohling and Saito, 2005; Lilenfeld, Stein, Bulik, Strober, Plotnikov, Pollice et al. 2000). Indeed, Shafran, Cooper and Fairburn (2002) consider

disordered eating to be the "expression of perfectionism in the domain of eating, shape or weight and their control" (p. 784), and contend that perfectionism is instrumental in the maintenance of disordered eating over time (Fairburn, Cooper, & Shafran, 2003).

The prevailing theoretical perspective conceptualises perfectionism as adaptive, accompanied by feelings of success and effectiveness, or maladaptive, accompanied by dichotomous thinking, selective attention to failure and the over-reliance of self-esteem upon success (Enns, Cox and Clara, 2002; Stumpf and Parker, 2000; Terry-Short, Ovens, Slade and Dewey, 1995). The adaptive component is associated most strongly with self-oriented perfectionistic (SOP) cognitions i.e. the "stringent evaluation and censure of one's own behaviour" and the maladaptive component is associated with socially-prescribed perfectionistic (SPP) cognitions i.e. the "perceived need to attain high standards and expectations prescribed by others" (Hewitt and Flett, 1991b; p. 457). However, emerging research indicates that SOP has a range of maladaptive developmental implications, including suicidal tendencies, depression and anxiety (Flett, et al., 2002; Hewitt, et al., 2002; Hewitt, Newton, Flett, & Callander, 1995). Consequently, some authors such as Shafran, Cooper & Fairburn (2002; Shafran, Lee, Payne, & Fairburn, 2006) have argued for an alternative construct of unidimensional "clinical perfectionism", i.e., maladaptive perfectionism of clinical relevance, omitting the SOP / SPP divide. Such perfectionism, they contend, consists of "the over-evaluation of the striving for, and achievement of, personally demanding standards, despite adverse consequences", and leads to escalating of cycles of goal-setting and striving with increasingly negative and psychologically injurious consequences (Shafran, et al., 2006, p.898). Whilst the debate about the dimensions of perfectionism continues to rage (see Dunkley, Blankstein, Masheb, & Grilo, 2006; Hewitt, Flett, Besser, Sherry, & McGee, 2003; Shafran, et al., 2002), its prevailing developmental construction remains one in which SOP and SPP are at least nominally dissociable (Flett, et al., 2002).

Both SOP and SPP are associated with disordered eating: individuals with diagnosed anorexia or bulimia nervosa have elevated total perfectionism in comparison to healthy controls (for a review, see Bardone-Cone, Wonderlich, Frost, Mulik, Mitchell, Uppala et al., 2007; Bastiani, Rao, Weltzin and Kaye, 1995; Cockell et al., 2002; Davis, 1997; Hewitt, Flett and Ediger, 1995; Klibert et al, 2005). Subclinical eating disorder symptomology likewise shows an association with both global perfectionism (for a review see Cassin and von Ranson, 2005; McLaren et al., 2001; Srinivasagam, Kaye, Plotnicov, Greeno, Weltzin and Rao, 1995), indicating that it acts both a risk and a maintenance factor for disordered eating (Stice, 2002). In keeping with this, Welch, Miller, Ghaderi & Vaillancourt (2009) suggest

that both SOP and SPP mediate *and* moderate the relationship between body dissatisfaction and disordered eating in adults.

Perfectionistic behaviour can be observed in children from an early age, and children commonly exhibit a phase of compulsive, rigid 'just right' behavior between the ages of about 2 and 5 years (Evans, et al., 1997). Flett et al (2002) suggest that experiences and learning throughout this period, as well as the period of early-adolescence, sets enduring patterns of exacting personal standards and striving that may last a lifetime. Both developmental periods are characterized, in different ways, by growing self-consciousness and the emerging concept of the self vs ideal self. Patterns set in these periods seem to have rather wide-ranging negative psychological implications both during and after childhood (Enns, Cox, & Clara, 2002; Flett, et al., 1997; Flett, et al., 2002). Unsurprisingly, therefore, a similar relationship to that seen in adults is seen between the symptoms of eating pathology and perfectionism in middle childhood, although this phenomenon has received less research attention than it has in adults (Castro, et al., 2004). In girls aged eleven and twelve, global perfectionism is associated with subclinical restrictive and bulimic eating symptomology (Kirsch, McVey, Tweed and Katzman, 2007; McVey, Pepler, Davis, Flett and Abdolell, 2002), whilst small prospective studies show that girls' peri-adolescent perfectionism predicts disordered eating symptoms up to eight years in advance (Tykra, Waldron, Graber and Brooks-Gunn, 2002; Waller, Wood, Miller and Slade, 1992). In contrast, Salling, Ricciardelli & McCabe (2005) found that perfectionism predicted boys', but not girls', dieting and muscle preoccupation over a 10 month period, although they observed cross-sectional associations between perfectionism and dieting in girls. This relationship, then, has not yet been fully longitudinally explored in pre-adolescent populations, an omission that the current study sought to rectify.

2.6 Socioeconomic Factors

Although clinical accounts have frequently specified that individuals of higher socioeconomic status experience higher levels of eating pathology, the research to support this assertion is methodologically flawed and the populations tested were subject to selection bias (Gard and Freeman, 1995). Some studies have found that lower socioeconomic status was associated with lower weight satisfaction (Wang, Byrne, Kenardy, & Hills, 2005) and higher rates of pathological weight control behaviours in adolescents (Neumark-Sztainer, Story, Falkner, Beuhring, and Resnick, 1999a), but others have found the inverse relationship

(Walters and Kendler, 1995) and still others have found no relationship at all (Story, French, Resnick and Blum, 1995; O'Dea, 1994).

In younger Caucasian girls, a small number of studies also suggest that higher levels of disordered eating attitudes and body dissatisfaction are associated with lower socioeconomic status (Ghaderi, Mårtensson, & Schwan, 2005; Robinson, et al., 2001). However, as with adolescent samples, other studies have failed to detect an effect of socioeconomic status on either disordered eating attitudes or body dissatisfaction (DeLeel, et al., 2009) Various theoretical explanations for these relationships have proposed that girls are differentially vulnerable to internalising and striving for weight and appearance standards depending on their social background (Walcott, Pratt, & Patel, 2003). Such explanations cannot easily account for the diversity of outcomes and relationships observed except, perhaps, by virtue of the diversity of sociocultural influences themselves. Given the considerable ambiguity surrounding this relationship, I sought to examine its developmental dynamics over time in this particular geographical and cultural context.

2.7 Objectives

Callam & Waller (1998) note, of their 12-year-old study population, that future studies of disordered eating must begin earlier in childhood to usefully identify prospective medium-term predictors. The principal aim of the study was to allow a longitudinal exploration of how these factors interrelate in children before the age at which fully pathological eating disorders appear. I sought to examine the relationship between body dissatisfaction, disordered eating and their putative risk factors both within-time, at each instance of measurement, and across time, i.e., for their predictive utility over the period of 2 years between Time 1 (T1) and Time 2 (T2).

2.8 Hypotheses

2.8.1 Primary (longitudinal) hypotheses.

First, it was hypothesised that T1 disordered eating attitudes, perfectionism, anxiety and body dissatisfaction would prospectively predict T2 disordered eating attitudes (in line with the research presented in subsections 2.3 to 2.5). Second, it was hypothesised that T1 body dissatisfaction and BMI would prospectively predict T2 body dissatisfaction (as per the research discussed in subsection 2.3). In both cases, the T1 predictors were expected to

account for significant variance in the T2 outcome beyond that explained by other relationships in the model, as shown in Figure 2.1 and described in subsection 2.2.

2.8.2 Secondary (developmental) hypotheses.

The average disordered eating attitude score was expected to decrease between T1 and T2 as per previous longitudinal studies (e.g., DeLeel et al, 2009; Rolland et al, 1997). Whilst net body dissatisfaction was not expected to change between T1 and T2 (Dohnt & Tiggemann, 2006; Harrison & Hefner, 2006; McCabe et al, 2005), the average size of both the 'ideal' and the 'perceived' body was expected to increase between T1 and T2 (Smolak, 2004b) alongside girls' increased BMI (Cole, Bellizzi, Flegal, & Dietz, 2000). Between T1 and T2, both anxiety and perfectionism were tentatively expected to decrease on the basis of limited previous research (Flett et al, 2002; O'Connor, Dixon & Ramussen, 2009; Spence 1998).

2.8.3 Tertiary (within-time) hypotheses.

Disordered eating attitudes were expected to show positive within-time associations with perfectionism, anxiety and body dissatisfaction (see, e.g., Stice, 2002). Disordered eating attitudes were not expected to be associated with socioeconomic status or BMI (as per research set out in subsections 2.3 and 2.6). Body dissatisfaction was expected to be positively associated with BMI (Ricciardelli & McCabe, 2001; Smolak, 2004b). As such, the longitudinal associations described in subsection 2.8.1 were expected to be mirrored by the within-time associations at T1 and T2. In addition, perfectionism and anxiety were expected to be positively associated within-time (Hewitt, et al., 2002).

Younger children were expected to report the highest levels of disordered eating attitudes at each timepoint (Erickson & Gerstle, 2007). Conversely, higher levels of body dissatisfaction were expected in the older children in the sample (as per, e.g., Smolak, 2004b). At both points in time a majority of girls was expected to identify a thinner ideal figure than their perceived figure (in keeping with Ricciardelli & McCabe, 2001). Girls' perceptual accuracy, as reflected by the strength of the association between BMI and their perceived figure, was expected to be moderately good (Truby & Paxton, 2002; Truby & Paxton, 2008). Both perfectionism and anxiety scores were expected to be lowest in older children and highest in younger children, as observed in previous preadolescent samples (e.g., Muris, Schmidt, & Merckelbach, 2000; Spence, 1998).

Chapter 3: Study 1 Method

3.1 Time 1 Participants

Schools were recruited via convenience sampling; state-run schools were selected from a list of participant institutions in the County Durham Healthy Schools initiative. The head-teachers of fifteen schools (out of sixteen contacted) agreed to participate in the study. Support was obtained from the school governors and the Local Education Authority. Thirteen schools were state-run and two (schools 8 and 14) were fee-paying private schools. At stage 1, caregivers of all girls aged 7 to 9 years old in school years 3 and 4 received a letter and an information sheet about the study, which was distributed via the school. They were asked to provide their own name, their child's full name and their child's date of birth and to indicate whether or not they consented to their child's participation. There were 466 girls eligible to participate in Time 1 data collection.

3.2 Measures

3.2.1 Anthropometrics.

Participants' weight and height measurements were used to calculate body mass index (BMI), a measure of weight adjusted for height, using the formula weight (kg) / height $(m)^2$. BMI is the preferred index of adiposity for children in clinical and epidemiological research (Dietz & Bellizzi, 1999) since it is simple to measure, reliable and strongly associated with skinfold thickness (r = .73, p < .001) total body fat (r = .98, p < .001) and percentage body fat (r = .69, p < .001; Dwyer & Gibbons, 1994; Pietrobelli, et al., 1998).

Measurements of participants' weight and height were obtained. Participants' weight was measured accurate to 100g using SECA 835 portable electronic scales. Repeated measurements of weight were taken until the same value was obtained twice. Participants were weighed whilst fully clothed in their indoor school uniform (without jackets or blazers and without their shoes). Their height was measured with their head positioned in the Frankfort plane accurate to 0.1 cm using a portable Leicester Height Measure. They removed their shoes and any hair ornaments liable to influence their measured height.

3.2.2 Children's Body Image Scale (Truby & Paxton, 2002).

The Children's Body Image Scale (CBIS; see Appendix A) is a body figure rating scale consisting of gender-specific photographic images of children aged 7-12 years of

known body mass index (BMI) corresponding to the 3rd, 10th, 25th, 50th, 75th, 90th and 97th percentiles of the NCHS reference (Hamill, et al., 1979). The face-on figures shared the same facial 'identity' and wore identical swimsuit bottoms. They are shown in Figure 3.1 (see also Table 3.1 for further details). Participants are presented with this simultaneous array of gender-appropriate images in percentile order and asked to choose, first, the figure most like their own (self) and, second, the figure they most wished to resemble. The discrepancy between the two figures was used to indicate the direction and extent of body dissatisfaction such that a negative difference indicated a smaller ideal body than perceived.

Graduated figure-choice arrays are frequently used to assess evaluative body dissatisfaction, but this scale is unique in its use of realistic photographs depicting specific BMI percentiles as opposed to line drawings (Gardner, 2004; Thompson, 2004). Truby & Paxton (2002) found that a quantitative directional preference to be thinner or fatter, signified by a child's endorsement of a preferred figure one or more categories larger or smaller than their own perceived figure, was associated with the child's expressed wish to be thinner or fatter, indicating construct validity (for girls < 8 years, $r = -.39$, $p < .05$; for girls aged 8-10 years, $r = -.59$, $p < .001$).

Test-retest reliabilities (r) of perceived figure, ideal figure and extent of the directional preference over three weeks were found to be .85, .73 and .68 respectively (Truby & Paxton, 2008). The use of figures of known BMI enabled the assessment of each participant's relative perceptual accuracy when compared to their measured BMI category. By age seven, girls' perceived figures were moderately associated with their measured adiposity (for girls < 8 years, $r = .52$, $p < .001$; for girls aged 8-10 years, $r = .50$, $p < .01$) (Truby & Paxton, 2002; Truby & Paxton, 2008).

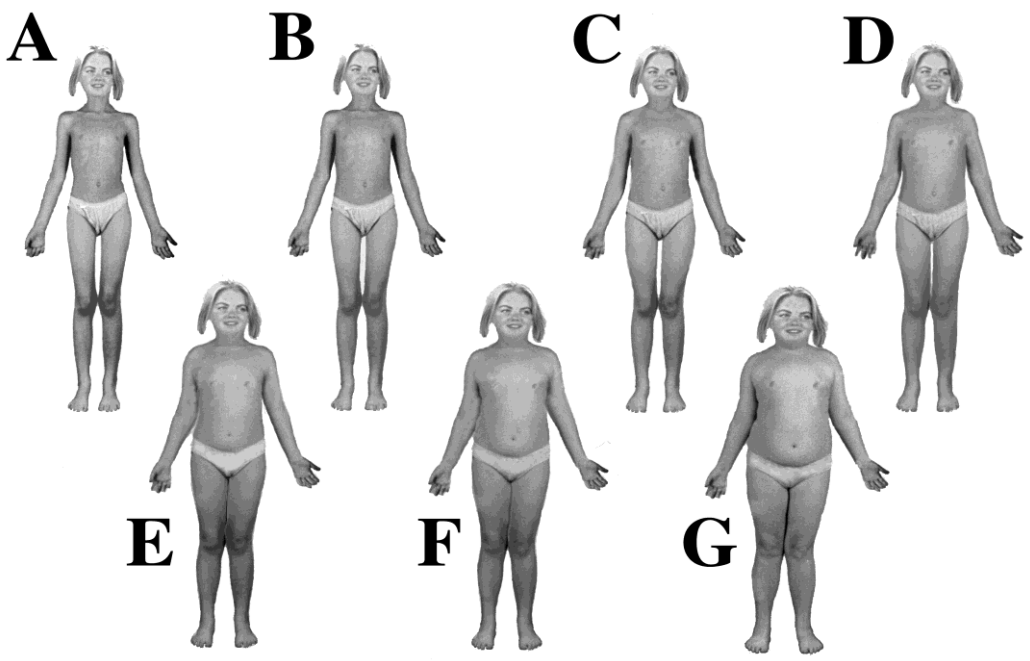

Figure 3.1 Children's Body Image Scale figure array: female.

3.2.3 Children's Eating Attitude Test (Maloney, et al., 1989).

Disordered eating attitudes were assessed using the Children's Eating Attitudes Test (ChEAT; see Appendix B), a linguistically simplified version of the abbreviated adult Eating Attitudes Test (EAT-26; Garner & Garfinkel, 1979). This twenty-six item scale, suitable for children from age 7 years, addresses concerns about being overweight, binging and purging symptoms and food pre-occupation (e.g., "I feel very guilty after eating"). Participants indicated their agreement with each item on a 6-point Likert scale where '6' indicated 'always' and '1' indicated 'never'. The three most incrementally symptomatic responses for each item were scored as 1, 2 and 3 respectively, whilst the remaining three responses received a score of zero. The minimum possible score was 0 and the maximum possible score was 78. Previous research found that the test-retest reliability (*r*) was satisfactory at .81 (Maloney, et al., 1988) whilst the ChEAT's internal reliability was found to be .87 with a group of 308 young adolescent girls (Smolak & Levine, 1994). Factor analysis of data from the latter study produced solutions accounting for under 50% of the variance in scores, indicating that a total ChEAT score remains substantially more informative than the use of subscales.

3.2.4 Child Adolescent Perfectionism Scale (Flett, et al., 1997).

The Child Adolescent Perfectionism Scale (CAPS; see Appendix C) is a twenty-two item scale designed for use with children aged seven and above. It is based upon its authors' two-dimensional conceptualisation of perfectionism in children, and is the more extensively used of the two existing perfectionism measures appropriate to this age group (Rice & Preusser, 2002). Participants indicate their agreement with a statement on a 5-point Likert scale where '1' indicates "true of me" and '5' indicates "not at all true of me". Twelve statements relate to self-oriented perfectionism (SOP) (e.g. "I feel that I have to do my best all the time") and the remaining ten relate to socially-prescribed perfectionism (SPP) (e.g. "There are people in my life that expect me to be perfect"). Three items are reverse-keyed and the order in which the items occur has been randomised. The test-retest reliability (*r*) for the whole scale was found to be .80 over the period of a week, whilst over a year values of .74 and .66 were obtained for the SOP and SPP subscales (Castro, et al., 2004; Flett, et al., 1997). Internal consistency values for the whole scale (.85) and the subscales (.75 and .82 respectively) are adequate (Castro, et al., 2004).

3.2.5 Multidimensional Anxiety Scale for Children (March, Parker, Sullivan, Stallings, & Conners, 1997).

The Multidimensional Anxiety Scale for Children (MASC; see Appendix D) is based upon the DSM-IV paediatric anxiety diagnoses (American Psychiatric Association, 1994), and the scale is suitable from the age of 8 years. It consists of 39 items comprising four major factors of which three contain two sub-factors. Twelve items assess physical symptoms, half of which comprise the tense/restless subscale (e.g. "I'm jumpy") and half the somatic autonomic subscale (e.g. "I have pains in my chest"). Nine items assess social anxiety, six of which comprise the humiliation/rejection subscale (e.g. "I worry about other people laughing at me") and three the performing in public subscale (e.g. "I'm shy"). Nine items assess separation anxiety (e.g. "I try to stay near my mum or dad"). Nine items assess harm avoidance, five of which comprise the anxious coping subscale (e.g. "I check to make sure things are safe) and four the perfectionism subscale (e.g. "I always ask permission"). Participants indicate their agreement with each item on a 4-point Likert scale where '3' indicates "often true about me" and '0' indicates "never true about me".

Item order was randomised during construction. For all subscales internal reliability (r) exceeds .65 (Muris, et al., 2002). Test-retest reliability for total MASC score at three weeks and three months was found to be .79 and .93 respectively (March, et al., 1997). Both

global and subscale scores on the MASC are strongly associated with concomitant scores on four other childhood anxiety scales (Muris, et al., 2002). Given the simultaneous use of the CAPS, it is worth noting that the MASC perfectionism subscale has recently been found to reflect a construct more akin to compliance and social conformity than perfectionism (Klibert, Langhinrichsen-Rohling, & Saito, 2005) and thus its conceptual similarity to the CAPS is limited.

3.2.6 Socioeconomic status: Free school meals uptake (FSM).

In order to assess the socioeconomic status (SES) of the participants, data regarding the proportion of pupils aged 5 to 11 in receipt of FSM at each school was obtained from Durham County Council. In England and Wales, eligibility to receive FSM relies upon the child's immediate caregiver(s) being in receipt of other benefits. These include Income Support, Income-based Jobseeker's Allowance, Income-related Employment and Support Allowance, support under Part VI of the Immigration and Asylum Act 1999, the Guarantee element of State Pension Credit and / or Child Tax Credit, provided they are not entitled to Working Tax Credit and have an annual income (as assessed by HM Revenue & Customs) that does not exceed a specific threshold per annum (p/a). In 2008, the year in which stage 1 of the study was carried out, this threshold was £15,575 p/a. In 2009, this threshold changed to £16,040 p/a and it remains at this level as at the date of writing (DFES, 2009).

For the purposes of this study, FSM data are specific to the school rather than the individual participant: this limits the extent to which school-wide FSM can account for individual differences. Other, more general, limitations of the measure include the fact that it is contingent upon being eligible for, and claiming, other benefits (Storey & Chamberlin, 2001). It nevertheless functions as the best centrally-available index of material deprivation for the school's pupils and their families (Wardle & Watters, 2004). Acquiring SES information such as parental occupation and income directly from adolescents is hampered by high proportions of missing and inaccurate data (Tuinstra, Groothoff, van den Heuvel, & Post, 1998). With young children it is virtually impossible. In its support, the measure shows stability over time insofar as the vast majority (86%) of families claiming FSM one year will continue to claim it three years later (Hobbs & Vignoles, 2007). FSM data have been used in multiple large-scale British longitudinal studies, including the Avon Longitudinal Study of Parents and Children (Golding, Pembrey, Jones, & The Alspac Study, 2001).

3.3 Procedure

Time 1 data collection took place between January and April 2008. Time 2 data collection took place throughout January to May 2010, between 21 and 29 months after Time 1 data were gathered (mean interval = 25.5 months, *SD* = 2.5 months).

3.3.1 Adult consent.

The head teacher and governors of each school received written and verbal information about the study and provided their consent. Teachers at the school then either distributed Information and Consent forms to the caregiver at the school gates or sent the forms home with each child in the target age-bracket (see Appendix E for Information and Consent form). The form provided details of the study and requested that caregivers return the tear-off response slip giving their positive, informed written consent to their child's participation in Time 1 data collection. As parental reading abilities vary widely between schools in different areas of County Durham and Hartlepool, the head teacher of each school assisted in fine-tuning the permission letter before its distribution to parents. The basic contents of the letter remained the same between schools. At Time 2 caregivers' consent to further participation was sought using a similar letter (see Appendix F).

3.3.2 Child assent.

On the day of testing, participants whose parents had returned completed, affirmative consent form were themselves given an age-appropriate information and assent form prior to participation (see Appendix G). The form was developed in conjunction with a primary school teacher and aimed to ensure truly informed assent from the participants themselves, using age-appropriate language and ideas. I read the contents of the form aloud and then led a discussion of the contents around the participants' questions before inviting the child to complete the form. I also asked questions to check participants' understanding of the right to withdraw at any time, the right to ask questions at any time, the right to miss out parts of the questionnaires if desired and the complete confidentiality and anonymity of the participant's responses from peers, teachers and parents. The same questions were discussed at the end of participation, and information about retroactive withdrawal from the study was contained in the debrief letter (see 'After participation'). Children who assented to participation signed and dated the form. Children provided their written assent at both Time 1 and Time 2.

3.3.3 Assessments.

Participants were assessed in groups of eight children or fewer seated in a quiet classroom during the school day. I welcomed the group of participants, introduced myself and gave a five minute introduction to the purpose of the study. Participants were then seated so that they were unable to see the responses of others. Once they had assented to participation they commenced completion of the psychometric measures. At this point each participant was assigned a unique number with which all their anonymised data were associated.

The psychometric scales in this study have been used successfully in previous studies with children of this age group and were established and appropriate psychometric tools for this population. During assessment sessions, participants were not expected to work any more intensely or rapidly than they would during a classroom session of the same duration as the testing session and were given at least equivalent access to breaks and recreation. Participants were asked to refer any questions to the author rather than their peers and to hand in each questionnaire immediately upon completion. The aim was to cultivate a relaxed and friendly atmosphere, and participants were encouraged to take breaks.

Before participants began each questionnaire they received standard written and verbal instructions and discussed key terms and definitions with me and each other. To ensure that participants fully understood scale items I read them aloud, slowly to participants as they completed them. Simple definitions and/or paraphrasing of potentially problematic terms and ideas were provided and specified in advance. Participants participated in an informal discussion of these terms and their underlying meaning before beginning the questionnaire. A list of the standard definitions and paraphrasing used can be found in Appendix H. Participants' understanding was systematically checked, item by item, by their response to my questions e.g. "what did we decide *feeling tense and uptight* meant? What words could have been used instead of *tense and uptight*?" Participants were permitted to work at their own pace if they wished to proceed at a faster rate, but all were required to stop and listen to the instructions for each new questionnaire. A relaxed and friendly atmosphere was cultivated, and participants were encouraged to take breaks.

When the psychometric questionnaires had been completed, participants were then individually measured for weight and height as specified in subsection 3.2, with another adult in the vicinity. Participants' weight and height were not visible to anyone other than me and, upon request, the individual participant. Advice was taken from a research psychologist and senior nutritionist who have carried out measurements of this kind in research projects in

schools in this area as regards the acceptability of the procedures involved. The Department of Health regularly requires that such measurements be taken in primary schools – for example, via the National School Measurement Programme (National Health Service Information Centre, 2010) – and the procedure was therefore a familiar one to most children. Participants were expressly discouraged from attempting to compare weight and height with their peers if they chose to be informed of the values.

3.3.4 After participation.

Upon completing all the required activities participants received a verbal debrief which repeated the information provided to them before commencing the study. They were given a chance to ask questions, and they then received an information sheet to read and take home to their caregivers (see Appendix I). This sheet included details of contacts (myself and my supervisor). This information was aimed at both the participants and their caregivers, and as such was presented in age-appropriate language and structured using a series of simple questions and answers. Before leaving the testing room participants' emotional wellbeing was checked verbally by the author. Participants received a certificate of thanks and a small novelty sticker in appreciation of their efforts.

3.3.5 Contingencies.

In the course of the testing session I observed participants for signs of emotional distress and planned to discontinue participation in the event or possibility of such distress. Teachers of participants were provided with details of the author and her supervisor should they have concerns about any specific child. No concerns were raised by teachers and no participants showed distress during testing. No concerns were expressed by participants or caregivers following participation. One caregiver contacted me to ask for information about the findings of the study once they were published.

None of the psychometric scales were diagnostic tools so was not possible for frank psychopathology to be identified in the course of the study. In the case of children with significantly higher than usual scores on one or more of the psychometric tests I planned to first assess the test sheet for test-completion factors (such as patterned or markedly inconsistent answering) in the high scorers and, second, consult with a general practitioner and a child clinical psychologist regarding any further steps to be taken (whilst maintaining the child's anonymity). Where the original author of a particular psychometric scale had not specified an upper cut-off score, a 'higher than usual' score was pre-defined as a score

exceeding 3 standard deviations above the mean for the test population. In the event it was not necessary to review any of the participant data with a medical professional.

3.4 Follow-up Data Collection

In October 2009, the schools provided information about any participants who had left the school during the intervening period. All remaining Time 1 participants were contacted via the school and caregiver permission sought for the girl to take part in Time 2 data collection (see Appendix F). Two identical letters were sent, two weeks apart, and each letter was individually addressed to each girl and her family in an attempt to maximise response rates. Each letter comprised an information sheet about the study's purposes, a recap of what was done at Time 1 and an invitation to provide consent for participation at Time 2. They were asked to return a tear-off slip confirming the child's date of birth and providing the caregiver's informed consent. Where consent forms were not returned, enquiries were made with the school to ascertain whether the child had left the area, was absent due to illness or had simply not returned a form. Of the 194 participants in Time 1 data collection, 138 participated in Time 2 data collection (70%).

All the psychometric measures used at Time 1 were used again at Time 2, and children were again anthropometrically measured for weight and height. Data collection proceeded as described in subsection 3.3, with the addition of two extra measures to complement measures of existing variables: a second measure of SES and a second measure of body dissatisfaction. The SES measure (the FAS II) is described in subsection 3.4.1. The second body dissatisfaction scale (the BMS) is described in subsection 3.4.2. Since the BMS was developed specifically for use in these projects, details of its development and validation process are given.

3.4.1 Family Affluence Scale II (Boyce, Torsheim, Currie, & Zambon, 2006).

The Family Affluence Scale II (FAS II; see Appendix J) is an index of relative family material deprivation that does not require parental input. This measure was introduced as an individual level measure of socioeconomic status to complement the existing school-wide figures for FSM uptake. Children, particularly those in primary education, tend to provide inaccurate and incomplete reports of their caregiver(s) socioeconomic status, such as occupational category or income (Currie, Elton, Todd & Platt, 1997). The FAS II achieves a higher response-rate and accuracy by asking children about simple, accessible elements of

everyday life, which reflect the affluence of their family. The FAS II also accommodates children living in non-traditional family structures by eliminating the emphasis on both maternal and paternal variables. It has been most widely used with children from age 11 but is suitable for children with a reading age of 6 to 7 years. It has been used in several large international studies such as the World Health Organisation Health Behaviour in School-Aged Children (HBSC) Survey (Currie, 2008).

The FAS II includes four item categories: participants are asked to endorse a sentence in each item category that best describes their family circumstances. One item category asks about the number of vehicles owned by the family, another whether or not the child has his/her own bedroom, another the number of family holidays in the last year and the last item the number of computers owned by the family. A composite score of the four items is produced, classifying the participant's family affluence level as low (score 0,1 or 2), medium (score 3, 4 or 5) or high (score 6, 7, 8, or 9). Children's endorsement of the scale items is reasonably consistent (κ = .41 - .74) with their parents' endorsement of the same items (Andersen et al, 2008), whilst FAS II scores and paternal occupation show a modest (r = .35) association (Currie et al, 1997). Internal consistency estimates for the FAS II have tended to be low e.g. r = .31 (Boudreau & Poulin, 2009) and r = .35 (Lin, 2010). Currie et al (2008) have argued that the FAS, as a formative scale, has not been designed to tap a specific, narrow latent construct but rather to provide a summated index of wealth. As such, they have previously contend that high internal consistency values should not be expected.

3.4.2 Body Manipulation Software (Evans & Tovée, 2012).

At Time 2, participants' body dissatisfaction was assessed using both the CBIS and a novel, unpublished computer-based figure choice scale, the Body Manipulation Scale (Evans & Tovée, 2012).

3.4.2.1 Rationale.

This scale was developed in response to a number of concerns about the CBIS and similar figure-choice scales used to measure girls' evaluative body dissatisfaction. Such scales (e.g., Collins, 1991) typically feature fewer than ten figures from which participants can choose, resulting in relatively coarse gradations of measurement. The figures are usually presented as a complete array, arranged in order of increasing size, potentially encouraging regression to the mean. Finally, figures tend to be line drawings, poorly defined and distributed arbitrarily across the distribution of adiposity. Whilst Truby and Paxton's (2002)

scale has the advantage of photographic images of children within a known BMI range, it fails to sample equally across the full spectrum of adiposity (see Table 3.1).

This scale, therefore, was designed to provide several advantages over similar instruments. In keeping with recent recommendations, it provided a greater number of figures than pre-existing alternatives–thus minimising scale coarseness–and the adipose variation of its array of figures was based upon the full distribution of anthropometric data as opposed to an artist's impression, in order to achieve realism (Gardner & Brown, 2010). It assessed evaluative body dissatisfaction in a similar manner to the CBIS but without the use of a continuously-present ordered visual array, presenting only one figure at a time which appeared to 'morph' into the next.

3.4.2.2 Scale development.

As with the CBIS, participants were required to select a figure that they considered most resembled their own (self) and one they most wished to resemble (ideal). The figures were created by Dr Martin Toveé, a specialist in the creation of life-like, anthropometrically accurate 3D human images. Each figure depicted a young photorealistic female, generated in Daz Studio 3.1 Version 9 (http://www.daz3d.com) to reflect the proportions of a Caucasian nine and a half year old girl (Victoria 4.2 Model) using the "youth" scale on the Morphs++ package. The body shape of this figure was then altered to create a continuum of body shapes simulating 12 different adipose levels, which were then rendered and exported as 24-bit colour BMP image files (567 x 846 pixels) for use as stimuli. The face-on figures shared the same facial 'identity' and wore identical one-piece swimsuits. As previously stated, only one version of the figure was shown on the computer screen at any one time.

The body volume of each figure was measured by exporting each 3D body model into Autodesk 3ds Max Version 8 (http://www.usa.autodesk.com) as a wavefront object, assuming the body had a height of 1.4m (average height of the participants in this study). Weight was then estimated, assuming that the bodies had an average density of 1.1g/cm^3 (Durnin & Taylor, 1960): from this BMI could then be calculated. The figures corresponded consecutively to BMIs on the 2nd, 5th, 10th, 20th, 35th, 50th, 65th, 75th, 85th, 90th, 93rd and >95th percentiles of the CDC reference (Ogden, et al., 2002) for girls aged 9.5 years. The figures ranged in apparent body mass index from 13.4 to 22.6 in 12 intervals. Table 3.1 displays the BMIs and centiles represented by the BMS images alongside those represented by the images on the CBIS for ease of comparison.

Table 3.1 Body manipulation scale (BMS) and Children's Body Image Scale (CBIS) stimulus images compared on simulated body mass index (BMI)

BMS	Simulated BMI (assuming height 1.4m and age 9.5 years)	BMS Figure: CDC 2000[a] percentile	BMS Figure: WHO 2007[b] growth standards	Equivalent CBIS image	CBIS Figure: CDC 2000[a] percentiles	CBIS Figure: WHO 2007[b] growth standards
1	13.4	2nd	3rd	A 13.0–13.5	1st – 2nd	1st – 3rd
2	13.9	5th	6th	B 13.6–14.9	2nd – 18th	4th – 20th
3	14.2	8th	9.5th			
4	15.0	20th	22nd	C 15.0–16.6	19th – 50th	21st – 54th
5	15.8	34th	38th			
6	16.7	51st	56th	D 16.7–17.7	51st – 68th	55th – 73rd
7	17.5	66th	71st			
8	18.5	76th	82nd	E 17.8–19.4	69th – 84th	74th – 89th
9	19.4	84th	90th			
10	20.4	91st	94th	F 19.5–24.6	85th – 97th	90th – 99.4th
11	21.5	93rd	97th			
12	22.6	95th	>98th			
-		-	-	G 24.7 – 28.5	> 97th	> 99.7th

Note. [a] Center for Disease Control (2000) centiles; [b] World Health Organisation (2007) centiles

3.4.2.3 Procedure of use.

Participants were seated, one-by-one, next to the experimenter. In front of them was a desk, a laptop and an external mouse. The laptop computer screen showed the first computer-generated figure in the sequence. Participants were asked to adjust the dimensions of the figure by moving the mouse left or right: one direction increased the apparent adiposity of the figure, whilst the other decreased it. Participants were asked to identify both their preferred figure (ideal) and their perceived figure (self) in this way. Instructions were displayed on screen, and were also read aloud to the participant. By pressing the mouse button, the participants saved their response once the figure displayed on screen depicted their chosen size of figure. Both the left/right directionality of the size change and the order

in which the questions were asked were randomised. Figure 3.2 illustrates some of the stimulus images used; the full range of images is presented in Appendix K. Participants completed a practice trial to familiarise themselves with the paradigm before undertaking the task.

Figure 3.2 Body manipulation scale stimulus images consisting of figures of simulated body mass index 13.4 kg/m^2, 16.7 kg/m^2 and 22.6 kg/m^2 respectively

The computer program recorded data about the exact lateral position of the cursor on the screen when the participant 'clicked' to endorse a figure. Cursor position ranged from – 50 frames to + 50 frames and changes in cursor position give rise to changes in the adiposity of the figure displayed. As such this represented a sensitive interval-level figure choice measure which, nevertheless, permitted the simulated BMI of the figure chosen to be specified. The discrepancy between the two recorded positions was used to indicate the direction and extent of body dissatisfaction: a negative difference indicated a smaller ideal body than perceived.

3.4.2.4 Validation of the BMS.

The BMS was validated with a separate sample of 51 girls aged between 8 and 12 years old (mean age = 10.3 years; *SD* = 0.7) recruited from schools that participated in the cross-sectional study, two years after that study was completed. Participants completed the BMS, the CBIS and the body esteem scale (BES; Mendelson, White, & Mendelson, 1996) on two occasions, 14 days apart. During each testing session, the BMS was administered twice – once at the beginning of the session and once at the end – to derive internal consistency

values. A mean of the two figures identified per session as 'self' was calculated, and a mean of the two figures identified per session as 'ideal' was also calculated. These values were used in calculating test-retest reliability.

Good internal consistency values for ideal (α = .80) and perceived (α = .92) figure were obtained (Evans & Tovée, 2012). Two week test-retest reliability values for ideal (r = .68) and perceived (r = .67) figure were found to be adequate. These test-retest data are comparable to those obtained with populations of a similar age (Collins, 1991; Truby & Paxton, 2008). The body dissatisfaction scores showed good convergent validity with those derived from the CBIS (r = .69) and from the weight satisfaction subscale (r = .60) of the BES (Truby & Paxton, 2002).

3.5 Data Confidentiality and Handling

The participant's name appeared only on the two consent forms (caregiver and participant) for each timepoint. The questionnaires were marked with an anonymous unique numerical identifier. A record of the child's name, date of birth and identifier was stored separately from the rest of the data for use in the case of retroactive withdrawal of consent by either caregiver or participant. All data were stored in compliance with the Data Protection Act (1998). Caregivers were informed of the author's intention to publish the anonymous data as part of a PhD thesis and concomitant journal publications.

3.6 Ethical Opinion

The study received clearance from the Durham University Psychology Department Ethics Committee in November 2007 for Time 1 and Time 2 data collection. Clearance for the use of the additional measures used at Time 2 was received from the committee in October 2009.

Chapter 4: Study 1 Results

4.1 Introduction to Within-time Analyses

This chapter presents the analyses of data gathered two years apart at Time 1 (T1) and Time 2 (T2). The within-time data for T1 and T2 are analysed separately in subsections 4.2 to 4.18, in each case providing reliability data, descriptive statistics, correlations and regression of predictor variables upon disordered eating attitudes and body dissatisfaction. Across-time analyses take place in subsections 4.20 to 4.28, and are introduced separately in subsection 4.19.

4.2 Time 1: Psychometric Properties of the Measures

Internal reliability estimates for scores on the psychometric measures used at T1 were calculated using Cronbach's coefficient alpha, as recommended by Nunnally (1978). They are shown in Table 4.1.

Table 4.1 Time 1: Internal reliability coefficients for psychometric scales

Measures	N	α
Anxiety [a]	189	.90
Physical symptoms		.79
Harm avoidance		.72
Social anxiety		.77
Separation anxiety		.65
Perfectionism [b]	190	.82
Self-oriented		.71
Socially-prescribed		.74
Eating attitudes [c]	190	.80

Note. [a] Multidimensional Anxiety Scale for Children (March et al, 1997), [b] Children and Adolescent Perfectionism Scale (Flett et al, 1997); [c] Children's Eating Attitude Test (Maloney et al, 1989)

For the 22 item Child and Adolescent Perfectionism Scale (CAPS; Flett, et al., 1997) Cronbach's coefficient α was calculated for the 12 item self-oriented perfectionism (SOP) and the 10 item socially prescribed perfectionism (SPP) subscales respectively as well as for the scale as a whole. Likewise, an overall Cronbach's α value for the Multidimensional Anxiety Scale for Children (March, et al., 1997) was calculated as well as for all four subscales (Physical symptoms: 12 items; Harm avoidance: 9 items; Social anxiety: 9 items; Separation anxiety: 9 items). The internal consistency of the Children's Eating Attitude Test (Maloney, et al., 1989) was assessed by calculating co-efficient α for the full 26-item scale (shown in Table 4.1). The co-efficient α for a 23-item version of the ChEAT was also calculated, as advocated by Smolak and Levine (1994) to improve internal consistency, omitting items 13, 19 and 25. Since the omission of these items resulted in an only slightly increased α value of .83 the data from the 26 item scale were retained. All of the scales and subscales evidenced adequate to very good internal consistency.

4.3 Time 1: Descriptive Statistics and Data Screening

The data were assessed for floor or ceiling effects and missing values. There were 8 data points missing from the anxiety scale data, 5 from the disordered eating attitudes data, 4 from the locus of control data and 3 from the perfectionism data. In all cases the missing data were due to partial or ambiguous completion of the scale measure by the participant. There was no evidence of floor or ceiling effects for any of the variables. Descriptive statistics for all variables at T1 are presented in Table 4.2.

Table 4.2 Time 1: Descriptive statistics for all Study 1 variables

Measures		N	Maximum possible	Mean	*SD*	Median	Minimum to maximum
Age (decimal years)		194	--	8.6	.6	8.6	7.3 – 9.9
Height (m)		194	--	1.3	.1	1.3	1.2 – 1.5
Weight (kg)		194	--	30.6	7.0	29.1	18.2 – 66.6
BMI (kg/m^2)		194	--	17.5	2.9	16.8	12.4 – 30.5
Body image							
Paper scale [a]	Dissatisfaction	194	6	-.9	1.5	-1	-6 – 3
	Ideal size	194	6	2.4	1.2	2.0	1 – 6
	Perceived size	194	6	3.3	1.5	3.0	1 – 7
Anxiety [b]		189					
Physical symptoms			33	15.4	7.4	14.0	0 – 33
Harm avoidance			27	18.8	5.2	20.0	0 – 27
Social anxiety			27	13.7	6.2	14.0	0 – 26
Separation anxiety			27	11.7	5.4	12.0	0 – 27
Perfectionism [c]		190	110	65.8	15.0	64.5	32 – 99
Self-oriented			60	37.9	8.3	37.9	18 – 60
Socially-prescribed			50	28.1	8.3	28.1	13 – 46
Eating attitudes [d]		192	78	18.2	12.8	15.5	0 – 63

Note. [a] Children's Body Image Scale (CBIS; Truby and Paxton 2002), [b] Multidimensional Anxiety Scale for Children (MASC; March et al 1997), [c] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [d] Children's Eating Attitudes Test (ChEAT; Maloney et al 1989).

Data for each variable were examined for their fit to a normal distribution. This involved a range of techniques including scrutiny of histograms and P-P plots, boxplots and values of kurtosis and skewness. Two variables (disordered eating attitude score and BMI) were logarithmically transformed to normalise their univariate distributions (Velleman & Hoaglin, 1981). The untransformed original variables were used for the descriptive statistics whilst the transformed variables were used for the subsequent correlations and regression analyses, including longitudinal analyses.

4.3 Characteristics of the T1 Sample Population

Out of the 466 potential participants in the Time 1 data collection, the caregivers of 198 girls returned a form (42%) giving their consent to participation. On the day of testing, four girls were absent from school and remained unavailable. The mean age of participants on the day of testing was eight years and seven months (ranging from 7 years and 5 months to 9 years and 10 months with a standard deviation of 7 months). 191 participants were Caucasian and 3 were of mixed race (British-Asian).

4.4 Time 1: Characteristics of the Sample Population

The distribution of body mass index values in the sample population is illustrated in Figure 4.1, showing a characteristic positive skew.

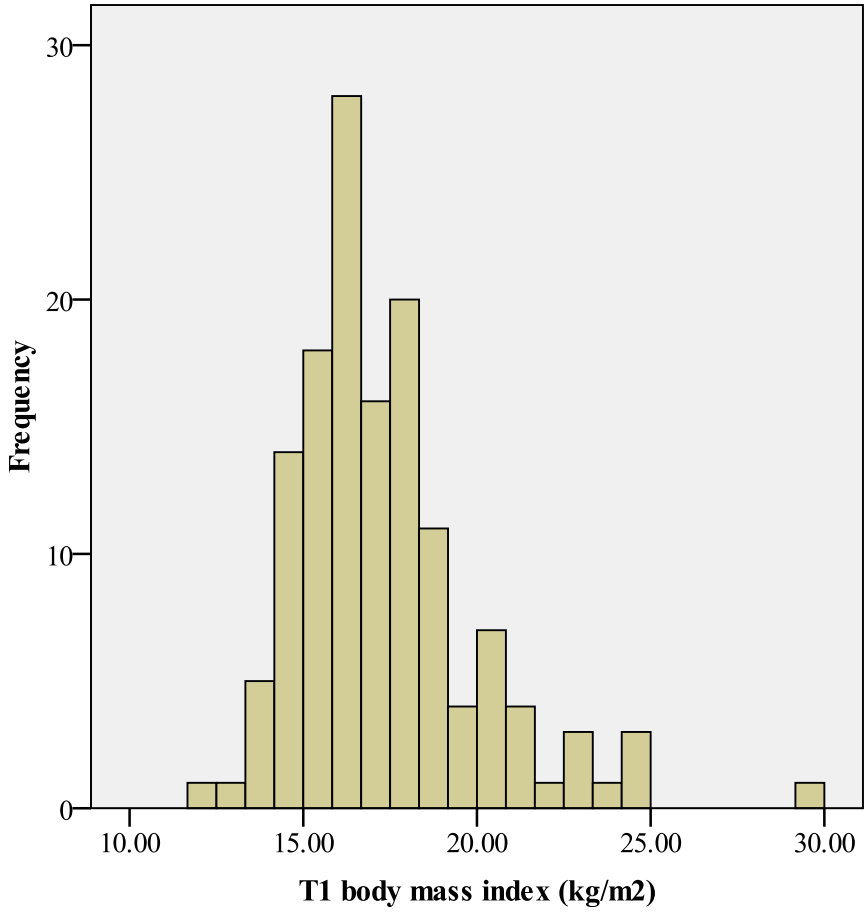

Figure 4.1 Time 1: Distribution of participants' body mass index

The T1 body mass index data were screened using International Obesity Task Force (IOTF) body mass index cut-offs for thinness, overweight and obesity (Cole, et al., 2000).

These cuff-offs are defined to extrapolate to a BMI at age eighteen of 17, 25 and 30 kg/m^2 respectively, and are age specific to the nearest 6 months (Cole, et al., 2000; Cole, Flegal, Nicholls, & Jackson, 2007). Using these cut-offs, three participants (2%) were categorised as thin, one-hundred-and-forty-seven (75%) were of normal weight, thirty-four (17%) were overweight and thirteen (7%) were obese.

Table 4.3 shows the number of participants recruited from each school, and the proportion of pupils attending the school who were in receipt of free school meals (FSM). Schools and their pupils were classified as 'low' (n = 72) or 'high' (n = 122) socioeconomic status depending on whether they fell above or below the national average FSM uptake for primary schools which, in 2008, was 15.5% (Office of National Office for National Statistics, 2008). The data shown are ranked in order of increasing FSM uptake.

Table 4.3 Time 1: School socioeconomic status based on proportion of pupils receiving free school meals (FSM)

School ID	*n*	FSM uptake (%)	SES
14	25	0	High
8	14	0	High
13	9	3.4	High
4	8	3.5	High
3	8	5.2	High
15	6	5.8	High
2	10	6.2	High
6	20	7.7	High
5	7	9.1	High
12	15	10.5	High
9	13	25.3	Low
10	9	30.2	Low
1	21	37.7	Low
7	21	46.0	Low
11	8	48.0	Low

4.5 Time 1: Correlations

Table 4.4 shows the bivariate Pearson correlations between the main variables.

Table 4.4 Time 1: Bivariate correlations between key variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Age (decimal years)	-															
2. Height (metres)	**.39**	-														
3. Weight (kilograms)	**.29**	**.70**	-													
4. Body mass index (kg/m^2) ǂ	.17	**.37**	**.91**	-												
Body image [a]																
{ 5.Dissatisfaction [b]	**-.14**	**-.25**	**-.37**	**-.36**	-											
{ 6. Ideal size	-.14	-.05	.10	.14	**.45**	-										
{ 7. Perceived size	.04	**.23**	**.47**	**.50**	**-.69**	**.34**	-									
8. Anxiety (total) [c]	.07	-.01	-.01	-.02	-.11	-.09	.05	-								
9. Physical symptoms	.02	-.01	-.00	-.02	-.10	-.04	.09	**.86**	-							
10. Harm avoidance	.07	.10	.07	.02	-.03	-.07	-.02	**.65**	**.35**	-						
11. Social anxiety	**.15**	-.05	-.02	.01	-.13	-.08	.08	**.86**	**.65**	**.47**	-					
12. Separation anxiety	-.01	-.05	-.07	-.07	-.07	-.12	-.01	**.83**	**.67**	**.39**	**.62**	-				
13. Perfectionism (total) [d]	**-.21**	-.08	-.09	-.06	**-.15**	**-.19**	.01	**.26**	**.30**	.05	**.21**	**.24**	-			
14. Self	**-.18**	-.08	-.09	-.07	**-.16**	**-.24**	-.03	**.17**	**.21**	.03	**.15**	.14	**.90**	-		
15. Social	-.19	-.07	-.06	-.04	-.12	-.10	.04	**.30**	**.34**	.06	**.23**	**.29**	**.90**	**.61**	-	
16. Eating attitudes [e] ǂ	-.06	-.10	-.01	.02	**-.22**	-.09	**.15**	**.22**	**.23**	-.00	**.19**	**.25**	**.36**	**.30**	**.33**	-

Note. All correlations Pearson's *r*; [a] Children's Body Image Scale (CBIS; Truby and Paxton 2002), [b] Perceived minus ideal figure category; [c] Multidimensional Anxiety Scale for Children (MASC; March et al 1997), [d] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [e] Children's Eating Attitudes Test (ChEAT; Maloney et al 1989), ǂ transformed variable utilized for analyses; Significant values marked in boldface, $p < .05$.

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4.6 Time 1: Body Size Perception, Dissatisfaction and Adiposity

The mean perceived body size category identified by participants on the CBIS (see Table 4.2) corresponds to a BMI range of 15.0 – 16.6 kg/m^2. Figure 4.2 illustrates the spread of data for the CBIS perceived category in comparison with the corresponding CBIS category for the participants' measured BMI.

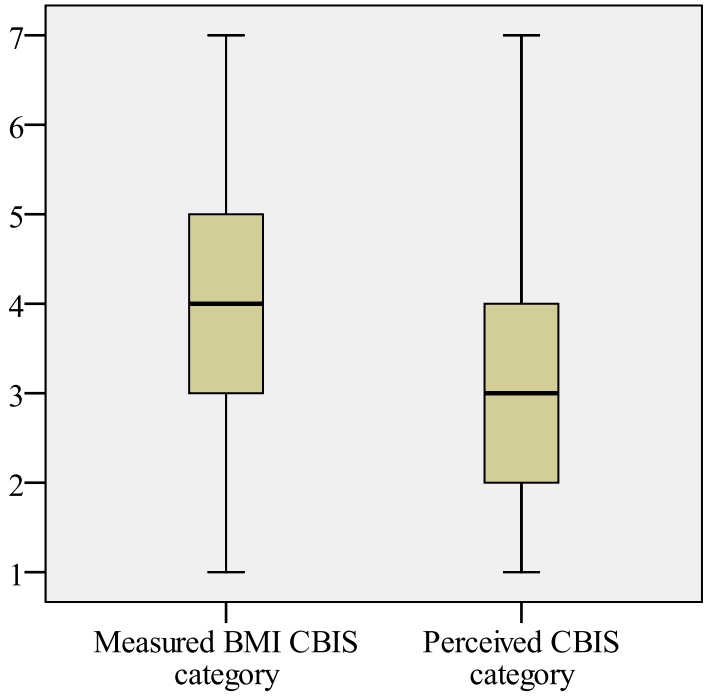

Figure 4.2 Time 1: Participants' measured body size compared to their perceived body size using Children's Body Image Scale categories. Boxes represent upper and lower hinge whilst whisker endpoints denote the maximum and minimum values or upper inner fence and lower inner fence, whichever is the closest to the median.

The directional discrepancy between participants' measured BMI category and their perceived body size category was used as an approximate indicator of their perceptual accuracy. The difference between the mean measured BMI category (3.9, *SD* = 1.4) and the mean perceived category (3.3, *SD* = 1.5) indicated that, overall, participants underestimated their body size by, on average, .6 category (*SD* = 1.5). A Student's t-test showed that the extent of this underestimation reached significance ($t_{(194)} = -5.74$, $p < .001$). Non-directional perceptual accuracy was calculated by converting the directional perceptual accuracy scores to uniformly positive values such that a larger value indicated greater inaccuracy irrespective

of under/overestimation. Non-directional perceptual accuracy ranged from 0 to 6 with a mean value of 1.3 categories (*SD*=1.2).

Participants with a higher BMI perceived their body size category with lower directional accuracy (r = -.43, p < .001) on the CBIS at T1. Table 4.5 illustrates the key differences between the body perceptions and preferences of overweight and non-overweight participants. Overweight participants perceived their body size to be significantly larger than the perceived bodies of non-overweight participants. However, they also selected a perceived figure that underestimated their measured BMI category to a significantly greater extent than did non-overweight participants. Overweight participants were also significantly more dissatisfied with their body size than non-overweight participants. However, even when variation in measured BMI was statistically controlled for, directional perceptual accuracy remained strongly negatively associated with body dissatisfaction, indicating that participants who underestimated their body size to a greater extent had concurrently higher levels of body dissatisfaction (r = -.57, p < .001).

Table 4.5 Time 1: Comparisons of mean measured and perceived Children's Body Image Scale (CBIS) categories and body mass index in non-overweight and overweight participants

	Non-overweight (n = 150)	Overweight (n = 47)	t-statistic ǂ
Body mass index (kg/m^2)	16.2	21.5	
CBIS measured category	3.3	5.8	
CBIS perceived category	3.0	4.3	$t_{(72.6)}$ = - 5.9***
Body size underestimation	-.3	-1.5	$t_{(80.9)}$ = 5.5***
CBIS ideal category	2.3	2.8	$t_{(67.0)}$ = -2.4*
CBIS body dissatisfaction	*-.7*	*-1.5*	$t_{(69.6)}$ = 3.1**

Note. ǂ Independent samples Student's t-test with equal variances not assumed; * p < .05, ** p < .01, *** p < .001.

The mean ideal body size identified by participants on the CBIS corresponded to a BMI range of 13.6 – 14.9 kg/m^2. This ideal body size category was on average 1.5 categories smaller on the CBIS than the participant's mean measured BMI category (*SD* = 1.7). Overweight participants selected an ideal figure which was significantly larger than that selected by non-overweight participants (see Table 4.5). As shown in Table 4.4, a smaller

ideal figure was associated with significantly higher levels of SOP. The partial correlation between ideal figure and SOP remained significant when variation in measured BMI was statistically controlled for (r = -.23, p = .001).

4.7 Time 1: Anxiety and Perfectionism

The data supported the hypothesis that perfectionism and anxiety would be associated: total anxiety was associated with both SOP and with SPP. However, not all of the individual anxiety subscales contributed to this association: physical symptoms and social anxiety were associated with both perfectionism subscales whilst separation anxiety was only associated with SPP. Harm avoidance was not associated with either SOP or SPP.

To ascertain whether relationships between the anxiety subscales themselves accounted for the shared variance with SOP, SOP was regressed upon physical symptoms and social anxiety. The regression coefficients are shown in Table 4.6. Whilst the addition of social anxiety to the model decreased the amount of variance in SOP for which the physical symptoms subscale accounted, it remained weakly predictive of SOP at step 2.

Table 4.6 Time 1: Coefficients for the regression of self-oriented perfectionism on physical symptoms and social anxiety

	b	*SE b*	*B*	*F*	R^2	$p\ \Delta R^2$
Step 1						
Constant	34.20	1.41				
Physical symptoms	.24	.08	.21**	8.29	.04	
Step 2						
Constant	33.99	1.57				
Physical symptoms	.22	.11	.19*			
Social anxiety	.04	.13	.03	4.17	.04	.77

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

SPP was then regressed upon physical symptoms, social anxiety and separation anxiety and the regression coefficients are presented in Table 4.7. Neither social anxiety nor separation anxiety made a significant contribution to variance in SPP when physical symptoms were

taken into account. The physical symptoms subscale, in contrast, continued to explain a significant proportion of variance in SPP at step 3.

Table 4.7 Time 1: Coefficients for the regression of socially-prescribed perfectionism on physical symptoms, social anxiety and separation anxiety

	b	*SE b*	*β*	*F*	R^2	ΔR^2
Step 1						
Constant	22.44	1.35				
Physical symptoms	.38	.08	.34***	23.34	.11	
Step 2						
Constant	22.29	1.52				
Physical symptoms	.37	.11	.32**			
Social anxiety	.03	.13	.02	11.26	.11	.82
Step 3						
Constant	21.75	1.58				
Physical symptoms	.30	.12	.27**			
Social anxiety	-.02	.13	-.02			
Separation anxiety	.19	.16	.12	8.26	.12	.23

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

As shown in Tables 4.6 and 4.7, the physical symptoms subscale was the only predictor of both SOP and SPP that accounted for significant amounts of unique variance when the influence of other predictors was taken into account. It is interesting to note that the 4 item 'perfectionism' component of the harm avoidance subscale was not significantly associated with either of the perfectionism subscales, which supports the hypothesis that the MASC 'perfectionism' items measure neither SOP ($r = .08$, $p = .27$) or SPP ($r = .07$, $p = .34$).

4.8 Time 1: Disordered Eating Attitude Score

Figure 4.3 shows the distribution of disordered eating attitude scores at Time 1, which evidenced a pronounced positive skew.

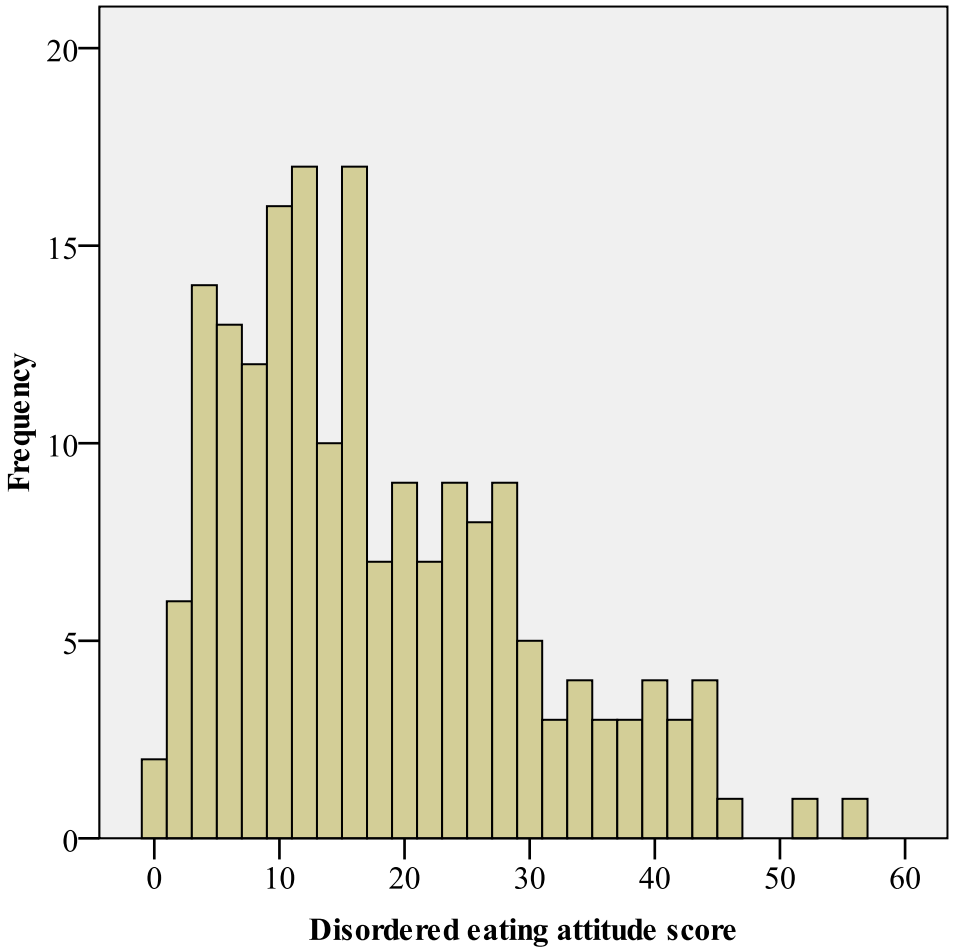

Figure 4.3 Time 1: Distribution of disordered eating attitude (ChEAT) scores

Transformed disordered eating attitude score was significantly negatively associated with body dissatisfaction (see Table 4.4). It was positively associated with total anxiety score, including all MASC subscales except harm avoidance. Disordered eating attitude score was also positively associated with both perfectionism scales. Scores on the anxiety scale as a whole significantly predicted disordered eating attitude score ($F_{4,179} = 4.15$, $p < .01$), as did total perfectionism scale scores ($F_{2,185} = 13.01$, $p < .001$). Table 4.8 shows the regression weights for body dissatisfaction and each significant separate subscale of the anxiety and perfectionism scales.

Table 4.8 Coefficients for the univariate predictors of Time 1 disordered eating attitude (ChEAT) score

Subscale	*B*	*SE b*	*β*	*t*	*p*
Anxiety					
Physical symptoms	.05	.01	.23	3.18	.002
Social anxiety	.05	.02	.19	2.61	.01
Separation anxiety	.07	.02	.25	3.52	.001
Perfectionism					
Self-oriented	.05	.01	.30	4.28	<.001
Socially-prescribed	.06	.01	.33	4.84	<.001
Body dissatisfaction	-.21	.07	-.22	-3.04	.003

To examine the influence of total perfectionism, T1 disordered eating attitude score was regressed upon both SOP and SPP, which were entered into the same block in the model. Together, they significantly predicted disordered eating attitudes ($F_{(2, 185)} = 13.31$, $p < .001$). Next, to look at the effect of total anxiety, T1 disordered eating attitude score was simultaneously regressed upon all four MASC subscales. Total anxiety significantly predicted disordered eating attitude score ($F_{(4,180)} = 4.22$, $p < .01$).

Finally, to examine the effects of these variables in conjunction with one-another, disordered eating attitude score was regressed upon total anxiety, total perfectionism and body dissatisfaction, which were entered into consecutive blocks in the model. The regression coefficients are shown in Table 4.9. At step 3, both total perfectionism and body dissatisfaction remained significant predictors of disordered eating attitude score whilst total anxiety did not.

Table 4.9 Coefficients for the regression of disordered eating attitude (ChEAT) score on total anxiety, total perfectionism and body dissatisfaction

	b	*SE b*	*β*	*F*	R^2	ΔR^2
Step 1						
Constant	3.22	.34				
Total anxiety	.02	.01	.20***	7.58	.04	
Step 2						
Constant	1.62	.49				
Total anxiety	.01	.01	.12			
Total perfectionism	.03	.01	.32***	13.87	.13	< .001
Step 3						
Constant	1.73	.48				
Total anxiety	.01	.01	.09			
Total perfectionism	.03	.01	.30***			
Body dissatisfaction	-.16	.07	-.16*	11.20	.16	<.05

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

4.9 Time 1: Differences with Age and Socioeconomic Status

4.9.1 Differences with age.

Looking at the bivariate correlations shown in Table 4.4, participants' age was positively associated with their weight and height as hypothesized. Contrary to hypothesis, older girls did not have higher BMI values than younger girls, although the relationship approached significance in the expected direction.

Age was also associated with body dissatisfaction such that older girls reported greater dissatisfaction with their bodies. Older girls also reported higher levels of social anxiety, as hypothesized. Younger girls, meanwhile, scored more highly than older girls on both perfectionism subscales, resulting in a significantly higher total score. Contrary to expectation, age was not associated with disordered eating attitude score.

4.9.2 Socioeconomic status.

A series of independent-samples t-tests was carried out to ascertain whether participants from low or high SES schools differed on key variables. The results are shown in Table 4.10. Participants from low SES schools perceived themselves to be significantly

larger than participants from high SES schools, although the groups did not differ on their BMI. Participants from low SES schools also reported significantly higher levels of perfectionism (both SOP and SPP) and disordered eating attitudes than participants from high SES schools.

Table 4.10 Time 1: Comparisons of participants from schools of low and high socioeconomic status (SES) on key variables

		Low SES (n = 72)	High SES (n = 122)	t-statistic ǂ
Age		8.6	8.6	-.6
Height (m)		1.3	1.3	1.4
Weight (kg)		30.6	30.7	-.1
BMI (kg/m^2)		17.6	17.4	.7
Body image				
Paper [a] Scale {	Dissatisfaction	-1.0	-.7	-.3
	Ideal size	2.6	2.3	1.4
	Perceived size	3.6	3.1	2.5*
Anxiety [b]		60.7	58.9	.6
Physical symptoms		16.0	15.0	.8
Harm avoidance		18.1	19.9	-1.2
Social anxiety		13.9	13.6	.3
Separation anxiety		12.6	11.1	1.8
Perfectionism [c]		70.9	62.8	3.7***
Self-oriented		40.2	36.5	3.0**
Socially-prescribed		30.7	26.5	3.5***
Eating attitudes [d]		21.5	15.2	3.7***

Note. ǂ Independent samples Student's t-test with equal variances assumed; [a] Children's Body Image Scale (CBIS; Truby & Paxton, 2002), [b] Multidimensional Anxiety Scale for Children (MASC; March et al, 1997), [c] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [d] Children's Eating Attitudes Test (ChEAT; Maloney et al, 1989); * $p < .05$, ** $p < .01$, *** $p < .001$.

4.10 Time 2: Psychometric Properties of the Measures

Internal reliability estimates for scores on the psychometric measures used at T2 were calculated using Cronbach's coefficient alpha, or the Kuder-Richardson coefficient for the dichotomous Family Affluence Scale (FAS), as recommended by Nunnally (1978). The internal reliability analyses proceeded as described in section 4.1, with the inclusion of the FAS. Data are presented in Table 4.11.

Table 4.11 Time 2: Internal reliability coefficients for psychometric scales

Measures	N	*α*
Family affluence [a]	138	.35
Anxiety [b]	132	.92
Physical symptoms		.86
Harm avoidance		.73
Social anxiety		.88
Separation anxiety		.77
Perfectionism [c]	138	.85
Self-oriented		.68
Socially-prescribed		.85
Eating attitudes [d]	135	.85

Note. [a] Family Affluence Scale (FAS; Boyce et al, 2006); [b] Multidimensional Anxiety Scale for Children (MASC; March et al, 1997); [c] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997); [d] Children's Eating Attitude Test (ChEAT; Maloney et al, 1989).

As in section 4.1, the internal consistency of the Children's Eating Attitude Test was assessed for the 26 item version and the 23 item version (omitting items, 13, 19 and 25). The shorter scale had an α value of .87, which differed only slightly to the value for the 26 item scale, so the items were retained. Whilst the Cronbach's α values were acceptable for most variables, the self-oriented perfectionism subscale value was borderline-acceptable but was,

nevertheless, retained in the analysis. The Family Affluence Scale coefficient α value was unacceptably low.

4.11 Time 2: Descriptive Statistics and Data Screening

Data were screened for floor or ceiling effects. One measure, the Family Affluence Scale, showed clear ceiling effects: 70% of participants obtained the maximum score of 3, whilst only two participants obtained the minimum score of 1. Since the scale had also shown low levels of internal consistency, this variable was excluded from further analyses. There were six data points missing from the computer scale body image data and anxiety scale data, three from the eating attitudes data and one from the paper scale body image data. Table 4.12 shows descriptive statistics for all variables at Time 2.

Table 4.12 Time 2: Descriptive statistics for all Study 1 variables

Measures		*N*	Maximum possible	Mean	*SD*	Median	Minimum to maximum
Age (decimal years)		138	--	10.8	.5	10.8	9.5 – 11.8
Height (m)		138	--	1.4	.1	1.4	1.3 – 1.6
Weight (kg)		138	--	38.9	9.7	36.6	21.9 – 86.6
BMI (kg/m^2)		138	--	18.5	3.3	17.9	13.1 – 32.8
Family affluence scale [a]		138	3	2.7	.5	3.0	2 – 3
Body image							
Paper [b] scale	Dissatisfaction	137	6	-1.0	1.5	-1.0	-5 – 2
	Ideal size		6	2.7	.9	3.0	1 – 5
	Perceived size		6	.7	1.5	3.0	1 – 7
Computer [c] Scale	Dissatisfaction	132	12	-1.3	2.3	-1.0	-9 – 5
	Ideal size		12	4.1	1.5	4.0	1 – 8
	Perceived size		12	5.4	2.2	5.0	1 – 12
Anxiety [d]		132	120	52.7	19.1	51.0	16 – 104
Physical symptoms			36	13.2	6.7	13.0	1 – 29
Harm avoidance			27	17.5	4.6	18.0	5 – 26
Social anxiety			27	13.0	6.6	12.5	0 – 26
Separation anxiety			27	9.3	5.5	9.0	0 – 24
Perfectionism [e]		138	110	60.1	13.3	62.0	29 - 87
Self-oriented		138	60	35.7	7.1	35.0	17 – 59
Socially-prescribed		138	50	24.6	8.6	26.0	10 - 43
Eating attitudes [f]		135	78	13.7	10.9	11.0	0 – 56

Note. [a] Family Affluence Scale (FAS; Boyce et al, 2006), [b] Children's Body Image Scale (CBIS; Truby and Paxton 2002), [c] Computer-based body dissatisfaction scale (BMS; Evans & Tovée, 2012), [d] Multidimensional Anxiety Scale for Children (MASC; March et al 1997), [e] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [f] Children's Eating Attitudes Test (ChEAT; Maloney et al 1989).

Data for each variable were examined for their fit to a normal distribution. This involved a range of techniques including scrutiny of histograms and P-P plots, boxplots and values of kurtosis and skewness. Three variables (disordered eating attitude score, BMI and total anxiety) were logarithmically transformed to normalise their univariate distribution (Velleman & Hoaglin, 1981). The untransformed original variables were used for the descriptive statistics whilst the transformed variables were used for the subsequent bivariate correlations and multivariate regressions. The distribution of socially prescribed perfectionism, shown in Figure 4.11, could not be transformed to normalise it. Consequently, the variable was used with caution in analyses.

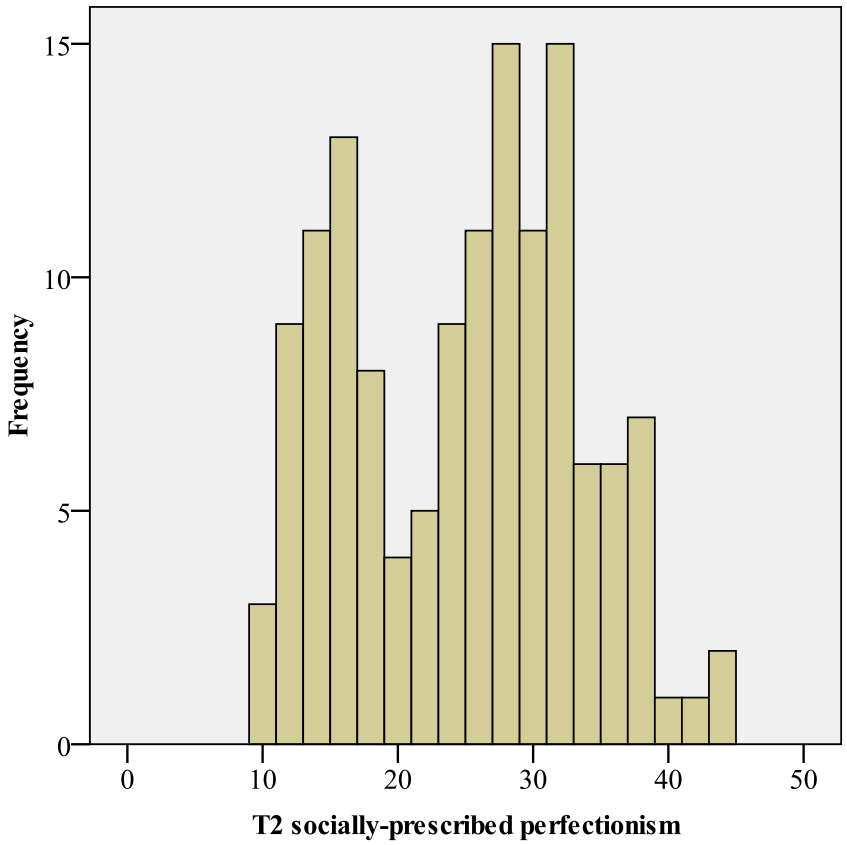

Figure 4.4 Time 2: Non-normal distribution of socially-prescribed perfectionism scores

For bivariate correlations using SPP, Spearman's rho was utilized. When SPP was included in multivariate analyses such as regressions, the distribution of the resultant residuals was scrutinized to ensure sufficient homoscedasticity.

4.12 Time 2: Characteristics of the Sample Population

Participants in T2 data collection had an average age of 10 years and 9 months, ranging from 9 years and 6 months to 11 years and 9 months (with a standard deviation of 6 months). Using the IOTF criteria, three participants were categorised at thin (2%), one-hundred-and-four (75%) were of normal weight, twenty-four (18%) were overweight and seven (5%) were obese.

Table 4.12 shows the number of girls who continued participation at T2 from each school, and the proportion of pupils attending the school who were in receipt of free school meals (FSM). Whilst these proportions had, of course, altered due to sample attrition, the official data on FSM uptake for each school remained substantially the same. As in subsection 4.4.2, schools were classified as 'high' (n = 97) or 'low' (n = 41) SES on the basis of whether they fell above or below the national average for FSM uptake, which – in 2008 – was 15.5% (Department for Children Schools and Families, 2008).

Table 4.13 Time 2: School socioeconomic status based on proportion of pupils receiving free school meals (FSM)

School ID	*n*	FSM uptake (%)	SES
14	16	0	High
8	9	0	High
13	8	3.4	High
4	7	3.5	High
3	5	5.2	High
15	5	5.8	High
2	9	6.2	High
6	17	7.7	High
5	7	9.1	High
12	14	10.5	High
9	6	25.3	Low
10	7	30.2	Low
1	14	37.7	Low
7	8	46.0	Low
11	6	48.0	Low

4.13 Time 2: Correlations

Table 4.14 presents the bivariate Pearson's correlations between the main variables.

Table 4.14 Time 2: Bivariate correlations between key variables

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1. Age (decimal years)		-																		
2. Height (metres)		**.44**	-																	
3. Weight (kilograms)		**.34**	**.74**	-																
4. Body mass index (kg/m^2) ǂ		**.21**	**.43**	**.91**	-															
Body image category																				
Paper scale [a]	5.Dissatisfaction [b]	-.07	**-.35**	**-.64**	**-.69**	-														
	6. Ideal size	**.18**	-.07	.02	.04	**.26**	-													
	7. Perceived size	**.18**	**.30**	**.64**	**.69**	**-.83**	**.33**	-												
Computer scale [c]	8. Dissatisfaction [b]	-.08	**-.29**	**-.47**	**-.44**	**.57**	.14	**-.48**	-											
	9. Ideal size	.03	-.01	.08	.12	-.04	**.32**	**.22**	**.40**	-										
	10. Perceived size	.10	**.30**	**.56**	**.56**	**-.63**	.08	**.66**	**-.78**	**.26**	-									
11. Anxiety [d]		-.05	.02	.01	-.01	-.01	-.04	-.03	-.07	-.09	.02	-								
12. Physical symptoms		.00	.08	.11	.08	-.05	-.02	.04	-.14	-.08	.10	**.82**	-							
13. Harm avoidance		-.03	.02	.02	.01	.06	.03	-.04	.01	.06	.03	**.70**	**.44**	-						
14. Social anxiety		-.00	.09	.06	.03	-.10	-.12	.02	-.12	-.11	.05	**.85**	**.64**	**.46**	-					
15. Separation anxiety		-.09	-.10	-.10	-.10	.05	-.03	-.07	-.00	-.13	-.09	**.76**	**.50**	**.43**	**.55**	-				
16. Perfectionism [e]		-.03	-.06	-.03	.01	-.06	-.05	-.04	-.11	-.03	.11	**.20**	.17	.14	.14	.07	-			
17. Self		.08	-.08	-.05	-.01	-.00	-.06	-.03	-.13	-.10	06	**.18**	.16	**.23**	.12	.11	**.84**	-		
18. Social		-.08	-.02	-.01	.02	-.12	-.04	.08	-.16	-.07	.11	**.17**	**.18**	.07	**.17**	.05	**.91**	**.55**	-	
19. Eating attitudes [f]		-.06	-.01	.08	.11	**-.21**	-.12	.14	**-.28**	-.07	**.25**	**.36**	**.40**	.09	**.41**	**.24**	**.32**	**.27**	**.30**	-

Note. [a] Children's Body Image Scale (CBIS; Truby & Paxton, 2002), [b] Perceived minus ideal figure category; [c] Body Manipulation Software (BMS; Evans & Tovée, 2012); [d] Multidimensional Anxiety Scale for Children (MASC; March et al, 1997), [e] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [f] Children's Eating Attitudes Test (ChEAT; Maloney et al 1989), ǂ transformed variable utilized for analyses; significant values marked in boldface, $p < .05$.

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4.14 Time 2: Body Size Perception, Dissatisfaction and Adiposity

The mean perceived body size category identified by participants on the CBIS (see Table 4.11) corresponds to a BMI range of 15.0 – 16.6 kg/m^2. Similarly, the mean perceived body size category on the BMS corresponds to a BMI range of 15.8 – 16.7 kg/m^2. Figures 4.5 and 4.6 illustrate the spread of data for the CBIS and the BMS perceived categories in comparison with the corresponding category data for the participants' measured BMI.

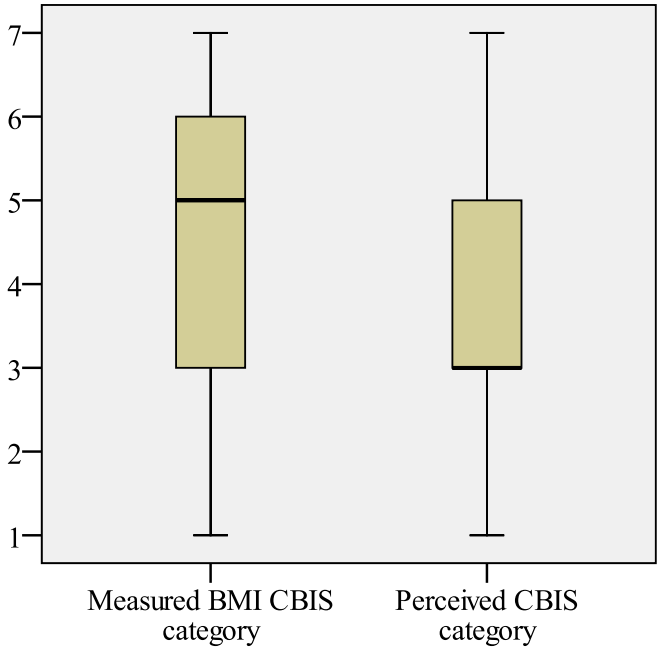

Figure 4.5 Time 2: Participants' measured body size compared to their perceived body size using Children's Body Image Scale (CBIS) categories. Boxes represent upper and lower hinge whilst whisker endpoints denote the maximum and minimum values or upper inner fence and lower inner fence, whichever is the closest to the median.

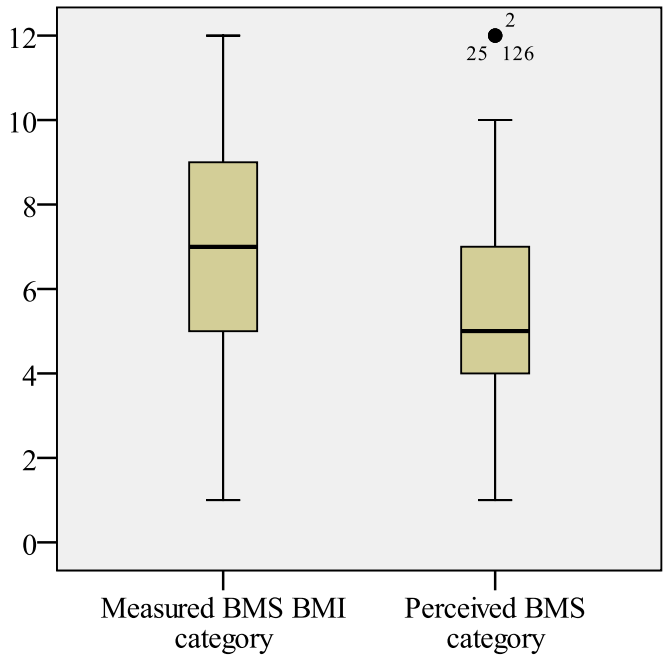

Figure 4.6 Time 2: Participants' measured body size compared to their perceived body size using Body Manipulation Software (BMS) categories. Boxes represent upper and lower hinge whilst whisker endpoints denote the maximum and minimum values or upper inner fence and lower inner fence, whichever is the closest to the median.

As at T1, the T2 directional discrepancy between participants' measured BMI category and their perceived BMI category was used as an index of their perceptual accuracy. For the CBIS, the difference between participants' mean measured body size category (4.4) and their mean perceived body size category (3.7) indicated that they underestimated their size by an average of .7 categories (*SD* = 1.3). Similarly, for the BMS, the difference between participants' mean measured (7.3) and perceived (5.4) categories indicated that they underestimated their size by an average of 1.8 categories. Using Student's t-test the significance of the difference between the measured and perceived categories was confirmed for both the CBIS ($t_{(136)} = -.6.11$, $p < .001$) and the BMS ($t_{(132)} = -7.80$, $p < .001$).

Non-directional accuracy for both scales was calculated by converting the directional perceptual accuracy scores to uniformly positive values such that a higher value indicated greater inaccuracy, whether under or overestimation. For the CBIS, non-directional perceptual accuracy ranged from -5 to 0 with a mean of -1.4 categories (*SD* = 1.2). For the BMS, non-directional perceptual accuracy ranged from 0 to 7 with a mean of 2.6 categories (*SD* = 1.8).

Participants with a higher BMI showed a lower level of perceptual accuracy when identifying their perceived body on both the CBIS ($r = -.27$) and the BMS ($r = -.58$).

Perceptual accuracy was strongly associated with body dissatisfaction at T2, even when measured BMI was controlled for: participants who underestimated their size to a greater degree had lower levels of body dissatisfaction (r = -.59).

Table 4.15 shows the differences in body size preferences and perceptions between overweight and non-overweight participants. The extent of the underestimation did not differ significantly between the two groups for the CBIS, but did differ significantly for the BMS. On the BMS, overweight participants underestimated their weight to a greater extent than non-overweight participants. This difference was not apparent for the CBIS although, given the aforementioned significant correlation between BMI and perceptual inaccuracy, the use of a t-test may have blunted the observed effect.

Table 4.15 Time 2: Comparisons of mean measured and perceived body size judgments in non-overweight and overweight participants

	Non-overweight (N = 107)	Overweight (N = 31)	t-statistic
Body mass index (kg/m^2)	17.1	23.4	
CBIS measured category	3.9	6.3	
CBIS perceived category	3.3	5.4	$t_{(45.3)}$ = - 2.1***
Body size underestimation	-.6	-.8	$t_{(49.2)}$ = .23
CBIS ideal category	2.7	2.9	$t_{(45.0)}$ = -.19
CBIS body dissatisfaction	*-.6*	*-2.6*	$t_{(44.1)}$ = 1.9***
BMS measured category	6.1	11.4	
BMS perceived category	4.9	7.4	$t_{(47.7)}$ = - 2.5***
Body size underestimation	-1.2	- 3.9	$t_{(77.2)}$ = 2.7***
BMS ideal category	4.0	4.4	$t_{(46.7)}$ = - .41
BMS body dissatisfaction	*-.9*	*-3.0*	$t_{(38.5)}$ = -2.1***

Note. * p < .05, ** p < .01, *** p < .001

The mean ideal body size identified by participants on the CBIS corresponded to a BMI range of 13.6 – 14.9 kg/m^2. This ideal body was on average 1.7 categories smaller on the CBIS than the participant's measured BMI category (SD = 1.7). The mean BMS ideal body size represented a range of 15.0 – 15.8 kg/m^2, which was on average 3.1 categories smaller than the measured BMI category (SD = 3.1). On neither the CBIS nor the BMS did the ideal figure chosen differ between overweight and non-overweight participants. Body

dissatisfaction was significantly higher in overweight participants than in non-overweight participants on both scales.

4.15 Time 2: Anxiety and Perfectionism

As shown in Table 4.14, the subscales of the anxiety questionnaire were significantly associated with one-another. Total anxiety was also associated with SPP and SOP. Physical symptoms and social anxiety were both associated with SPP but not SOP. In contrast, harm avoidance was associated with SOP but not with SPP. SPP was regressed upon social anxiety and physical symptoms but the residuals evidenced sufficient heteroscedasticity as to cast doubt upon the analysis. SOP was regressed upon harm avoidance (B = .36, SE = .13, β = .24) and accounted for a small but significant proportion of its variance (r^2 = .06, t = 2.81, p < .01). SOP and SPP were moderately associated with one-another.

4.16 Time 2: Disordered Eating Attitude Score

Figure 4.17 shows the distribution of disordered eating attitude scores at T2 (before transformation), indicating a marked positive skew.

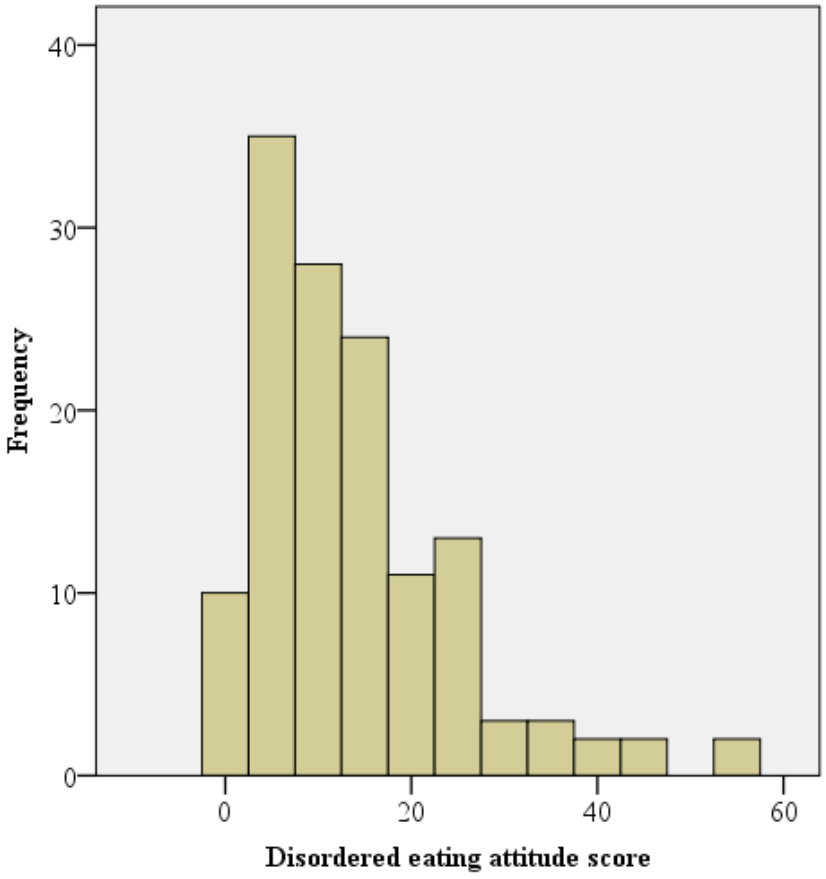

Figure 4.7 Time 2: Distribution of disordered eating attitude (ChEAT) scores

As shown in Table 4.14, disordered eating attitude score was significantly negatively associated with body dissatisfaction on the CBIS and the BMS. Disordered eating attitude score was positively associated with perceived body size on the BMS but not the CBIS. Higher levels of disordered eating attitudes were also associated with higher scores on three of the anxiety subscales: physical symptoms, social anxiety and, more weakly, separation anxiety. Disordered eating attitudes were also positively associated with SOP and, more strongly, with SPP. The anxiety scale as a whole significantly predicted disordered eating attitudes ($F_{(4,122)} = 9.02$, $p < .001$), as did perfectionism as a whole ($F_{(2,130)} = 7.53$, $p = .001$). Table 4.16 shows the coefficients for each of the univariate predictors of disordered eating attitudes.

Table 4.16 Time 2: Coefficients for univariate predictors of disordered eating attitude (ChEAT) score

Subscale	*B*	*SE b*	*β*	*t*	*p*
Anxiety					
Physical symptoms	.08	.02	.40	4.94	< .001
Social anxiety	.08	.02	.40	4.94	< .001
Separation anxiety	.06	.02	.24	2.70	< .01
Perfectionism					
Self-oriented	.05	.02	.27	3.16	.002
Socially-prescribed	.05	.01	.29	3.51	.001
Body dissatisfaction					
CBIS	-.20	.08	-.21	-2.50	< .05
BMS	-.16	.05	-.28	-3.20	.002

To examine the influence of total perfectionism, T2 disordered eating attitude score was regressed upon both SOP and SPP, which were entered into the same block in the model. Together, they significantly predicted disordered eating attitudes ($F_{(2, 128)} = 11.39$, $p < .001$). Next, to look at the effect of total anxiety, T1 disordered eating attitude score was then simultaneously regressed upon all four MASC subscales. Total anxiety significantly predicted disordered eating attitudes ($F_{(4,122)} = 8.91$, $p < .001$).

To examine the effects of all these variables in conjunction with one-another, disordered eating attitude score was regressed upon total anxiety, total perfectionism and CBIS body dissatisfaction, which were entered into consecutive blocks in the model. The regression coefficients are shown in Table 4.17. At step 3, all variables significantly predicted disordered eating attitude score.

Table 4.17 Coefficients for the regression of disordered eating attitude (ChEAT) score on total anxiety, total perfectionism and Children's Body Image Scale (CBIS) body dissatisfaction

	b	*SE b*	*β*	*F*	R^2	ΔR^2
Step 1						
Constant	2.22	.33				
Total anxiety	.03	.01	.38***	20.52	.14	
Step 2						
Constant	.82	.54				
Total anxiety	.02	.01	.33***			
Total perfectionism	.03	.01	.26**	16.28	.21	< .01
Step 3						
Constant	.74	.53				
Total anxiety	.02	.01	.33***			
Total perfectionism	.03	.01	.25**			
CBIS body dissatisfaction	-.17	.07	-.19*	13.12	.24	< .05

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The regression was then repeated with BMS to replace CBIS body dissatisfaction. The regression coefficients are shown in Table 4.18. Similarly, all variables significantly predicted disordered eating attitudes at step 3.

Table 4.18 Coefficients for the regression of disordered eating attitude (ChEAT) score on total anxiety, total perfectionism and Body Manipulation Software (BMS) body dissatisfaction

	b	*SE b*	*β*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	2.22	.33				
Total anxiety	.03	.01	.38***	19.86	.14	
Step 2						
Constant	.82	.54				
Total anxiety	.02	.01	.33***			
Total perfectionism	.03	.01	.26**	15.75	.21	< .01
Step 3						
Constant	.83	.48				
Total anxiety	.01	.01	.31***			
Total perfectionism	.03	.01	.24**			
BMS body dissatisfaction	-.16	.07	-.23**	13.76	.26	< .01

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

4.17 Time 2: Differences with Age and Socioeconomic Status

4.17.1 Differences with age.

At T2, looking at the bivariate correlations presented in Table 4.14, weight and height were associated with age, as hypothesized and as observed at T1. However, unlike the T1 data, on this occasion BMI was also positively associated with age, in keeping with initial hypotheses.

At T1, older girls expressed greater CBIS body dissatisfaction than younger girls. At T2, this relationship was no longer observed. However, at T2 older girls identified CBIS perceived and ideal bodies that were significantly larger than those of younger girls; neither of these relationships was observed in the T2 BMS data. At T2, the significant T1 associations between age and social anxiety, and age and perfectionism, were no longer evident. Contrary to hypothesis, again T2 disordered eating score was not associated with age.

4.17.2 Socioeconomic status.

A series of independent-samples t-tests was carried out to ascertain whether participants from low or high SES schools differed on key variables at T2. The results are shown in Table 4.19. Participants from low SES schools were significantly shorter than participants from high SES schools, but did not differ on weight or BMI. Participants from low SES schools identified a significantly larger ideal figure on the CBIS than participants from high SES schools, but they did not significantly differ on the ideal figure they selected on the BMS. As at T1, participants from low SES schools reported significantly higher levels of perfectionism (both SOP and SPP) and disordered eating attitudes than participants from high SES schools, although the size of the gap between the two groups decreased markedly.

Table 4.19 Time 2: Comparisons of participants from schools of low and high socioeconomic status (SES) on key variables

		Low SES (n = 41)	High SES (n = 97)	t-statistic †
Age (decimal years)		10.7	10.8	-.3
Height (m)		1.4	1.5	-2.1*
Weight (kg)		37.8	39.2	-.8
BMI (kg/m^2)		18.5	18.5	-.0
Body image				
Paper Scale [a]	Dissatisfaction	-1.0	-1.0	.1
	Ideal size	3.1	2.6	3.3**
	Perceived size	4.1	3.6	1.8
Computer Scale [b]	Dissatisfaction	-1.4	-1.3	-.2
	Ideal size	4.2	4.1	.5
	Perceived size	5.6	5.4	.6
Anxiety [c]		54.0	52.2	.5
Physical symptoms		16.0	15.0	.3
Harm avoidance		17.7	17.4	.3
Social anxiety		13.4	12.8	.5
Separation anxiety		9.7	9.1	.6
Perfectionism [d]		64.4	58.1	2.6*
Self-oriented		37.6	34.6	2.4*
Socially-prescribed		26.8	23.5	2.1*
Eating attitudes [e]		16.8	12.5	-2.1*

Note. [a] Children's Body Image Scale (CBIS; Truby and Paxton 2002), [b] Body Manipulation Software (BMS; Evans & Tovée, 2012), [c] Multidimensional Anxiety Scale for Children (MASC; March et al 1997), [d] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [e] Children's Eating Attitudes Test (ChEAT; Maloney et al 1989). †Independent samples Student's t-test with equal variances assumed; * $p < .05$, ** $p < .01$.

4.18 Introduction to Across-time Analyses

The across-time analyses were intended to examine the variation and covariation of variables over time. They began with analysis of sample attrition and description and significance testing of changes in key variables over time. Across-time correlations were then examined in detail, and finally longitudinal predictors of body dissatisfaction and disordered eating attitude score were tested and modeled using multivariate regression. Notably, because these analyses relate to change in the same variables over time, i.e., the comparison of like with like, data from the BMS and the FAS were not included since they were only obtained at T2.

4.19 Sample Attrition

56 out of the original 194 participants did not take part in the T2 stage of data gathering (hereafter referred to as 'T2 non-participants'. Of these 56 girls, 23 had left their respective schools during the intervening period. Despite reminders, in 27 cases the girl's caregiver(s) did not return a Time 2 consent form. Four caregivers returned forms stating that they declined to consent to the girl's further participation, whilst two participants with completed forms granting consent were absent on the day of testing. Total sample attrition was 29%.

To examine whether T2 participants differed from T2 non-participants, the two groups were compared on their baseline scores using a series of independent-samples Student's t-tests without the assumption of equal variances. The results are presented in Table 4.20. There were no significant differences between the data obtained from T2 participants and T2 non-participants at T1 on any of the key variables.

Table 4.20 Comparison of Time 2 participants with Time 2 non-participants on Time 1 data

	Mean values at T1			
	T2 non-participants	T2 participants		
	n =56	*n* =138	t-statistic †	*p*
Age (decimal years)	8.7	8.6	.5	.65
Height (metres)	1.3	1.3	-1.3	.20
Weight (kilograms)	31.8	30.2	-1.3	.19
BMI (kg/m^2)	17.9	17.3	-1.2	.24
Body dissatisfaction [a]	-1.0	-.8	.9	.22
Ideal	2.5	2.4	-.7	.47
Perceived	3.5	3.2	-1.6	.12
Anxiety (total) [b]	57.7	60.3	.8	.44
Physical symptoms	14.9	15.6	.6	.58
Harm avoidance	17.7	19.1	1.6	.12
Social anxiety	13.2	14.0	.8	.44
Separation anxiety	11.9	11.6	-.3	.74
Perfectionism (total) [c]	66.9	65.3	-.6	.54
Self-oriented	38.2	37.8	-.3	.75
Socially-prescribed	28.7	27.8	-.7	.51
Eating attitudes [d]	19.3	16.70	-1.4	.17

Note. [a] Children's Body Image Scale (CBIS; Truby & Paxton 2002), [b] Multidimensional Anxiety Scale for Children (MASC; March et al, 1997), [c] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [d] Children's Eating Attitudes Test (ChEAT; Maloney et al, 1989). † Equal variances not assumed.

4.20 Across-time Change in Key Variables for T2 Participants

The interval between T1 and T2 testing ranged from 21 to 29 months with an average of 25.5 months and a standard deviation of 2.6 months. Table 4.21 shows that, with the exception of body dissatisfaction, the mean values of all variables significantly changed between T1 and T2, as assessed using a series of paired-samples Student's t-tests.

Table 4.21 Comparison of Time 1 and Time 2 variable means for Time 2 participants (N = 138)

	T1		T2			
	Mean	(*SD*)	Mean	(*SD*)	$\Delta\,\mu$	t-statistic †
BMI (kg/m^2)	17.3	(2.6)	18.5	(3.3)	1.2	-10.8***
Body dissatisfaction [a]	-.8	(1.6)	-1.0	(1.5)	-.2	1.7
Ideal	2.4	(1.2)	2.7	(.9)	.3	-2.9**
Perceived	3.2	(1.5)	3.8	(1.5)	.6	-4.8***
Anxiety (total) [b]	60.3	(19.0)	52.7	(19.1)	- 7.6	4.5***
Physical symptoms	15.6	(7.4)	13.2	(6.7)	- 2.4	3.7***
Harm avoidance	19.1	(5.1)	17.5	(4.6)	-1.6	3.6***
Social anxiety	14.0	(5.9)	13.0	(6.6)	-1.0	2.1*
Separation anxiety	11.6	(5.4)	9.3	(5.5)	-2.3	4.8***
Perfectionism (total) [c]	65.6	(14.8)	60.0	(13.5)	-5.6	4.1***
Self-oriented	37.7	(8.7)	35.5	(6.8)	-2.2	2.6*
Socially-prescribed	27.9	(7.9)	24.5	(8.5)	-3.4	4.3***
Eating attitudes [d]	17.3	(12.6)	13.8	(10.9)	-3.5	3.2**

Note. [a] Children's Body Image Scale (CBIS; Truby & Paxton 2002), [b] Multidimensional Anxiety Scale for Children (MASC; March et al, 1997), [c] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [d] Children's Eating Attitudes Test (ChEAT; Maloney et al, 1989). † Equal variances not assumed, *$p < .05$, ** $p < .01$, *** $p < .001$.

Over time, the mean BMI of participants increased significantly, as did the size of their ideal and perceived bodies, leading to a net result of no significant change in CBIS body dissatisfaction. Anxiety, on the other hand, decreased significantly across all of its subscales and total. Likewise, SOP, SPP and total perfectionism decreased over time, and so did disordered eating attitude score.

4.21 Across-time Correlations

The bivariate correlations between the variables measured at both T1 and T2 are shown in Table 4.22; all values are Pearson's *r* with the exception of T2 socially-prescribed perfectionism, which is Spearman's rho. Significant across-time associations were further explored in the subsequent subsections 4.23 to 4.26. In these subsections the partial

correlations between variables were calculated, taking into account the contribution to shared variance of *both* variables at *both* time-points (i.e., 4 variables in total) to the significance of the association, but making no assumptions about the directionality of the relationships involved. These partial correlations lay the groundwork for the directional multivariate regressions shown in subsections 4.27 and 4.28.

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Table 4.22 Bivariate Correlations for Variables at Time 1 with Time 2

		TIME 2 DATA													
		Age	BMI ǂ	Body diss [a]	Ideal size	Perc size	Total anx [c] ǂ	Phys sym	Harm avoid	Soc anx	Sep anx	Total perf [d]	SOP	SPP	Eating attit [e] ǂ
TIME 1 DATA	Age (decimal years)	**.93**	.15	-.02	**.17**	.12	-.05	-.02	-.05	-.02	-.05	-.00	.10	-.09	-.06
	Body mass index (kg/m^2) ǂ	**.24**	**.92**	**-.66**	.10	**.71**	-.03	.04	.04	.04	-.16	-.05	-.01	-.03	.05
	Body image														
	Paper scale [a] { Dissatisfaction [b]	.15	**-.39**	**.35**	-.04	**-.36**	**-.27**	**-.20**	**-.26**	**-.32**	-.15	-.06	-.03	-.09	-.14
	Paper scale [a] { Ideal size	.02	.09	-.07	**.20**	**.18**	**-.19**	-.13	**-.26**	-.14	-.12	-.12	-.05	-.08	**-.17**
	Paper scale [a] { Perceived size	-.14	**.50**	**-.44**	**.20**	**.55**	.15	.12	.07	**.16**	-.08	-.02	-.10	.03	.02
	Anxiety (total) [c]	.08	.10	**-.18**	-.08	.13	**.30**	**.30**	.13	**.27**	**.29**	.03	-.02	.05	.17
	Physical symptoms	.02	.10	**-.20**	-.05	**.18**	**.20**	**.31**	.01	.17	**.21**	.09	.02	.08	**.27**
	Harm avoidance	.05	.03	-.04	.02	.06	.10	.09	**.18**	.04	.04	-.11	-.09	-.07	-.15
	Social anxiety	.14	.08	**-.17**	-.10	.11	**.33**	**.26**	.12	**.40**	**.27**	.08	.03	.10	.16
	Separation anxiety	.04	.10	-.11	-.12	.04	**.30**	**.25**	.14	**.23**	**.37**	-.01	-.05	.03	.16
	Perfectionism (total) [d]	-.15	-.01	-.15	-.05	.12	**.19**	**.22**	.15	.14	.11	**.40**	**.31**	**.38**	**.39**
	Self	-.17	-.01	-.13	-.07	.09	.14	.16	.14	.05	.11	**.33**	**.31**	**.29**	**.36**
	Social	-.10	-.02	-.14	-.01	.13	**.20**	**.23**	.11	**.20**	.08	**.39**	**.24**	**.38**	**.34**
	Eating attitudes [e]	.04	**.16**	**-.23**	-.02	**.21**	**.23**	**.32**	.11	**.27**	.05	**.21**	.11	**.23**	**.37**

Note. [a] Children's Body Image Scale (CBIS; Truby & Paxton, 2002), [b] Perceived minus ideal figure category; [c] Multidimensional Anxiety Scale for Children (MASC; March et al, 1997), [d] Child and Adolescent Perfectionism Scale (CAPS; Flett et al, 1997), [e] Children's Eating Attitudes Test (ChEAT; Maloney et al, 1989), ǂ transformed variable utilized for analysis; Significant values marked in boldface, $p < .05$.

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4.22 Age and Adiposity

As shown in Table 4.22, T1 BMI was very strongly associated with T2 BMI (r = .92, p < .001). Across time, participants' change in adiposity (BMI) ranged from a decrease of -2.3 to an increase of 5.7, with a mean increase of 1.2 kg/m^2 (SD = 1.2). Table 4.22 also shows that T1 age was not significantly associated with BMI at T2 (r = .15; p = .08), i.e., older girls did not increase in adiposity at a greater rate than younger girls. Similarly, the length of the interval between T1 and T2 testing sessions was not significantly associated with increased adiposity (r = .07; p = .40).

In Table 4.22, T1 disordered eating attitudes showed a modest association with T2 BMI (r = .16, p = .05). This suggests that participants who reported higher levels of disordered eating attitudes at T1 gained greater amounts of weight-for-height in the interim than participants who reported lower T1 disordered eating attitude scores. However, when the contributions of T1 BMI and T2 ChEAT were accounted for, the significance of this relationship disappeared (r = .14; p = .12).

4.23 Body Size Perception and Dissatisfaction

4.23.1 Perceived body size.

Table 4.22 shows that participants' perceived body size at T1 was strongly associated with their perceived body size at T2 (r = .55, p < .001), indicating a degree of temporal stability. The strength of this relationship was greatly lessened but not fully eliminated when BMI at both time-points was taken into consideration (r = .27, p = .002). This suggested that stability in participants' size perceptions across-time cannot be fully explained by the concomitant stability of their measured BMI; rather, one or more additional influences must account for the additional portion of shared variance.

In keeping with these findings, T1 BMI was associated with participants' perceptions of their body size at T2 (r = .71, p < .001). Controlling for T2 BMI and T1 perceived body size reduced but did not completely remove the significance of this relationship (r =.18; p = .03). This suggested that participants with a higher initial T1 BMI perceived themselves to have an even larger body two years later than one would expect on the basis of their subsequent BMI and initial body size perceptions.

When considering the psychological consequences of initial body size perception, an inspection of Table 4.22 shows that a larger perceived T1 body size was associated with subsequently greater social anxiety at T2 (r = .16, p = .05). The significance of this effect

was, in fact, increased when T1 social anxiety and T2 perceived body size were controlled for (r = .24, p = .006). This finding indicated that that the initial perception of a larger body accounts for significantly higher levels of T2 social anxiety scores above and beyond the influence of initial social anxiety and subsequent perceptions of body size.

4.23.2 Ideal body size.

The data in Table 4.22 show that ideal body size at T1 and T2 was moderately associated (r =.20, p = .02). Having a larger T1 ideal body was weakly associated with having a larger T2 perceived body (r =.18, p = .03), an effect whose significance disappeared once the contributions of initial perceived body and subsequent ideal body were accounted for (r = -.04; p = .65).

As regards the psychological consequences of having a smaller T1 ideal body, Table 4.22 shows that the preference for a smaller T1 body was negatively correlated with T2 levels of harm avoidance (r = -.26, p = .003). The significance of this relationship endured when initial harm avoidance and subsequent ideal body size were taken into account (r = -.26; p = .003). These findings suggest that the initial preference for a smaller ideal body may contribute to greater levels of harm avoidance two years later, even when initial harm avoidance and subsequent ideal body size are taken into consideration.

4.23.3 Time 1 body dissatisfaction.

Table 4.22 shows that higher T1 body dissatisfaction was associated with a higher T2 BMI (r = -.39, p < .001), a relationship for which T1 BMI on its own fully accounted when shared variance was partialled out (r = -.05; p = .55). T1 body dissatisfaction was also associated with T2 anxiety subscale scores for physical symptoms (r = -.20, p = .02), harm avoidance (r = -.26, p = .003) and social anxiety (r = -.32, p < .001). When T2 body dissatisfaction and T1 scores on each subscale were controlled for using partial correlations, the relationship remained for harm avoidance (r = -.28; p = .001) and social anxiety (r = -.26; p = .003) .but did not for physical symptoms (r = -.16; p = .06). This suggests that initial body dissatisfaction may predict subsequent anxiety symptoms in the domains of harm avoidance and social anxiety, above and beyond the contribution of initial anxiety symptoms and subsequent body dissatisfaction to the relationships.

4.24 Anxiety and Perfectionism

The data in Table 4.22 show that the T1 anxiety subscale scores were significantly positively associated with their corresponding T2 values in all cases, although for the harm avoidance subscale the association was marginal (r = .18, p = .04). With the exception of the harm avoidance subscale at both points in time, all T1 anxiety subscales were significantly correlated with all T2 anxiety subscales.

T1 socially-prescribed perfectionism was associated with T2 physical symptoms and social anxiety. When the T2 score on each perfectionism subscale was taken into account, neither relationship remained significant (r = .16, p = .06 and r = .13, p = .19 respectively). Notably, whilst T1 perfectionism and a number of the T2 anxiety subscales were associated, there were no significant associations between any of the T1 anxiety subscales and T2 perfectionism.

4.25 Time 1 Disordered Eating Attitude Score

Disordered eating attitude score at T1 was strongly associated with disordered eating attitude score at T2 (r = .42, p < .001). T1 disordered eating attitude score was also negatively correlated with T2 CBIS body dissatisfaction (r = -.23, p = .04), an effect which became non-significant when T1 body dissatisfaction and T2 disordered eating attitude score were taken into account (r =.10, p = .27).

T1 disordered eating attitude score was associated with T2 SPP (r = .23, p = .01) but the significance of the association disappeared when T1 SPP and T2 disordered eating attitude score were taken into account (r = .07, p = .43). T1 disordered eating attitude score was also positively associated with the T2 physical symptoms (r = .32, p < .001) and T2 social anxiety (r = .27 p = .01) anxiety subscales. When their respective T1 anxiety subscale scores and T2 disordered eating attitude score were controlled for, the relationship with physical symptoms became non-significant (r = .12, p = .18) and so did the relationship with social anxiety (r = .04, p = .68).

4.26 Predicting Key Time 2 Outcomes over Time

In this section, factors contributing to the emergence of the key outcome variables (T2 disordered eating attitudes and T2 body dissatisfaction) were examined using multivariate regression techniques. The predictor variables were selected on the basis of significant correlations with the T2 outcome as shown in Table 4.22, as well as initial hypotheses (see

Section 2.8). A series of regression analyses of outcomes upon putative predictors was carried out, and the resultant coefficients tabulated. T2 outcome was first regressed upon T1 outcome (*step 1*). In the next step, the predictor variable measured at T1 was added to the model (*step 2*), allowing its additional contribution to variance in levels of the T2 outcome to be considered. Finally, the predictor variable measured at T2 was entered into the model, allowing consideration of its within-time contribution to variance in the T2 outcome (*step 3*).

Each regression analysis was also translated into a zero degrees-of-freedom path analytic framework using AMOS 17™ statistical package. This framework, exemplified in Figure 4.8, displayed all standardized beta coefficients corresponding to the model, unlike the regression analysis results. It also enabled the inverse of the predictor-outcome relationship to be tested, i.e., whether the T1 'outcome' actually predicted the T2 'predictor'. The fit between the data and the models was assessed using the generalised least squared (GLS) estimation method of path analysis, in keeping with the recommendations made for small sample sizes by Fan, Thompson and Wang (1999). Maximum-likelihood estimation (ML) was used to handle missing data as recommended by Schafer and Graham (2002).

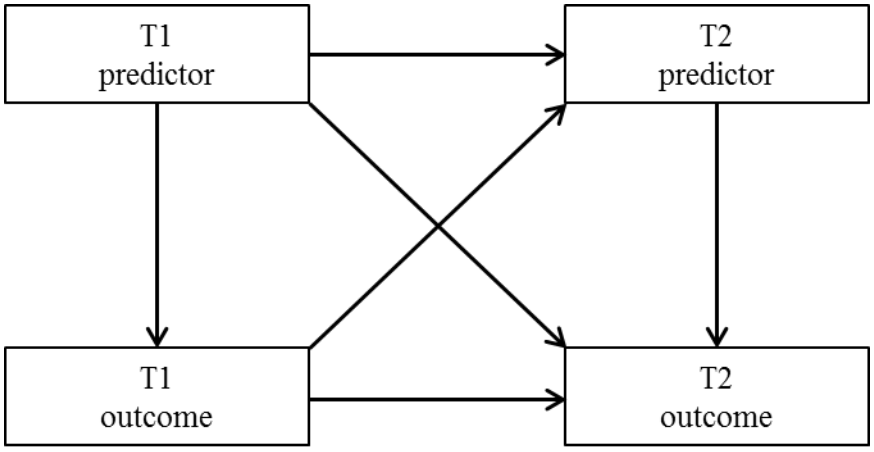

Figure 4.8 Example path analytic framework showing regression relationships between outcome and predictor variables both within and across-time

4.27 The Development of Body Dissatisfaction over Time

The data in Table 4.22 indicated several potential across-time predictors of T2 body dissatisfaction. In keeping with initial hypotheses, T1 BMI was very strongly associated with T2 body dissatisfaction (r = .66, p < .001), so the latter variable was regressed upon the former as well as T1 body dissatisfaction and T2 BMI in the analyses shown in subsection 4.28.1.

A novel finding was that T1 total anxiety (r = -.18, p = .04), T1 physical symptoms (r = .-.20, p = .02) and T1 social anxiety (r = -.17, p = .05) all showed small but significant bivariate negative associations with T2 body dissatisfaction. Controlling for T1 levels of body dissatisfaction and T2 levels of the anxiety variables resulted in increases in the significance of the partial correlations between T2 body dissatisfaction and T1 total anxiety (r = -.23, p = .01), T1 physical symptoms (r = -.22, p = .01) and, marginally, T1 social anxiety (r = -.19, p = .03). Consequently, all three anxiety measures were entered into regression analyses shown in subsection 4.28.2.

Also novel was the observed, significant association between T1 disordered eating attitude score and T2 body dissatisfaction. However, once the variance accounted for by T1 body dissatisfaction and T2 disordered eating attitude score had been adjusted for, the association was no longer significant (r = -.10, p = .27) so no further analyses were undertaken.

4.27.1 The regression of T2 body dissatisfaction upon T1 body dissatisfaction, T1 BMI and T2 BMI.

From the data displayed in Table 4.22 it can be seen that body dissatisfaction at T1 was moderately strongly associated with body dissatisfaction at T2 (r = .35, p < .001). T1 BMI showed a strong negative association with T2 body dissatisfaction (r = -.66, p < .001) whilst T2 BMI was also negatively associated with T1 body dissatisfaction (r = -.39, p < .001). To examine the relative contributions of these predictors in the context of one-another, T2 body dissatisfaction was regressed upon T1 body dissatisfaction, T1 BMI and T2 BMI. The resultant coefficients are shown in Table 4.23.

Table 4.23 Coefficients for the regression of Time 2 Children's Body Image Scale (CBIS) body dissatisfaction on Time 1 CBIS body dissatisfaction, Time 1 body mass index (BMI) and Time 2 BMI

	b	*SE b*	*B*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	-.76	.14				
T1 CBIS body dissatisfaction	.33	.08	.35***	18.80	.12	<.001
Step 2						
Constant	16.19	1.87				
T1 CBIS body dissatisfaction	.12	.07	.13			
T1 BMI	-13.84	1.52	-.62***	56.45	.45	<.001
Step 3						
Constant	16.99	2.05				
T1 CBIS body dissatisfaction	.07	.07	.08			
T1 BMI	-4.47	3.90	-.18			
T2 BMI	-10.06	3.23	-.49***	41.62	.48	.002

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

T1 body mass index strongly predicted T2 body dissatisfaction, and its addition to the model rendered the contribution of T1 body dissatisfaction non-significant at Step 2. The subsequent addition of T2 BMI to the model at Step 3 meant that the contribution of T1 BMI to variance in T2 body dissatisfaction became only marginally significant ($p = .05$). Concurrent BMI, therefore, more strongly predicted current body dissatisfaction than either previous body dissatisfaction or previous BMI. These relations are illustrated in the path analysis shown in Figure 4.9, which also features the other standardized beta coefficients involved in the predictive framework. It is apparent that strong within-time relationships between body dissatisfaction and BMI also contributed to significant proportions of variance in the model. Moreover, there is no evidence that T1 body dissatisfaction predicted T2 BMI, i.e., the inverse relationship did not hold.

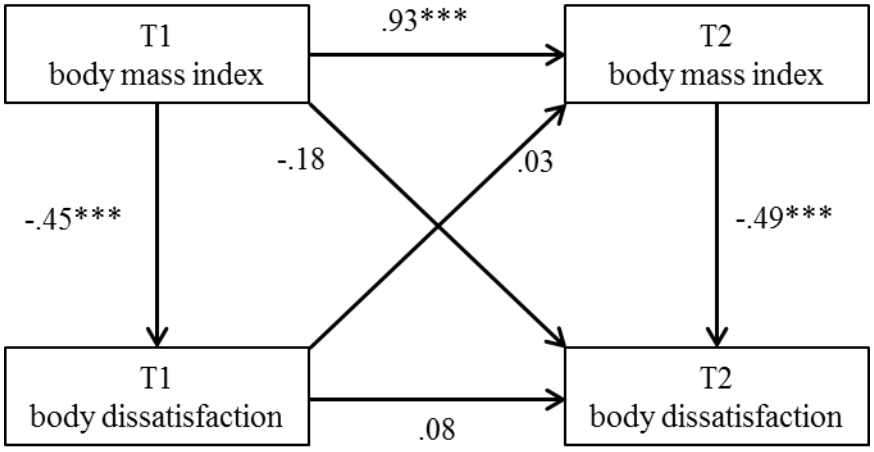

Figure 4.9 Path analytic framework showing the across-time heirarchical regression analysis of the relationship between body mass index (BMI) and Children's Body Image Scale (CBIS) body dissatisfaction

4.27.2 The regression of T2 body dissatisfaction upon T1 anxiety variables.

Alongside significant negative associations between relationships between T2 body dissatisfaction and T1 total anxiety, T1 physical symptoms, and T1 social anxiety, T1 body dissatisfaction and T2 body dissatisfaction were positively associated. T1 body dissatisfaction, meanwhile, was also negatively associated with T2 total anxiety (r = -.27, p = .001), T2 physical symptoms (r = -.20, p = .02) and T2 social anxiety (r = -.32, p < .001). To examine the relative contributions of these anxiety predictors in turn, T2 body dissatisfaction was regressed upon T1 body dissatisfaction and each respective anxiety predictor at T1 and T2 in the following analyses.

The coefficients for the regression of T2 body dissatisfaction upon T1 body dissatisfaction, T1 total anxiety and T2 total anxiety are shown in Table 4.24.

Table 4.24 Coefficients for the regression of Time 2 Children's Body Image Scale (CBIS) body dissatisfaction on Time 1 CBIS body dissatisfaction, Time 1 total anxiety and Time 2 total anxiety

	b	*SE b*	*B*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	-.79	.13				
T1 CBIS body dissatisfaction	.33	.08	.35***	17.55	.12	<.001
Step 2						
Constant	-.32	.41				
T1 CBIS body dissatisfaction	.31	.08	.33**			
T1 total anxiety	-.01	.01	-.11	9.56	.13	.22
Step 3						
Constant	-1.28	.71				
T1 CBIS body dissatisfaction	.34	.08	.36***			
T1 total anxiety	-.01	.01	-.14			
T2 total anxiety	-.16	.10	-.15	7.34	.15	.11

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The addition of T1 total anxiety to the model at Step 2, followed by T2 total anxiety at Step 3, did not significantly improve the proportion of variance for which the model accounted once the significant contribution of T1 body dissatisfaction had been taken into account. Previous body dissatisfaction, therefore, remained the only significant predictor of current body dissatisfaction in the model. These relations are illustrated in Figure 4.10, which also shows the other standardized beta coefficients involved in the predictive framework. It is apparent that T1 body dissatisfaction was, in fact, a significant predictor of T2 anxiety, i.e., the inverse of the proposed outcome-predictor relationship was observed. This relationship retained its significance even when the contributions of T1 anxiety and T2 body dissatisfaction to the model were adjusted for.

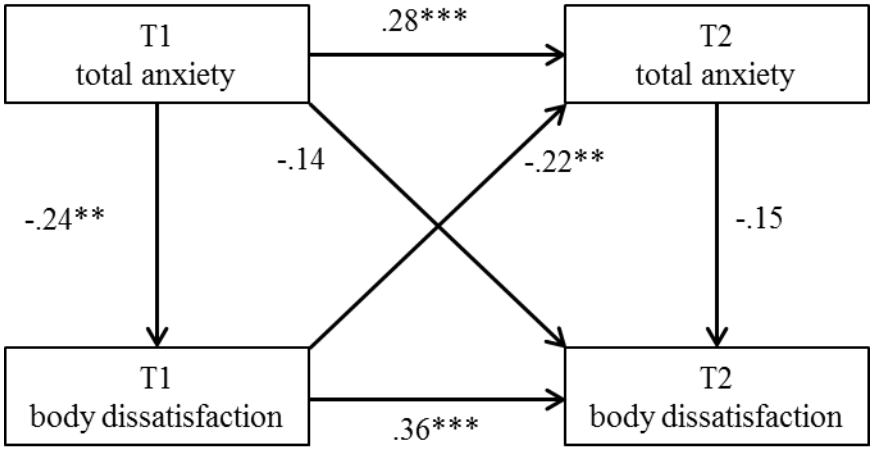

Figure 4.10 Path analytic framework showing the across-time heirarchical regression analysis of the relationship between total anxiety and Children's Body Image Scale (CBIS) body dissatisfaction.

Next, the coefficients for the regression of T2 body dissatisfaction upon T1 body dissatisfaction, T1 physical symptoms and T2 physical symptoms are shown in Table 4.25.

Table 4.25 Coefficients for the regression of Time 2 Children's Body Image Scale (CBIS) body dissatisfaction on Time 1 CBIS body dissatisfaction, Time 1 physical symptoms of anxiety and Time 2 physical symptoms of anxiety

	b	*SE b*	*B*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	-.79	.14				
T1 CBIS body dissatisfaction	.33	.08	.35***	17.55	.12	.001
Step 2						
Constant	-.37	.28				
T1 CBIS body dissatisfaction	.30	.08	.32**			
T1 physical symptoms	-.03	.02	-.14	10.31	.13	.10
Step 3						
Constant	-.51	.33				
T1 CBIS body dissatisfaction	.31	.08	.33***			
T1 physical symptoms	-.03	.02	-.16			
T2 physical symptoms	-.02	.02	-.07	7.06	.15	.43

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

When T1 physical symptoms were entered into the model at Step 2, they did not significantly contribute to the variance explained by the model. Similarly, the addition of T2 physical symptoms at Step 3 made a non-significant contribution to the model. Once again, previous body dissatisfaction was the only significant predictor of current body dissatisfaction in the model. These relations are illustrated in Figure 4.11, which also shows the other standardized beta coefficients involved in the predictive framework.

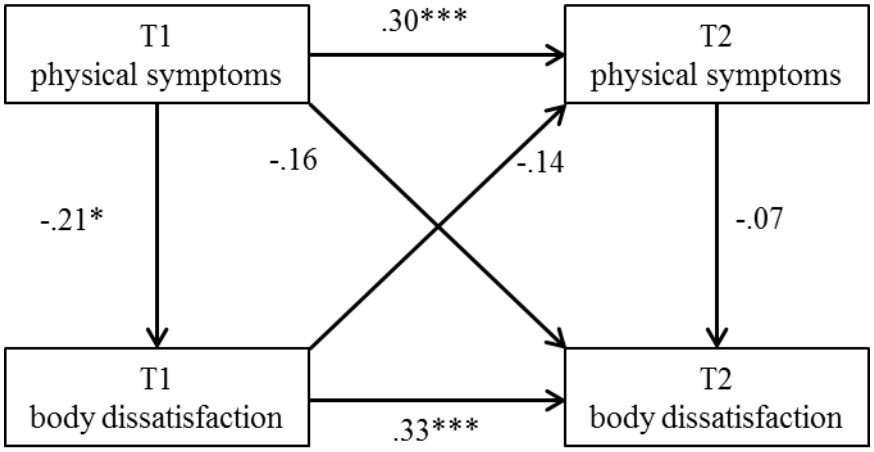

Figure 4.11 Path analytic framework showing the across-time heirarchical regression analysis of the relationship between physical symptoms of anxiety and Children's Body Image Scale (CBIS) body dissatisfaction

Finally, the coefficients for the regression of T2 body dissatisfaction upon T1 body dissatisfaction, T1 social anxiety and T2 social anxiety are shown in Table 4.26.

Table 4.26 Coefficients for the regression of Time 2 Children's Body Image Scale (CBIS) body dissatisfaction on Time 1 CBIS Body Dissatisfaction, Time 1 social anxiety and Time 2 social anxiety

	b	*SE b*	*B*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	-.78	.14				
T1 CBIS body dissatisfaction	.33	.08	.35***	17.55	.12	.001
Step 2						
Constant	-.45	.32				
T1 CBIS body dissatisfaction	.31	.08	.33***			
T1 social anxiety	-.03	.02	-.10	9.51	.13	.24
Step 3						
Constant	-.55	.35				
T1 CBIS body dissatisfaction	.32	.08	.34***			
T1 social anxiety	-.03	.02	-.12			
T2 social anxiety	-.01	.02	-.06	6.46	.14	.50

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The addition of T1 social anxiety to the model at Step 2, followed by T2 social anxiety at Step 3, did not significantly improve the proportion of variance for which the model accounted once the significant contribution of T1 body dissatisfaction had been taken into account. Previous body dissatisfaction, therefore, remained the only significant predictor of current body dissatisfaction in the model. These relations are illustrated in Figure 4.12, which also shows the other standardized beta coefficients involved in the predictive framework. It is apparent that T1 body dissatisfaction was, in fact, a significant predictor of T2 social anxiety, i.e., the inverse of the proposed outcome-predictor relationship was observed. This relationship retained its significance even when the contributions of T1 anxiety and T2 body dissatisfaction to the model were taken into account.

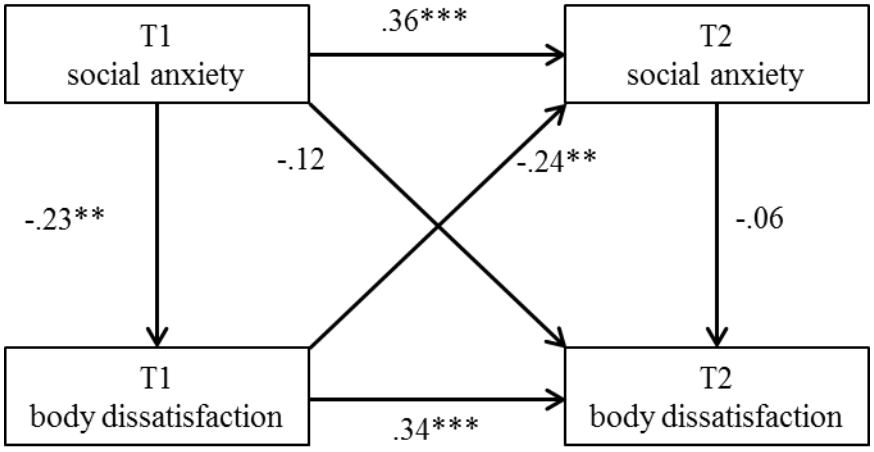

Figure 4.12 Path analytic framework showing the across-time heirarchical regression analysis of the relationship between social anxiety and Children's Body Image Scale (CBIS) body dissatisfaction

4.28 The Development of Disordered Eating Attitudes over Time

The bivariate correlational data in Table 4.22 indicated several potential across-time predictors of T2 disordered eating attitude score. As hypothesized, disordered eating attitudes score at T1 significantly predicted that at T2 (r = .37, p < .001).

Also in keeping with the initial hypotheses, T2 disordered eating attitude score was positively associated with T1 physical symptoms anxiety subscale score (r = .27, p = .002). When initial levels of disordered eating attitudes and T2 physical symptoms were taken into account, the partial correlation that emerged was non-significant (r = .11, p = .21). However, further analyses were undertaken with physical symptoms as a predictor in order to rule out a recurrence of the unexpected inversions of relationship directionality observed with the anxiety subscales in section 4.28.2; the analyses for disordered eating attitude score are shown in subsection 4.29.1.

As expected, T1 total perfectionism (r = .39, p <. 001), T1 SOP (r = .36, p < .001) and T1 SPP (r =.34, p < .001) were associated with T2 eating attitude score. These associations remained for all three variables when T1 eating attitude score and the respective forms of T2 perfectionism were taken into account (total perfectionism r = .21, p = .02; SOP r = .21, p = .02 and SPP r = .19, p = .04). Consequently, further analyses were undertaken with the T1 perfectionism variables, shown in subsection 4.29.2.

Finally, whilst T1 body dissatisfaction did not, as expected, predict T2 disordered eating attitude score, a smaller T1 ideal body size did (r = -.17, p = .05). When T1 levels of

disordered eating attitudes and T2 ideal body size were adjusted for, however, the resultant partial correlation was non-significant (r = -.08, p = 37). Consequently, no further analyses were undertaken with T1 ideal body size as the predictor.

The procedure described in section 4.27 was followed to examine each of the putative longitudinal predictors of disordered eating attitude score in turn using hierarchical regression then regression via path analysis.

4.28.1 The regression of T2 disordered eating attitudes upon T1 disordered eating attitudes, T1 physical symptoms of anxiety and T2 physical symptoms of anxiety.

The coefficients for the regression of T2 disordered eating attitude score upon T1 physical symptoms subscale scores, T1 disordered eating attitude score and T2 physical symptoms subscale scores are shown in Table 4.27.

Table 4.27 Coefficients for the regression of Time 2 disordered eating attitude (ChEAT) score upon Time 1 disordered eating attitude score, Time 1 physical symptoms of anxiety and Time 2 physical symptoms of anxiety

	b	*SE b*	*β*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	2.11	.34				
T1 disordered eating attitudes	.38	.08	.39***	22.28	.15	
Step 2						
Constant	1.74	.37				
T1 disordered eating attitudes	.33	.08	.34***			
T1 physical symptoms	.03	.02	.19*	14.14	.19	.02
Step 3						
Constant	1.44	.36				
T1 disordered eating attitudes	.27	.08	.28**			
T1 physical symptoms	.02	.02	.12			
T2 physical symptoms	.06	.02	.29**	14.09	.26	.001

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

On its own, T1 disordered eating attitude score predicted its T2 equivalent, and the significance of this relationship remained after the marginally significant addition of T1 physical symptoms to the model at step 2. At step 3, T2 physical symptoms significantly

increased the amount of variance in T2 disordered eating attitude score explained by the model, to which T1 eating attitude score continued to make a significant contribution, but to which T1 physical symptoms no longer did. These relations are illustrated in the path analysis shown in Figure 13, which also indicates that T1 disordered eating attitude score was, in fact, a significant predictor of T2 physical symptoms of anxiety. Consequently, the inverse of the expected outcome-predictor relationship was observed. This relationship retained its significance even when the contributions of T1 physical symptoms and T2 disordered eating attitude score to the model were adjusted for.

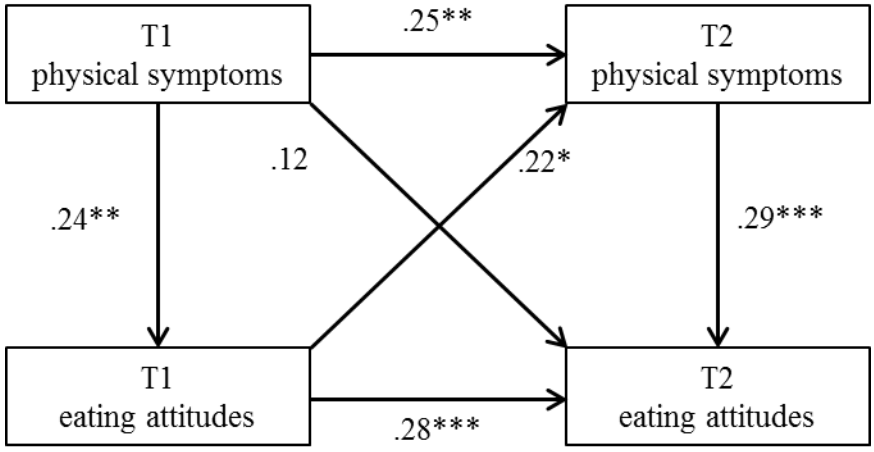

Figure 4.13 Path analytic framework showing the across-time heirarchical regression analysis of the relationship between physical symptoms of anxiety and disordered eating attitude (ChEAT) score

4.28.2 The regression of T2 disordered eating attitude score upon T1 disordered eating attitude score, T1 total perfectionism and T2 total perfectionism.

Since both T1 perfectionism subscales were significant predictors of T2 disordered eating attitudes, their relationship with the outcome variable was examined for mediation and moderation using the regression-based method set out in Baron & Kenny (1986). Neither T1 SOP nor T1 SPP significantly mediated or moderated the effect of the other upon T2 disordered eating attitudes, so it was concluded that the two subscales related additively rather than interactively in predicting subsequent levels of the outcome variable. Consequently, T2 disordered eating attitude score was regressed upon T1 disordered eating attitudes, T1 total perfectionism and T2 total perfectionism. The resultant coefficients are shown in Table 4.28.

Table 4.28 Coefficients for the regression of Time 2 disordered eating attitude (ChEAT)score on Time 1 disordered eating attitude score, Time 1 total perfectionism and Time 2 total perfectionism

	b	*SE b*	*B*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	2.06	.34				
T1 disordered eating attitudes	.38	.08	.39***	23.39	.15	
Step 2						
Constant	.76	.52				
T1 disordered eating attitudes	.29	.08	.30**			
T1 total perfectionism	.03	.01	.28**	20.66	.20	.001
Step 3						
Constant	.17	.60				
T1 disordered eating attitudes	.29	.08	.29**			
T1 total perfectionism	.02	.01	.21**			
T2 total perfectionism	.02	.01	.16	15.64	.22	.07

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The significance of T1 disordered eating attitudes in predicting T2 disordered eating attitudes was reduced but not eliminated by the addition of T1 and T2 perfectionism to the model. At step 3, taking into account the significant contributions of the preceding two variables, T2 total perfectionism did not significantly increase the variance in T2 disordered eating attitudes explained by the model. These relationships are illustrated in the path analysis shown in Figure 4.14, which also indicates that T1 disordered eating attitude score did not significantly predict T2 total perfectionism.

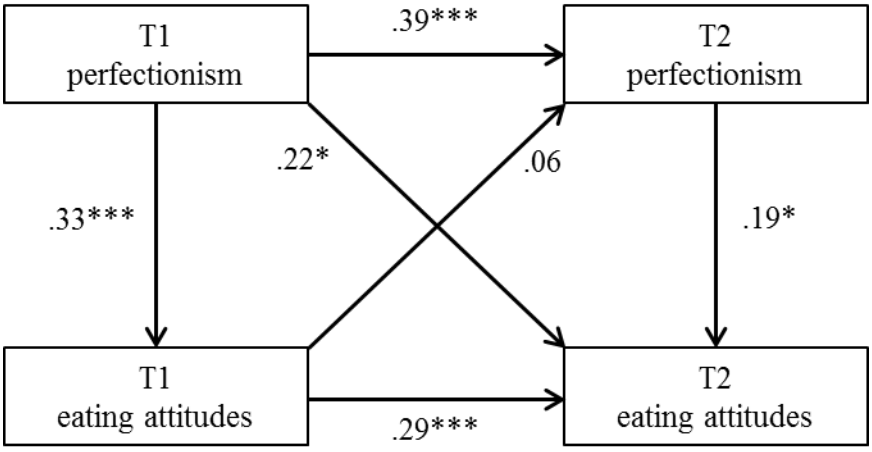

Figure 4.14 Path analytic framework showing the across-time hierarchical regression analysis of the relationship between total perfectionism and disordered eating attitude (ChEAT) score framework

4.28.3 The regression of T2 disordered eating attitude score upon T1 disordered eating attitude score, T1 total perfectionism and T2 total perfectionism, T1 physical symptoms of anxiety and T2 physical symptoms of anxiety.

The predictors from the analyses shown in subsections 4.29.1 and 4.29.2 were combined in the same analysis in order to examine the simultaneous effect of both sets of predictors upon T2 disordered eating attitude score. T2 disordered eating attitude score was regressed upon three blocks of predictors. The first block consisted of T1 disordered eating attitude score; the second block consisted of T1 physical symptoms and T2 physical symptoms, and the third block consisted of T1 total perfectionism and T2 total perfectionism. The resultant coefficients are shown in Table 4.29.

Table 4.29 Coefficients for the regression of Time 2 disordered eating attitude (ChEAT) score on Time 1 disordered eating attitude score, Time 1 total perfectionism and Time 2 total perfectionism

	b	*SE b*	*B*	*F*	R^2	$p \Delta R^2$
Step 1						
Constant	1.93	.35				
T1 disordered eating attitudes	.39	.09	.40***	21.17	.16	
Step 2						
Constant	1.37	.37				
T1 disordered eating attitudes	.25	.09	.26**			
T1 physical symptoms	.02	.02	.11			
T2 physical symptoms	.06	.02	.31***	13.26	.27	.001
Step 3						
Constant	-.03	.58				
T1 disordered eating attitudes	.19	.09	.18*			
T1 physical symptoms	.01	.02	.04			
T2 physical symptoms	.06	.02	.30**			
T1 total perfectionism	.02	.01	.23*			
T2 total perfectionism	.01	.01	.10	10.69	.33	.007

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The contribution of T1 disordered eating attitude score to variance in T2 disordered eating attitude score remained significant throughout the analysis. At step 2, T2 but not T1 physical symptoms significantly predicted T2 disordered eating attitudes. At step 3, the significant contribution of T2 physical symptoms remained, whilst T1 but not T2 total perfectionism accounted for additional variance in T2 disordered eating attitude score.

These relationships are illustrated in the path analysis shown in Figure 4.15, which also depicts a number of other relationships between the variables in questions, notably the significant role of T1 disordered eating attitude score in predicting T2 physical symptoms (as shown in subsection 4.29.1).

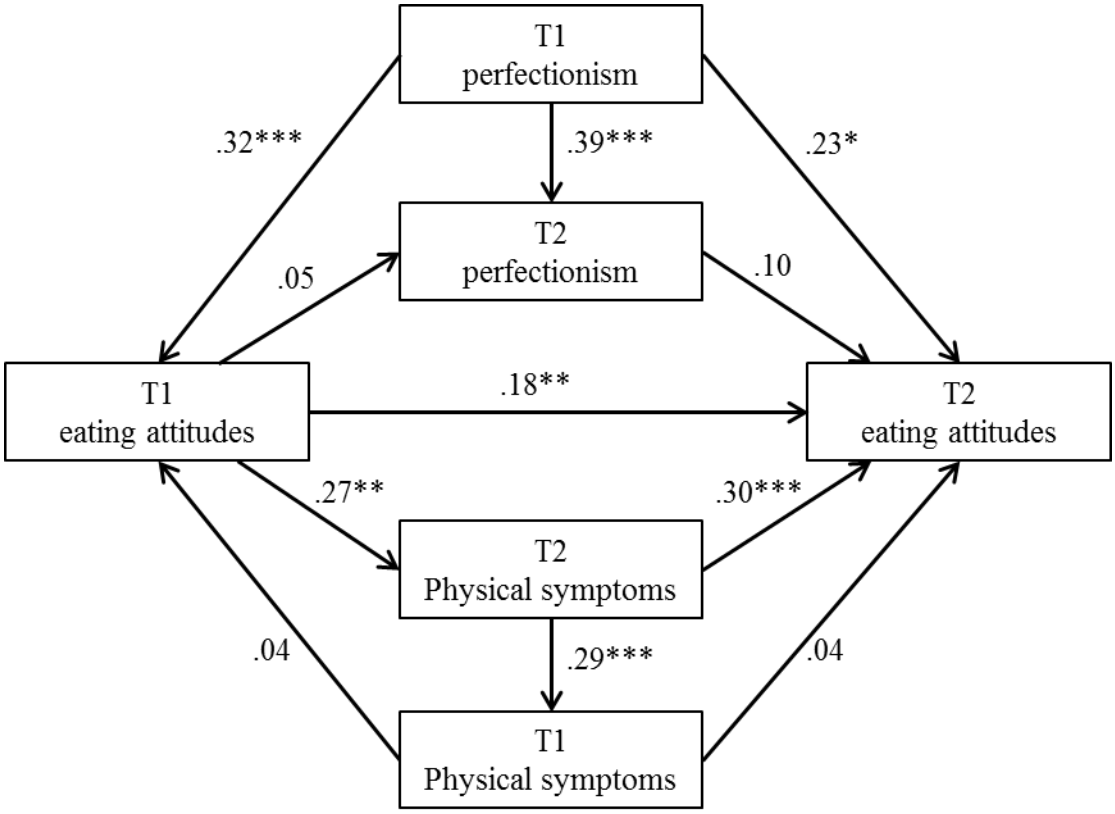

Figure 4.15 Path analytic framework showing the across-time hierarchical regression analysis of the relationship between total perfectionism, physical symptoms of anxiety and disordered eating attitude (ChEAT) score

Chapter 5: Study 1 Discussion

5.1 Introduction

The current study assessed the longitudinal relationship between disordered eating attitudes and their putative causal risk factors, which included perfectionism, anxiety, body dissatisfaction and body mass index (BMI), in a population of preadolescent girls. Perfectionism and initial disordered eating attitudes emerged as the only significant predictors of subsequent disordered eating attitudes in this population, an entirely novel finding. Whilst anxiety and body dissatisfaction showed within-time associations with disordered eating attitudes, they did not significantly predict future levels when initial levels of the outcome and subsequent levels of the predictor were taken into account. Predictors of body dissatisfaction included previous body dissatisfaction and previous levels of adiposity, but concurrent adiposity emerged as the only significant source of variation in body dissatisfaction. Also novel was the finding that initial levels of disordered eating attitudes and body dissatisfaction predicted subsequent levels of anxiety amongst participants when all other within and across-time relationships were taken into account.

The research needs addressed by the study, as established in Chapter 2, were twofold. First, I sought to add to the small but growing body of prospective research into the emergence and consolidation of girls' cognitions and behaviours around weight, shape and eating. Most previous longitudinal studies of the aetiology of disordered eating and body image have focused upon adolescent populations (e.g., Calam & Waller, 1998; Wichstrøm, 2000). These populations may be too old to allow for the observation of these phenomena in their embryonic state, given evidence to suggest that the period between 7 and 11 years of age provides a key developmental window for this purpose (Davison, et al., 2003; Smolak, 2004b, 2009; Wertheim, et al., 2009). Second, previous research into the longitudinal developmental predictors of disordered eating attitudes and body dissatisfaction has not used measurement and analytical methods that take into account initial levels of the outcome variable, and subsequent levels of the predictor, when determining the significance of a predictive relationship (e.g., Clark & Tiggemann, 2006; Davison, et al., 2003; Dohnt & Tiggemann, 2006; Gardner, et al., 2000; Shunk & Birch, 2004). I used such methods to distinguish spurious predictive relationships from those that endured when other sources of outcome variance were accounted for. In summary, no previous studies have prospectively examined this constellation of causal risk factors in such a young population whilst taking such rigorous measures to ensure the inferences drawn from the data were warranted.

In this section, I present the main findings from the within and across-time analyses of data, and explain the potential theoretical implications of these findings as well as their coherence with previous bodies of research. However, several the wider implications of these findings for our developmental understanding of body dissatisfaction and disordered eating attitudes are presented in Chapter 10, wherein the findings from this study and the subsequent sociocultural study are drawn together.

5.2 Adiposity, Body Size Perception, Preference and Dissatisfaction

In common with previous findings and in keeping with initial hypotheses, at both Time 1 (T1) and Time 2 (T2) a majority of girls identified a figure that was smaller than their perceived figure: for the CBIS, this was 60% at T1 and 67% at T2; for the BMS this was 64%. These proportions slightly exceeded those found in previous studies (e.g., Collins, 1991; Hill, Draper, & Stack, 1994; Rolland, et al., 1997) from which Ricciardelli and McCabe (2001) identified a typical range of 25-55%. At T1, 20% of girls identified a larger ideal body than their perceived body using the CBIS, whilst at T2 this proportion fell to 13% on the CBIS but remained at 20% on the BMS. These proportions fall roughly within the range of 4-18% identified by Ricciardelli and McCabe (2001), and they mean that a remaining 20% of participants on the CBIS at T1 and T2, and 15% of participants on the BMS, selected an ideal body of the same size as their perceived body. These data offer additional confirmation that the preference for a thinner ideal body is present in early childhood, and also indicate that the proportion of participants selecting a thinner body did not significantly increase over the course of the study. These findings support assertions that body dissatisfaction is as common amongst preadolescents as amongst adults and adolescents (Dohnt & Tiggemann, 2006; Phares, Steinberg, & Thompson, 2004).

Also in keeping with initial hypotheses, at both points in time adiposity (BMI) was significantly associated with participants' perceived figure, indicating that participants selected a figure at least proportionate to their measured adiposity. However, on both occasions participants selected figures that significantly underestimated their measured adiposity, a bias that was observed using both the CBIS and BMS body dissatisfaction scales. Underestimation of body size using figure choice methodologies is common amongst preadolescent children and has been reported in the majority of the preceding literature (e.g., Chaimovitz, Issenman, Moffat, & Persad, 2008; Truby & Paxton, 2002). Body size underestimation was most common amongst overweight or obese participants, again in

keeping with previous findings (Allen, et al., 2008; Saxton, et al., 2009; Standley, et al., 2009).

It is interesting to note that body size underestimation was not related to age using either the CBIS or the BMS, at either T1 or T2, in keeping with some (Truby & Paxton, 2002; Truby & Paxton, 2008) but not all previous research (Allen, et al., 2008). Allen et al (2008) similarly found that age did not significantly predict perceptual inaccuracy once previous inaccuracy and previous BMI had been taken into account. They did not, unfortunately, control for the influence of current BMI. However, taken as a whole these findings indicate that developmental immaturity does not account for additional variance in perceptual inaccuracy once BMI has been taken into account, even when an initial bivariate association between inaccuracy and age was observed. In the current study, a comparison of T1 levels of perceptual inaccuracy with T2 levels indicated that participants' perceptual inaccuracy had not materially altered over the two year interval. Again, this suggests that the increases in accuracy theorised to occur with age, as a consequence of a consolidating thinness schema, were not at all evident in the current sample (Cash, 2004; Smolak, 2004b). The conceptual mechanisms by which body size underestimation arises in preadolescence in conjunction with adiposity are discussed further in Chapter 10, subsection 10.2.

Whilst participants' perceived size significantly increased between T1 and T2, it did not increase to the same extent as their measured BMI. Similarly, participants' ideal body significantly increased in size between T1 and T2, although at both points in time, it remained smaller than either their perceived body or their measured BMI. As both the perceived and the ideal figure increased in size between the two timepoints, this resulted in no significant net change in body dissatisfaction over the period of the study. This absence of developmental increases or decreases in body dissatisfaction is in keeping with multiple previous studies (Dohnt & Tiggemann, 2006; Harrison & Hefner, 2006; McCabe, et al., 2005) although not with others (Clark & Tiggemann, 2008; Davison, et al., 2003). The finding of 'no change' arguably obscures the fact that key elements of the thinness schema – self and ideal perception – have indeed increased developmentally, but done so in rough proportion to one another. Indeed the one-year longitudinal perceived and ideal figure CBIS data of Harrison and Hefner (2006) show an analogous pattern of change over time.

Although there were weak indications that older participants were less satisfied with their bodies at T1, this association was no longer significant at T2. This finding is at odds with most previous cross sectional research, in which increased body dissatisfaction in older girls has been reported (e.g., Allen, et al., 2008; Rolland, et al., 1997). Taken alongside the

longitudinal stability of body dissatisfaction, this within-time finding suggests that maturational increases are not inevitable across the preadolescent period, as some have implied (e.g., Littleton & Ollendick, 2003). This hypothesis is supported by the finding that the significance of the association between age and perceived and ideal body size seen at T2 could be fully accounted for using BMI. In other words, it is getting larger – rather than simply getting older – that drives changes in the size of girls' perceived and ideal bodies. The consolidation of the thinness schema over preadolescence (Smolak, 2004a), therefore, may not automatically entail the escalation of body dissatisfaction. This premise, and the issue of the meaning of developmental change in key variables is explored further in Chapter 10, subsection 10.2.

5.3 Prospective Predictors of Body Dissatisfaction

If the process of simply getting older is not the primary catalyst in the 'normative' emergence of body dissatisfaction, where else might attention be directed? Arguably, the focus ought to be upon risk factors amongst girls whose body dissatisfaction did increase over the study period, alongside attention to those factors that protect against such increases. BMI was examined as a prime candidate for both such roles given that it functioned as the only within-time predictor of body dissatisfaction at both T1 and T2, and also given an overwhelming body of previous evidence (Ricciardelli & McCabe, 2001).

Regression analyses (Chapter 4, subsection 4.28.1) indicated that T1 body dissatisfaction was not a significant predictor of T2 body dissatisfaction once the influence of T1 BMI was taken into account. However, the predictive value of T1 BMI fell to sub-significant levels once the contribution of T2 BMI was included. In other words, at T2 girls' current BMI was the only significant predictor of their concurrent body dissatisfaction although the contribution of T1 BMI approached significance.

The relationship of these findings to those of previous research is unclear. Dohnt and Tiggemann (2006), Clark and Tiggemann (2006) and Allen et al (2008) all reported that initial body dissatisfaction and initial BMI predicted subsequent body dissatisfaction, but none of them took the relationship with current BMI into account. Certainly, up to the point of adding current BMI to the predictive model, the results of the current study were largely in keeping with their findings. Our findings underscore the importance of considering the collaborative importance of both proximal and distal factors in the genesis of body image

phenomena – it seems likely that previous body size plays an important role in shaping body dissatisfaction, but that current size makes a relatively statistically larger contribution.

5.4 Disordered Eating Attitudes

The mean overall level of disordered eating attitudes at T1 with this sample was higher than in previous studies with young girls, but at T2 a more typical group-mean for the age group was obtained (Smolak and Levine, 1994; Lattimore and Halford, 2003; McVey, Tweed and Blackmore, 2004; Rolland, Farnhill and Griffiths, 1997). This decrease in disordered eating attitudes over the course of the study was in keeping with the hypotheses, and also in keeping with a substantial number of previous studies (Davison, et al., 2003; DeLeel, et al., 2009; Rolland, et al., 1997). However, there was no concurrent evidence of an age gradient in levels of disordered eating attitudes during the within-time analyses, i.e., contrary to hypothesis, younger participants did not report higher levels of disordered eating attitudes than older participants at either T1 or T2. Age, then, did not account for between-participant variation in disordered eating attitudes at either point in time, but may potentially account for the within-participant variation observed over time.

A number of different explanations have been offered for this phenomenon by which longitudinal data on disordered eating attitudes show decreases over the preadolescent period – although it is worth noting that these decreases have, not infrequently, been observed in adolescent samples too (e.g., Knez, et al., 2006; Striegel-Moore, Schreiber, et al., 2000). In preadolescents, primary amongst the explanations proffered is that such decreases are spurious, and secondary is the suggestion that the decreases are the consequence of repeated testing. The consistency with which the phenomenon has been observed in preadolescents, particularly given the relative dearth of studies assessing the longitudinal course of disordered eating attitudes in children, casts doubt upon the first suggestion. The second, although feasible, would be surprising given the relatively long intervals of time between the occasions on which data have been gathered. A third explanation was proposed by Erikson and Gerstle (2007), who suggested that the Children's Eating Attitudes Test posed comprehension challenges for younger children, potentially giving rise to inflated scores. One rudimentary way of assessing this hypothesis was assessing the internal consistency of the ChEAT scores to ascertain whether Cronbach's α values were lower for younger children (see Appendix L). On neither occasion did these values differ between participants of different ages, indicating that participants in the current study responded with similar levels of consistency regardless

of their age. Whilst this does not rule out item comprehension difficulties in younger children, it makes them a less likely explanation. In support of children's comprehension of the concepts discussed in the ChEAT, a series of in-depth interviews conducted by Schur, Sanders and Steiner (2000) concluded that children aged 8 to 10 had a relatively sophisticated understanding of a wide range of strategies to change size and shape.

In Chapter 1 I concluded that the varied trajectory of longitudinal trends in adolescents' disordered eating attitudes indicated that variables other than age and development accounted for substantial proportions of their variance. It is not unreasonable to propose that this may also be the case for preadolescents. In the following subsection, 5.5, I review the extent to which the range of putative risk factors considered in the current study contributed to within-individual, across-time variance in disordered eating attitudes.

5.5 Prospective Predictors of Disordered Eating Attitudes

In keeping with a number of previous studies, the strongest predictor of subsequent disordered eating attitudes was initial disordered eating attitudes (e.g., Wichstrøm, 2000). This indicated considerable stability in the construct for individual participants over time, and challenges assertions that the disordered eating attitudes of young children may suffer from temporal and indeed conceptual instability (Micali & House, 2011).

5.5.1 Body dissatisfaction.

At both T1 and T2, body dissatisfaction predicted eating attitudes amongst participants as found in a number of previous studies of preadolescent populations (e.g., Gardner, Friedman, Stark, et al., 1999; Thompson, Corwin, & Sargent, 1997). This finding supports the role of body dissatisfaction as a key proximal psychological contributor to patterns of disordered eating in preadolescents, as proposed by numerous authors (Cash, 2004; Smolak, 2004a). However, in the current study body dissatisfaction did not significantly longitudinally predict disordered eating attitudes when initial eating attitudes and subsequent body dissatisfaction were taken into account. This finding seems at odds with those of Davison et al (2003) and Gardner et al (1999), but with two important caveats: the latter two studies operationalised body dissatisfaction using the Body Esteem Scale – Revised (Mendelson & White, 1994), and neither study adequately controlled for initial disordered eating attitudes or subsequent levels of body dissatisfaction in their analyses. As the analyses in Chapter 8, subsection 8.13.1 suggest, body esteem and body dissatisfaction do

not relate to weight and shape-related variables in the same way. In fact, Gardner et al (1999) found that a figure-based measure of body dissatisfaction did not predict subsequent disordered eating attitudes amongst their sample until the age of ten years. In conclusion, the current finding is at odds with reliable evidence from adults and adolescents that body dissatisfaction predicts subsequent disordered eating (see Stice & Shaw, 2002 for a summary of evidence) but its status in relation to evidence from other studies with preadolescents is less clear.

5.5.2 Body mass index.

In keeping with the initial hypotheses, increased BMI did not significantly predict maladaptive eating attitudes. This finding is consistent with a large body of previous prospective research (Graber, Brooks-Gunn, Paikoff, & Warren, 1994) which led Stice to conclude that "body mass may play a more important role in promoting the risk factors for eating pathology than in directly fostering or maintaining eating disturbances" (2002; p. 828). Since the current study did not directly assess the risk factors to which he refers (thin-ideal internalisation and dieting), it is impossible to say whether these findings support this assertion.

5.5.3 Anxiety.

Whilst anxiety was a significant within-time predictor of T2 disordered eating attitudes, it did not predict within-time variance at T1. Moreover, both total anxiety and its subscales failed to longitudinally predict subsequent disordered eating attitudes, contrary to the initial hypotheses. Physical symptoms of anxiety made a marginally significant contribution to variance in T2 disordered eating attitudes after T1 disordered eating attitudes had been taken into account, but the introduction of T2 physical symptoms to the model eliminated its significance. Given an absence of directly comparable studies with preadolescents, this null finding is of interest in itself. Anxiety's within-time association with a range of disordered eating behaviours in preadolescents is established, including loss of control eating and concerns about eating shape and weight (Eddy, et al., 2007; Goossens, et al., 2009), and the T2 findings bear this out. However, support for anxiety's aetiological role in children of this age has remained theoretical, and the findings of the current study cast doubt upon even this. Given anxiety's high co-morbidity with a range of other DSM-IV diagnoses, it is possible that it acts as a "general risk factor for psychiatric disorders which

operates … upon associated personality … characteristics, rather than on specific characteristics of eating disorders" (Drewett, 2007, p.6).

5.5.4 Perfectionism.

Both SPP and SOP emerged as a strong predictor of disordered eating attitudes at both T1 and T2, in keeping with the initial hypotheses. On each occasion, the two subscales were combined to form a total perfectionism score once their additive rather than interactive contribution to variance had been confirmed. These findings are consistent with findings from adults and young adolescents that suggest that both SOP and SPP contribute to within-time variance in disordered eating attitudes (Chang, Ivezaj, Downey, Kashima, & Morady, 2008; Hewitt, Flett, et al., 1995; McVey, Pepler, Davis, & Abdolell, 2002; Welch, et al., 2009). Total perfectionism also significantly predicted subsequent disordered eating attitudes in the current sample, even when initial levels of disordered eating attitudes and subsequent levels of perfectionism were taken into account.

This finding is novel; Salling, Ricciardelli and McCabe (2005) did not find that perfectionism predicted dieting or muscle preoccupation over a 10 month period with a similar preadolescent group, but they did not directly measure disordered eating attitudes. The result is, however, entirely in keeping with perfectionism's putative role as a specific risk factor for clinical eating pathology (Shafran, et al., 2002) and a longitudinal predictor of increased symptomology (Stice, 2002). This finding is also consistent with the premise that perfectionistic children are more likely to internalize and repeatedly strive for unattainable standards of thinness and extremely rigid patterns of eating behaviour when attempting weight control (Slade & Owens, 1998). In this context, goals for size, shape and diet are continuously revised to render them more exacting whilst the failure to attain a standard results in an escalation of efforts towards the goal. Since the CAPS has not previously been used to investigate perfectionism's relationship with eating attitudes in non-clinical preadolescent girls, larger scale research is required to further elucidate this association, which is the keystone of so many theoretical accounts of disordered eating (Shafran, et al., 2002; Strober & Humphrey, 1987).

5.6 Anxiety and Perfectionism

As predicted, the perfectionism subscales and anxiety were positively associated at both T1 and T2. This association could not be attributed to the perfectionism items of the

MASC since these were not significantly related to perfectionism at either timepoint. This is unsurprising given Klibert, Langhinrichsen-Rohling and Saito's (2005) assertion that these items reflect social compliance rather than perfectionism per se. At T1, both perfectionism dimensions were associated with total anxiety, physical symptoms and social anxiety, and SPP was associated with separation anxiety. In contrast, at T2 fewer significant associations were seen: SPP was associated with physical symptoms and social anxiety, whilst SOP was associated with harm avoidance. No previous studies have examined the relationship between anxiety components and perfectionism, but these findings are broadly in keeping with those of Hewitt et al (2002) in that both SOP and SPP contributed in different ways to variance in children's anxiety.

As hypothesised, both anxiety and perfectionism decreased between T1 and T2, in keeping with a limited body of previous research (Evans, et al., 1997; Spence, 1998). Within-time, at T1 only social anxiety was positively related to age, consistent with evidence that children's social anxiety emerges later than other forms of fears and anxiety (Kovacs & Devlin, 1998), whilst at T2 age was unrelated to any of the anxiety dimensions. The within-time findings were largely inconsistent with the initial hypotheses.

5.7 Prospective Predictors of Anxiety

Unexpectedly, a number of predictors of T2 anxiety emerged from the analysis of predictors of disordered eating attitudes and body dissatisfaction. Initial positive across-time associations between initial disordered eating attitude scores and subsequent physical symptoms and social anxiety led to the finding that the former predicted the latter even when subsequent disordered eating attitudes and initial physical symptoms / social anxiety were taken into account. This finding offers a simple but intriguing explanation for the significant associations between anxiety and disordered eating attitudes discussed in subsection 5.5.3 in conjunction with their absence of predictive utility. It may be that the experience of disordered eating cognitions and behaviours in preadolescence – many of which are at least somewhat aversive and may provoke negative affect – gives rise to subsequent increases in anxiety, rather than the inverse relationship. In keeping with this, initial body dissatisfaction significantly predicted subsequent total anxiety and subsequent social anxiety. It is at least feasible that initial body consciousness and negative emotions about one's physical appearance predict both concurrent and later anxiety about social activities and situations. Previous research in this area is lacking with which to compare these findings. Relatedly,

however, Stice, Hayward, Cameron, Killen, and Barr-Taylor (2000) found that both body dissatisfaction and disordered eating attitudes predicted negative affect over time in young adolescent girls; Ohring, Graber and Brooks-Gunn (2002) detected similar effects over eight years between girls' adolescence and young adulthood. Body dissatisfaction and disordered eating attitudes, therefore, may represent either causal or exacerbating factors in anxiety symptoms amongst preadolescents, but currently constitute only promising candidates for future research consideration.

5.8 Strengths of the Study

Few previous studies have focused prospectively upon pre-pubertal populations and none have assessed this specific constellation of putative risk factors. In this sense alone, the study is novel. However, this study also utilised statistical methods to control for sources of additional variance in T2 outcomes when considering the significance of the role of T1 predictors, a strategy that has been woefully underused in previous studies of this nature. As a consequence, the study has elucidated novel predictors of disordered eating attitudes and has an arguably firmer statistical basis for claiming their significance than much of the research that has gone before it.

5.9 Limitations of the Study

A key limitation of the study was its attrition rate, which approached 30%. Although attrition analyses suggested no significant differences between the participants that continued in the study and those that did not, such a high rate of attrition serves, at the very least, to reduce statistical power and, at worst, risks calling into question the conclusions of the study.

The study relied primarily upon self-report data and this may have resulted in the inflation of reported disordered eating symptomology (Stice and Whitenton, 2002) and body dissatisfaction (Paxton et al, 1991). Other potential limitations include the choice of the CAPS to assess perfectionism which, whilst the most widely-used perfectionism scale suitable for pre-adolescents, is based upon one of several conceptualisations of perfectionism: an alternative conceptualisation might yield different results (Shafran et al., 2002). Future research should address and seek to clarify these concerns.

Chapter 6: Study 2 Introduction

6.1 Introduction

Disordered eating attitudes and body dissatisfaction may be understood as phenomena of both clinical and cultural significance. Such an understanding has two key implications for their developmental investigation: one must look beyond the medical model of psychopathology to understand their development, and one must specifically look to cultural influences to understand their 'transmission'. In Chapter 1 sociocultural influences upon the development of disordered eating were considered, and in this chapter I sought to set them within the proximal context in which they are hypothesised to contribute to the emergence and maintenance of body dissatisfaction and disordered eating attitudes.

For several decades, sociocultural factors have been firmly implicated in the development and expression of body dissatisfaction and disordered eating (Striegel-Moore, Silberstein, & Rodin, 1986). Whilst the societal prevalence of obesity trends upwards, more numerous images of an unhealthily thin, unrealistically proportioned female ideal body populate the visual diet (Nemeroff, Stein, Diehl, & Smilack, 1994; Spitzer, Henderson, & Zivian, 1999). In short, Western females have never been more aware of the socially prescribed thin-ideal and have never been physically further from it (Cusumano & Thompson, 1997). Children are not immune to these influences: most are exposed to thin beauty ideals before the age of formal schooling (Blowers, et al., 2003; Dittmar, et al., 2006). By 6 or 7 years of age, girls' level of awareness of the thin ideal body matches that of girls 5 or 6 years their senior (Murnen, et al., 2003).

The very pervasiveness of cultural standards of thinness means that awareness of them is not a sufficient antecedent to the development of eating and body image disturbance (Polivy & Herman, 2004). Disordered eating attitudes and body dissatisfaction are not confined to girls who are, or who risk being, overweight, although both are more common in this group (Ranzenhofer, et al., 2008; Smolak, 2004b). Having considered distal physical (adiposity) and personality (perfectionism, anxiety and body dissatisfaction) predictors of disordered eating and body dissatisfaction, it is necessary to turn to sociocultural factors of proximal relevance to the emergence of these phenomena. Of course, sociocultural factors interact with the distal context in which they occur, and certain factors – such as negative affect – seem to influence development at multiple points, on multiple levels. Nevertheless, it is worth considering their contribution to the conceptual 'uniqueness' of eating disorders before examining their role within an extant framework of eating disorder pathogenesis.

6.2 Eating Attitudes and Body Image: Culture-bound Syndromes?

Multiple authors have differentiated eating disorders from other psychopathologies by virtue of their 'culture bound' status. It is worth examining the features of disordered eating attitudes and body image that mark them as distinct from psychopathologies that are not so intimately bound up with cultural norms and trends. Gordon (2000) asserts that these cognitions and behaviours are culture-bound insofar as they "express crucial contradictions and core anxieties of a society" (p. 8). Western society's enduring promotion and pursuit of the thin-ideal body amid a deeply obesogenic environment and the highest-ever levels of population overweight and obesity arguably constitutes such a contradiction. Gordon elaborates upon this initial premise by highlighting (in keeping with Devereux (1980)), the following characteristics as indicative of their ethnically-embedded status:

> "Phenomena are expressed dimensionally upon a spectrum of varying seriousness and frequency, incorporating numerous non-clinical and sub-clinical forms" (Gordon, 2000; p. 6)

In Chapter 1, this particular characteristic of disordered eating and body dissatisfaction was invoked as evidence of the importance of regarding them through a developmental lens. Similarly, such a conceptualisation of disordered eating attitudes is in keeping with the rarity of clinically disordered eating but the prevalence of its component behaviours and cognitions within non-clinical populations. Furthermore, as detailed in Chapter 1, subsection 1.4, sub-clinical variants of disordered eating are ontogenetically indistinguishable from its clinical forms, save by frequency, in terms of their known antecedents, correlates and prognostic indicators (Crow, Stewart Agras, Halmi, Mitchell, & Kraemer, 2002; Stice, Marti, Shaw, & Jaconis, 2009).

By virtue, therefore, of the prevalence of disordered eating and body dissatisfaction cognitions and behaviours across large swathes of the female population, these phenomena come to constitute "direct extensions and exaggerations of normal behaviours and attitudes within the culture [which are] often highly valued" (Gordon, 2000, p. 8). Dieting, watching one's weight and exercising to stay slim are activities which generally accrue social approval, particularly amongst young girls (Paxton, Schutz, Wertheim, & Muir, 1999) . Both body dissatisfaction and disordered eating attitudes are familiar features of our current cultural vocabulary and, in moderation, their component behaviours are promoted both informally and formally. Discussion of dieting and body dissatisfaction, indeed, comprises a key strategy of social cohesion and easing known as 'fat talk', particularly evident amongst high-

risk young female populations (Stice, Maxfield, & Wells, 2003; Tompkins, Martz, Rocheleau, & Bazzini, 2009).

Eating disorders embody cultural conflicts endemic to society, but what relevance does this have to the development of their attitudes and behaviours in individual young girls? Quite simply, these "social contradictions experienced by all" (Gordon, 2000; p. 12) are likely to interact with other factors of vulnerability or resilience in ways that contribute to disordered eating pathogenesis. Although almost all individuals in society are aware of them, a few will react to them in a way that puts them at risk of eating and body image psychopathology.

6.3 Thin-ideal Awareness and Internalisation

To partially account for individual differential vulnerability to disturbances of body image and eating, some researchers have considered thin-ideal internalisation, the extent to which one "cognitively 'buys into' socially-defined ideals of attractiveness and engages in behaviours designed to produce an approximation of these ideals" (Thompson & Stice, 2001, p. 55). Of course, to buy into socially-defined ideals of attractiveness one must first be aware of them: awareness of the thin-ideal is a necessary but not sufficient prerequisite for its internalisation.

Thin-ideal internalisation accounts for significant additional variance in body dissatisfaction and disordered-eating variables beyond that accounted for by thin-ideal awareness, indicating distinctness (Heinberg, Thompson, & Stormer, 1995). Thin-ideal internalisation is a discriminating predictor of body dissatisfaction and disordered eating attitudes, particularly amongst adolescent girls (Groesz, Levine, & Murnen, 2001; Heinberg, et al., 1995; Stice, et al., 2010). However, relatively few studies have focused upon sociocultural factors and body dissatisfaction in girls below the age of 12 and those that have, have not simultaneously assessed disordered eating attitudes (Blowers, et al., 2003; Brown & Slaughter, 2011; Dittmar, et al., 2006; Murnen, et al., 2003; Phares, et al., 2004). The present study sought to address this research need by examining girls' eating attitudes, body dissatisfaction, and adiposity within a network of related variables known collectively as the sociocultural model (Stice, 2001).

6.4 The Sociocultural Model of Disordered Eating

The sociocultural model – one of the most thoroughly supported models of disordered eating – originally described the development of bulimic symptoms, but has since been applied to a range of clinical and non-clinical pathological behaviours around food (Thompson & Stice, 2001). It proposes that thin-ideal internalisation leads to body dissatisfaction and thence to an increased risk of disordered eating attitudes via two distinct 'pathways': dietary restraint and depression. Elevated adiposity also acts upon this process, contributing to initial variance in both thin-ideal internalisation and body dissatisfaction (Stice & Shaw, 2002). Figure 6.4 depicts the sociocultural model, incorporating the influence of adiposity.

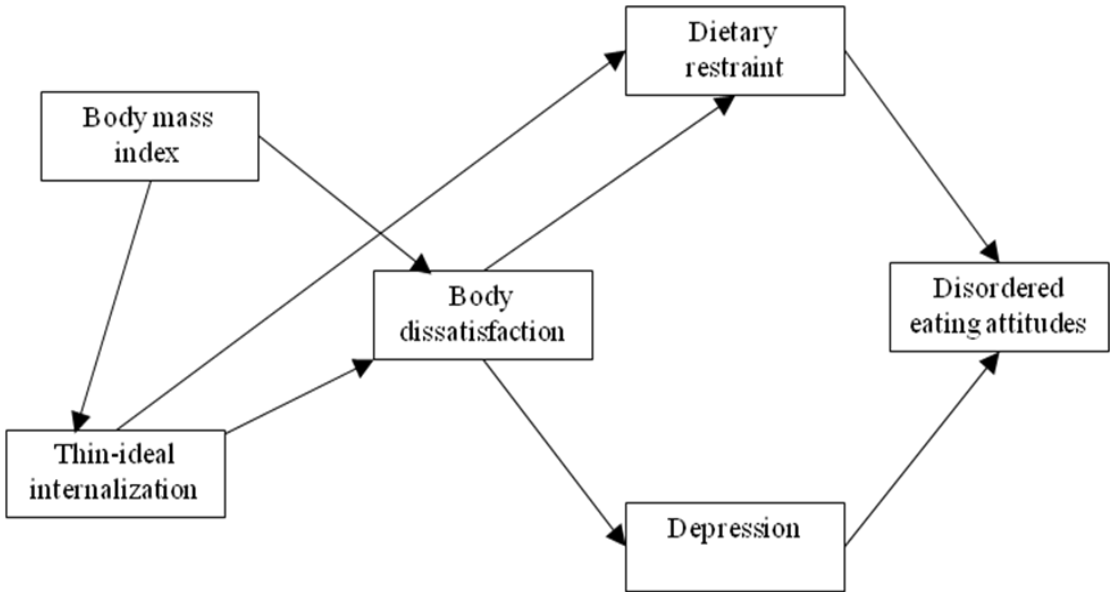

Figure 6.4 The Sociocultural Model of Disordered Eating incorporating adiposity

6.5 The Sociocultural Model in Preadolescents

Despite the prevalence of disordered eating attitudes amongst young girls, most of the more than 200 studies examining the sociocultural model involve adults and adolescents. There remains considerable, warranted debate about the degree to which young children are truly aware of abstract concepts such as cultural and societal appearance norms (Smolak, 2004b). In addition, there are challenges inherent in measuring the components of the sociocultural model in girls as young as seven: tests must be simple and comprehensible, reliable and sensitive enough to show individual variation, and they must exhibit construct validity with the age group in question (Kelly, Ricciardelli, & Clarke, 1999). Over the last decade, several such instruments have been developed (e.g., Smolak, et al., 2001; Van Strien

& Oosterveld, 2007). Using these tools, many of the individual relationships in the sociocultural model can be evaluated in this age group.

6.5.1 Thin ideal internalisation and awareness in preadolescents.

Thin-ideal awareness and internalisation have been reported, and the constructs validated, in girls as young as six years (Murnen, et al., 2003). Thin-ideal awareness seems to develop first: from the age of 3 years, children exhibit body size stereotyping which suggests the assimilation of sociocultural appearance ideals (Cramer & Steinwert, 1998; Musher-Eizenman, et al., 2004). Aged 6, girls' internalisation of the thin-ideal is associated with a liking for it and an expressed preference to resemble it (Murnen, et al., 2003). There are no clear age trends in thin-ideal awareness, or indeed for thin-ideal internalisation, probably due to the relative scarcity of studies during the preadolescent period (Murnen, et al., 2003; Sands & Wardle, 2003).

Thin-ideal internalisation has been shown to partially mediate the relationship between body dissatisfaction and body mass index in girls aged 9 to 12 years (Sands & Wardle, 2003). Moreover, the same authors found that thin-ideal internalisation fully mediated the relationship between thin-ideal awareness and body dissatisfaction in this age group, as it has been shown to do in early adolescent girls (Austin & Smith, 2008). The current study sought to examine this relationship between thin-ideal awareness, thin-ideal internalisation and body dissatisfaction in more detail (by using a number of different measures of body dissatisfaction). Since Austin and Smith (2008) also found that thin-ideal internalisation completely mediated the relationship between thin-ideal awareness and disordered eating attitudes, I sought to test these relationships in preadolescents too.

Previous research investigating components of the sociocultural model in preadolescents has tended to treat body dissatisfaction and body esteem as composites of the same latent construct (e.g., Sands & Wardle, 2003), but the current study sought to examine them, and their relationships with other variables, separately. The figure choice methodologies usually used to assess body dissatisfaction have an emphasis firmly upon the selection of an ideal size and shape in comparison to one's own. In contrast, the most commonly used index of body esteem in children, the Body Esteem Scale – Revised (Mendelson & White, 1994), consists mainly of a global appearance esteem subscale, with only a few questions specifically focused on weight and shape. The assumption that these two quite different types of scales represent the same construct is rarely challenged, but ought to be (Thompson, 2004). The current study therefore examined whether the various body image scales could be used statistically interchangeably in the component relationships of the

sociocultural model, as a guide to whether the constructs themselves were sufficiently similar as to be treated as synonymous.

6.5.2 Dietary restraint and depression: Dual pathways?

Due to its high prevalence amongst girls and women of all ages, dietary restraint is not a particularly discriminating predictor of disordered eating attitudes on its own (Stice, et al., 2010). In adolescents it may, however, mediate the relationship between body dissatisfaction and disordered eating attitudes (Stice, 2002; Stice & Shaw, 2002). Although this meditational relationship has not yet been tested in children, girls' body dissatisfaction at 5 and 7 years of age has been shown to predict subsequent dietary restraint at 9 years old (Davison, et al., 2003) which, in turn, is associated with disordered eating attitudes from eight years of age (Maloney, et al., 1989). Additionally, in young adult and adolescent females (Stice, 2001; Stice, Mazotti, Weibel, & Agras, 2000), dietary restraint mediates the relationship between thin-ideal internalisation and disordered eating attitudes, even in the absence of body dissatisfaction, due to the wish to attain a socially desirable figure (Stice, 2002). Previous research has not examined whether a similar relationship exists in younger girls.

Body dissatisfaction may also lead to disordered eating attitudes by the second of the two pathways shown in Figure 6.4, depression (Field, et al., 2001; Stice, 2001). In eight-year-old girls, Phares, Steinberg, & Thompson (2004) found that body dissatisfaction was associated with depression, which itself was associated with disordered eating attitudes. The original sociocultural model also posits that dietary restraint predicts depression, as shown in Figure 5.4 (Stice & Bearman, 2001). Evidence for this relationship is both limited and mixed in adults and adolescents (Chen, McCloskey, & Keenan, 2009; Stice, 2001; Stice, Hayward, et al., 2000). For example, Stice (2001) found that negative affect and dietary restraint fully mediated the prospective relationship between body dissatisfaction and disordered eating attitudes, directly supporting the dual-pathway model, but failed to find the significant relationship between the two that the sociocultural model posits. In contrast, Sinton & Birch (2005) found that depression in five and seven-year-old girls prospectively predicted subsequent dietary restraint although initial dietary restraint was not taken into consideration.

6.5.3 Extensions of the sociocultural model.

Finally, there is evidence from research with adolescents that thin-ideal internalisation influences eating attitudes directly, even when its relationship with intervening variables such as dietary restraint is taken into account (Field, et al., 2001; Stice & Agras, 1998; Stice,

Presnell, & Spangler, 2002). This pathway does not feature in the original sociocultural model but does feature in a recent extension of it with girls aged 12 to 14 years (Vander Wal, Gibbons, & Grazioso, 2008). In intervention studies (e.g., Stice, Marti, Rohde, & Shaw, 2011), reductions in thin-ideal internalisation have prospectively predicted reductions in disordered eating symptoms. This notwithstanding, some studies have not shown a direct link between the variables, and this relationship has not been examined in girls aged younger than 12 years (Rodgers, Paxton, & Chabrol, 2009; Wichstrøm, 2000). Another subsidiary aim was to examine the relationship between the components of the sociocultural model in preadolescents and their socioeconomic status (SES), particularly given the conflicting findings of studies into the relationship between SES, body dissatisfaction and disordered eating themselves, as presented in Chapter 2, subsection 2.6. No previous work has reported on whether levels of thin-ideal internalisation and thin-ideal awareness vary between pre-adolescent girls of different SES, so the current study examined this for the first time. Very limited research with adolescents suggests that the sociocultural model of disordered eating might be equally applied to populations of girls across the socioeconomic spectrum (Vander Wal, et al., 2008).

6.6 Objectives

The aims of the current study were to, first, describe levels of thin-ideal awareness, internalisation, body dissatisfaction (and body esteem), dietary restraint, depression and disordered eating attitudes in girls aged seven to 11 years of age.

Second, the interrelationships between the aforementioned variables were examined. This comprised scrutiny of the extent to which awareness of the thin-ideal affected body dissatisfaction and disordered eating attitudes via thin-ideal internalisation, and whether this mediation relationship was partial or total. This also comprised examination of the degree to which the roles of weight- and size-specific body dissatisfaction and global appearance dissatisfaction might be distinguished.

Third, I aimed to examine the extent to which the sociocultural model successfully predicts the relationships between the key variables in this population. Finally, I sought to set the findings in the context of participants' socioeconomic status.

6.7 Hypotheses

6.7.1 Across-time associations between variables.

It was predicted that body mass index would be negatively associated with body dissatisfaction and body esteem, and positively associated with thin-ideal internalisation and thin-ideal awareness, in keeping with previous findings (Sands & Wardle, 2003; Thompson & Stice, 2001). It was expected that thin-ideal internalisation would account for all significant shared variance between body dissatisfaction and thin-ideal awareness, i.e., would fully mediate the relationship, as reported by Austin and Smith (2008). Body dissatisfaction and body esteem were expected to be negatively associated with dietary restraint and depression (Austin & Smith, 2008; Blowers, et al., 2003; Vander Wal, et al., 2008) whilst dietary restraint and depression were tentatively expected to be associated with one-another (Chen, et al., 2009; Stice, 2001). Finally, disordered eating attitudes were expected to be positively associated with thin-ideal awareness and thin-ideal internalisation, negatively associated with body dissatisfaction and body esteem, and positively associated with dietary restraint and depression (Cash, 2005; Clark & Tiggemann, 2008; Polivy & Herman, 2004; Sands & Wardle, 2003; Stice, 2002). Overall, the sociocultural framework was expected to provide a well-fitting model of the relationship between the variables shown in Figure 6.4 (Austin & Smith, 2008; Sands & Wardle, 2003; Vander Wal, et al., 2008)

6.7.1 Differences with age.

As regards age differences in the component variables of the sociocultural model, several cross-sectional studies report lower levels of disordered eating attitudes in older children within the 7 to 11-year-old age-group (Flannery- Schroeder & Chrisler, 1996; Smolak & Levine, 1994), as described in Chapter 1 subsection 1.6.1. As detailed in Chapter 1, subsection 1.7.1, there are no clear trends in the relationship between age and body dissatisfaction (Smolak, 2004b). Age-related trends in preadolescence have not been reported for thin-ideal internalisation (Murnen, et al., 2003; Sands & Wardle, 2003), dietary restraint (Van Strien & Oosterveld, 2007) or depression (Twenge & Nolen-Hoeksema, 2002). Adiposity reliably increases with age in 7 to 11 year olds (Cole, Flegal, Nicholls & Jackson, 2007). On the basis of this prior research I expected to find the highest levels of disordered eating attitudes in the youngest children in the sample, to see the inverse trend for adiposity and to find that the remainder of the variables were age-invariant.

Chapter 7: Study 2 Method

7.1 Participants

Schools were recruited via convenience sampling; state-run schools were selected from a list of participant institutions in the County Durham Healthy Schools initiative. The head-teachers of seven schools (out of seven contacted) agreed to participate in the study. Support was obtained from the school governors and the Local Education Authority (LEA). Six schools were state-run and one (school 22) was a fee-paying private school. Although four schools took part in both the longitudinal and the cross-sectional studies, the two samples were entirely separate, i.e., none of the participants in the longitudinal study also took part in the cross-sectional study. Caregivers of all girls aged 7 to 11 years old in school years 3, 4, 5, and 6 received an Information and Consent form regarding the study, which was distributed via the school (see Appendix M). The forms were sent out on two occasions in an attempt to improve the response rate. Respondents were asked to provide their own name, their child's full name and their child's date of birth and to indicate whether or not they consented to their child's participation. There were 374 girls eligible to participate, and response rates can be found in Chapter 8, subsection 8.4.

7.2 Measures

Age-appropriate psychometric measures with standardisation data from large school-based samples were selected for use whenever possible. Where materials had been specifically adapted for use with young participants, previous adaptations were adopted. This section describes them and presents validity and reliability data. Psychometric properties of the scales with the current study population are presented in Chapter 8, subsection 8.2.

7.2.1 Anthropometrics.

To assess adiposity, measurements of participants' weight and height were obtained using the procedures detailed in Chapter 3, subsection 3.2.1.

7.2.2 Children's Body Image Scale (Truby & Paxton, 2002).

Participants' body satisfaction was assessed using the Children's Body Image Scale (CBIS). Details of the scale were presented in Chapter 3, subsection 3.2.2.

7.2.3 Body Manipulation Software (Evans & Tovée, 2012).

Participants' body satisfaction was also assessed using the body manipulation software (BMS). The development of the BMS, as well as its validity, reliability and procedures of use, were described in detail in Chapter 3, subsection 3.4.2.

7.2.4 Body Esteem Scale - Revised (Mendelson & White, 1994).

The Body Esteem Scale – Revised (BES-R; see Appendix N) is a 20-item yes/no questionnaire intended to assess children's affective evaluation of their overall appearance. Unlike figure choice body dissatisfaction scales such as the CBIS, it is not weight- and size-specific: 17 items such as 'I'm pretty happy about the way I look' reflect global appearance-related affect whilst three items (comprising an optional subscale) refer to satisfaction with one's weight, such as 'my weight makes me happy' (Mendelson, et al., 1996). The BES-R was utilised alongside the preceding two measures of body dissatisfaction (CBIS and BMS) because it enabled a distinction to be made between weight and shape dissatisfaction and global appearance dissatisfaction.

Items are both positively and negatively keyed, and high final scores indicate high body esteem. The authors report an internal consistency coefficient of .88 and also report adequate concurrent validity with other measures of satisfaction with appearance. The BES has been used extensively with children aged 8-11 years and has good reliability in this age group (2-week test–retest r = .90) as well as excellent internal consistency (α = .92; Vander Wal & Thelen, 2000).

7.2.5 Children's Eating Attitudes Test (Maloney, et al., 1989).

Disordered eating attitudes were assessed using the Children's Eating Attitudes Test (ChEAT). Details of the scale were presented in Chapter 3, subsection 3.2.3.

7.2.6 Sociocultural Attitudes Towards Appearance Questionnaire (Smolak, et al., 2001).

Two related concepts, the *awareness* of sociocultural ideals of thinness and the extent of the individual's *internalisation* of these ideals, were assessed using the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ; see Appendix O). This scale was adapted to be suitable for younger participants by Smolak, Levine & Thompson (2001) from the adult original (Heinberg, et al., 1995). The revised SATAQ consists of fourteen uniformly positively-keyed items with which participants indicate their agreement using a 5

point Likert scale. Two seven-item subscales exist, denoting *Internalisation* (e.g. 'Photographs of thin women make me wish I was thin') and *Awareness* of societal ideals of thinness (e.g. 'Attractiveness is very important if you want to get ahead in our culture') respectively. Smolak et al. (2001) obtained a whole-scale internal consistency value of .90 as well as α values of .88 and .82 for the Internalisation and Awareness subscales respectively.

In its adapted form, the SATAQ has been used with children as young as 6 years old (Murnen, et al., 2003), and has shown sound internal consistency (internalisation subscale α = .75; awareness subscale α = .80) with girls aged 9 and above (Sands & Wardle, 2003). In the current study, the items were adapted to this young British population as in Sands and Wardle (2003). This included, but was not limited to, the provision of definitions of words identified as potentially problematic such as 'culture' (the shared rules, ideas and knowledge that you and the people around you have) and 'society' (the people around you of all ages, including friends, family, other people you know and even people you don't). A list of standard definitions can be found in Appendix H. Age- and culturally-appropriate names of popular magazines were also substituted for the American originals.

7.2.7 Dutch Eating Behaviour Questionnaire for Children (Van Strien & Oosterveld, 2007).

Participants' eating behaviours were assessed using the Dutch Eating Behaviour Questionnaire for Children (DEBQ-C; see Appendix P), a twenty-item scale consisting of three subscales designed to assess distinct cognitive patterns of eating regulation. The Restraint subscale assesses eating reduced amounts in order to lose or maintain weight. It includes 7 items such as 'Do you intentionally (on purpose) eat food that makes you lose weight?' The External Eating subscale measures eating in response to cues from the environment. It comprises a further 6 items including 'Does walking past a sweet store make you feel like eating?' Finally, the Emotional Eating subscale measures eating in response to negative emotions. It includes 7 items such as 'Does worrying make you feel like eating?' To each item, participants are required to respond 'no', 'sometimes' or 'yes'. Items are all positively keyed.

Internal consistency coefficients of .82 for the restraint subscale, .77 for the emotional eating subscale and .75 for the external eating subscale were obtained with a large standardisation sample of 7 to 11-year-old overweight and non-overweight girls. An examination of the relationships between the DEBQ-R subscales and other measures of

motivated eating behaviours in the standardisation sample showed the construct validity to be adequate (α = .6 to .8; Van Strien and Oosterfeld, 2007).

7.2.8 Child Depression Inventory – Short Form (Kovacs, 1992).

Depression was assessed using the Child Depression Inventory – Short Form (CDI-S; see Appendix Q), a simplified version of the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). This abbreviated form of the Child Depression Inventory (CDI) is suitable for children from seven years of age and consists of 10 items, each comprising three statements assigned a numerical value 0, 1, or 2. The participant selects the single statement out of the three choices that best describes the way he/she has been feeling and thinking during the preceding two weeks e.g. 'I do most things okay' 'I do many things wrong' 'I do everything wrong'. The CDI-S has an internal consistency of .80 and is strongly associated (r =.89) with the longer version of the CDI (N = 1266; Kovacs, 1992).

7.2.9 Free School Meals uptake.

In order to assess the school-wide socioeconomic status (SES) of the participants, data regarding the proportion of pupils aged 5 to 11 in receipt of Free School Meals (FSM) at each school was obtained from Durham County Council. Details of the eligibility criteria for FSM and the scale's use as a proxy for SES were presented in Chapter 3, subsection 3.3.5.

7.2.10 Family Affluence Scale II (Boyce, et al., 2006).

In order to assess the individual-level socioeconomic status (SES) of the participants, the Family Affluence Scale II (FAS II) was used as an index of relative familial material deprivation that does not require parental input, to complement the existing school-wide figures for FSM uptake. Details of the FAS II were presented in Chapter 3, subsection 3.4.1.

7.3 Procedure

Data collection took place from October 2009 through to May 2010. Participants completed the questionnaires in groups of eight children or fewer seated in a quiet classroom during the school day. Data collection took place on a single occasion and lasted between 60 and 90 minutes, depending upon the rate at which the group progressed, and included at least one ten minute break.

Adult consent and child assent were secured in line with the procedures described in Chapter 3, subsections 3.3.1 and 3.3.2. The adult consent form is provided in Appendix M and the child assent form, in Appendix R.

Assessment of participants proceeded as described in Chapter 3, subsection 3.3.3. A list of standard definitions and paraphrasing used can be found in Appendix H. Participants' understanding was systematically checked against these definitions, item by item, by their response to the experimenter's questions e.g. "what did we decide *attractiveness* meant? What words could have been used instead of *attractiveness*?" Once all questionnaires had been completed, each participant completed the computer-based body image task one by one, using the body manipulation software. They did this seated next to the experimenter at a desk using a laptop and external mouse, following completion of a practice trial. Following participation, participants were debriefed as described in Chapter 3, subsection 3.3.4. The information sheet that participants took home to their caregivers can be found in Appendix S. As in the longitudinal study, participants received a certificate of thanks and a small novelty sticker in appreciation of their efforts.

Contingency planning proceeded as detailed in Chapter 3, subsection 3.3.5. No concerns were raised by teachers and no participants showed distress during testing. No concerns were expressed by participants or caregivers following participation. It was not necessary to review any of the participant data with a medical professional.

7.4 Data Confidentiality and Handling

The participant's name appeared only on the two consent forms (caregiver and participant) for each timepoint. The questionnaires were marked with an anonymous unique numerical identifier. A record of the child's name, date of birth and identifier was stored separately from the rest of the data for use in the case of retroactive withdrawal of consent by either caregiver or participant. All data were stored in compliance with the Data Protection Act (1998). Caregivers were informed of the author's intention to publish the anonymous data as part of a PhD thesis and concomitant journal publications.

7.5 Ethical Opinion

This project received Durham University Psychology departmental Ethics Committee clearance in October 2009.

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Chapter 8: Study 2 Results

8.1 Introduction

This chapter presents the analyses of the data gathered in Study 2. Scale reliability data, descriptive statistics and correlations are provided in subsections 8.2 to 8.12. In subsection 8.13 multiple regressions testing hypothesized relationships between discrete sets of variables in the sociocultural model are presented. In subsection 8.14, the fit of the data to the full sociocultural model and its variants is examined in path analyses using AMOS 17™.

8.2 Psychometric Properties of the Measures

Internal reliability estimates for scores on the psychometric measures were calculated using Cronbach's coefficient alpha, or the Kuder-Richardson coefficient 20 (K-R 20) for dichotomous responses, as recommended by Nunnally (1978). They are shown in Table 8.1.

Table 8.1 Internal reliability coefficients for psychometric scales

Measures	*N*	α
Family affluence [a]	127	.41
Body esteem [b]	123	.90
Global appearance		.89
Weight specific		.80
Thin-ideal [c]		
Internalisation	125	.82
Awareness	125	.75
Eating behaviours [d]		
Restraint	126	.70
Emotional cues	126	.70
External cues	126	.75
Eating attitudes [e]	125	.87
Depression [f]	124	.91

Note. [a] Family Affluence Scale (FAS; Boyce et al, 2006); [b] Body Esteem Scale (BES; Mendelson & White, 1982); [c] Sociocultural Attitudes Towards Appearance Questionnaire Revised (SATAQ-R; Smolak et al, 2001); Dutch Eating Behaviour Questionnaire Child (DEBQ-C; Van Strien & Oosterveld, 2007); [e] Children's Eating Attitude Test (ChEAT; Maloney et al, 1989); [f] Child Depression Inventory – Short form (CSI-S; Kovacs, 1992)

For the dichotomously coded Body Esteem Scale the K-R 20 coefficient α was calculated for all 20 questions. For the 14-item Sociocultural Attitudes Towards Appearance Questionnaire, internal reliability estimates were calculated using coefficient α for the 8 item Internalisation subscale and the 6 item Awareness subscale individually. Coefficient α for the three subscales of the Dutch Eating Behaviour Questionnaire (Restraint: 7 questions; Emotional cues: 7 questions; External cues: 6 questions) was likewise calculated independently for each subscale. The internal consistency of the Children's Eating Attitude Test was assessed by calculating co-efficient α for the full 26-item scale (shown in Table 5.1). The co-efficient α for a 23-item version of the ChEAT was also calculated, as advocated by Smolak and Levine (1994) to improve internal consistency, omitting items 13, 19 and 25. Since the omission of these items resulted in an only slightly increased α value of .90 the data from the 26 item scale were retained. The co-efficient α obtained for the Child Depression Inventory (Short Version) was based on all ten items. Overall, the K-R 20 and co-efficient α values are acceptable, but for the four-item Family Affluence Scale a substantially lower α of .41 was obtained.

8.3 Descriptive Statistics and Data Screening

Data were screened for floor or ceiling effects and missing values. There were five data points missing from the computer body dissatisfaction data, three from the depression data, two from the thin-ideal internalisation/awareness data and the eating pathology data and one from the eating behaviours data. In all cases the missing data were due to non- or partial-completion of the scale measure by the participant in question. None of the measures showed floor or ceiling effects. Table 8.2 presents descriptive statistics for all variables.

Table 8.2 Descriptive statistics for all Study 2 variables

Measures		*N*	Maximum possible	Mean	*SD*	Median	Minimum to maximum
Age (decimal years)		127	--	9.5	1.2	9.3	7.4 – 11.8
Family affluence [a]		127	3	2.3	.7	2.0	1.0 – 3.0
Height (m)		127	--	1.4	.1	1.4	1.2 – 1.6
Weight (kg)		127	--	35.2	8.8	34.5	19.1 – 59.4
BMI (kg / m^2)		127	--	18.6	3.0	18.3	11.6 – 27.3
Body image							
Paper [b]	Dissatisfaction	127	6	-1.3	1.7	-1.0	-6.0 – 3.0
scale {	Ideal size	127	6	2.5	1.1	2.0	1.0 – 6.0
	Perceived size	127	6	3.8	1.5	3.0	1.0 – 7.0
Computer [c]	Dissatisfaction	122	12	-1.3	2.1	-1.0	-7.0 – 4.0
scale {	Ideal size	122	12	4.3	1.9	4.0	1.0 – 9.0
	Perceived size	122	12	5.6	2.0	6.0	2.0 – 12.0
Body esteem [d]		123	40	32.1	5.7	33.0	21 – 40
Thin-ideal [e]							
Internalisation		125	40	24.3	7.6	24.0	10 – 40
Awareness		125	30	19.8	5.5	20.0	8 – 30
Eating behaviours [f]							
Restraint		126	3	1.9	.5	1.9	1.0-3.0
Emotional cues		126	3	1.5	.4	1.4	1.0-2.6
External cues		126	3	2.1	.5	2.0	1.0-3.0
Eating attitudes [g]		125	78	18.7	14.3	13.0	0 – 63.0
Depression [h]		124	20	4.6	4.1	4.6	0 – 19.0

Note. [a] Family affluence Scale (FAS; Boyce et al, 2006), [b] Children's Body Image Scale (CBIS; Truby & Paxton, 2002); [c] Body Manipulation Software (BMS; Evans & Tovée, 2012); [d] Body Esteem Scale (BES; Mendelson & White, 1982); [e] Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-R; Smolak et al, 2001); [f] Dutch Eating Behaviour Questionnaire Child (DEBQ-C; Van Strien & Oosterveld, 2007); [g] Children's Eating Attitude Test (ChEAT; Maloney et al, 1989); [h] Depression=Child Depression Inventory (CDI; Kovacs, 1992)

The univariate distribution of data for each variable was examined for its fit with a normal distribution using a variety of techniques including scrutiny of histograms and P – P plots, boxplots and values of kurtosis and skewness. Four variables (BMI, depression, eating

disorder symptoms and body esteem) were transformed to normalise their univariate distribution (Velleman & Hoaglin, 1981). Whilst the transformed variables were used in all bivariate (correlations) and multivariate analyses (regressions and path analyses), the untransformed original variables were used in the preceding descriptive analyses. Data (excluding height, weight and BMI) were also screened for univariate outliers, defined as scores larger or smaller than 3 standard deviations from the mean (Kline, 2005). Since only two out of 1905 cases fitted this criterion, they were retained in the analysis.

8.4 Characteristics of the Sample Population

Out of a potential participant population of 374, the parents or guardians of 133 girls returned a form (36%) and of those 130 gave their consent whilst 3 declined. A further 3 girls whose parents consented to their participation were absent on the day of testing and remained unavailable. Since three schools took part in both the longitudinal and the cross sectional studies, the names and dates of birth of participating children were carefully checked to ensure that no child took part in both studies. The mean age of participants on the day of testing was 9 years and 6 months (ranging from 7 years and 9 months to 11 years and 10 months with a standard deviation of 1 year and 2 months). 126 participants were Caucasian and one was of mixed race.

Participant values for Family Affluence Scale (FAS II) score, an index of familial socioeconomic status, ranged from 1 (low) to 3 (high). Table 8.3 displays the proportion of participants per school and over the whole sample with a low, medium or high family affluence score. Whole-school percentage uptake of free school meals, the second index of socioeconomic status, is displayed alongside the FAS II data. Schools were categorised as ‘high’ or ‘low’ SES depending on whether the proportion of pupils in receipt of FSM was higher or lower than 15.5%, the 2008 national average for primary schools according to the Department for Children, Schools and Families (2008).

Table 8.3 Socioeconomic status (SES) indicators by school in decreasing order of overall affluence: Family Affluence Scale II (FAS) score and proportion of children receiving free school meals (FSM)

School ID	FAS								FSM	High / low SES
	Low		Medium		High		Total			
	%	(*n*)	%	(*n*)	%	(*n*)	%	*(n)*	%	
22	0	(0)	33	(6)	67	(12)	100	(18)	0	High
24	11	(3)	25	(7)	64	(18)	100	(28)	6	High
21	0	(0)	50	(3)	50	(3)	100	(6)	4	High
23	22	(2)	22	(2)	56	(5)	100	(9)	30	Low
25	19	(4)	38	(8)	43	(9)	100	(21)	38	Low
27	20	(3)	47	(7)	33	(5)	100	(15)	38	Low
26	30	(9)	43	(13)	27	(8)	100	(30)	39	Low
Total	17	(21)	36	(46)	47	(60)	100	(127)	26	Low

8.5 Physical Characteristics of the Sample Population

The distribution of body mass index values in the sample population is illustrated in Figure 8.5.

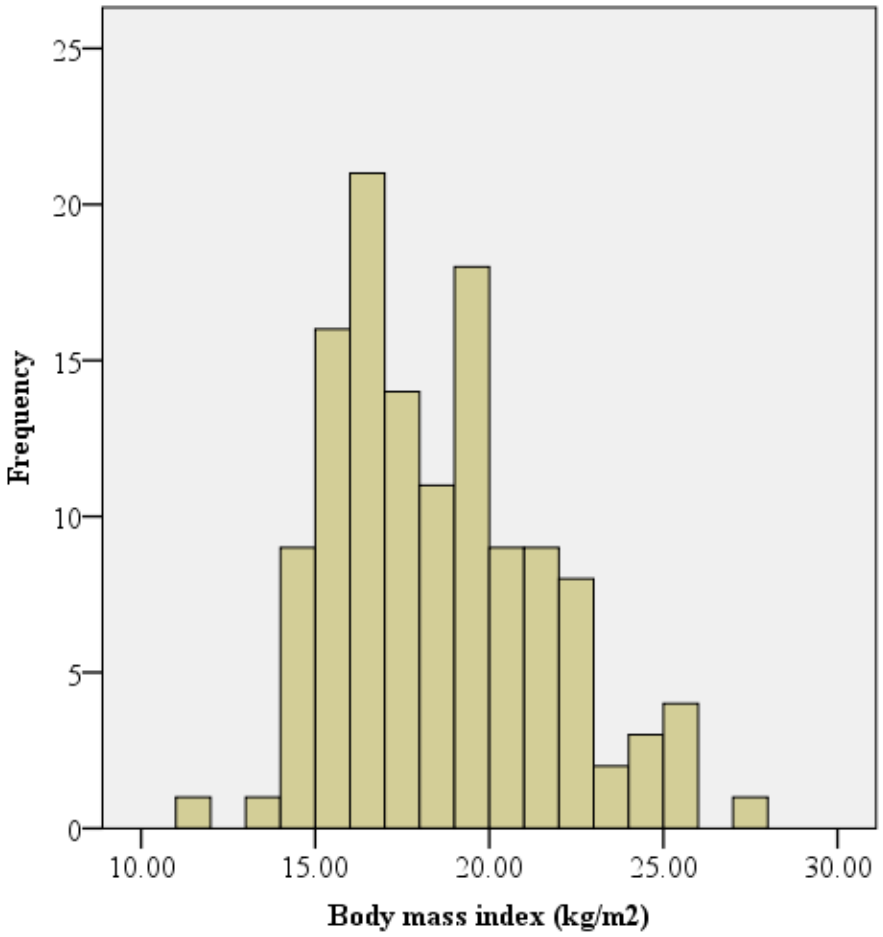

Figure 8.1 Distribution of participant body mass index (BMI)

Body mass index data were screened using International Obesity Task Force (IOTF) body mass index cut offs for thinness, overweight and obesity. These cut-offs are defined to extrapolate to a BMI at age eighteen of 17, 25 and 30 kg/m^2 respectively, and are age-specific to the nearest 6 months (Cole, et al., 2000; Cole, et al., 2007). Using the criteria of Cole *et al*., one participant was categorised as thin (<1%), seventy-eight participants (62%) were of normal weight, thirty-eight participants (30%) were overweight and ten participants (8%) were obese.

8.6 Correlations

Table 8.4 presents the bivariate Pearson's correlations between the main variables.

Table 8.4 Bivariate correlations between key variables

Measures			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1. Age (decimal years)			_																		
2. Height (m)			**.72**	_																	
3. Weight (kg)			**.50**	**.80**	_																
4. BMI (kg/m^2)			**.21**	**.42**	**.87**	_															
5. Family affluence [a]			-.15	**-.18**	-.02	.09	_														
Body image category																					
Paper Scale [b]	6.	Dissatisfaction	**-.18**	**-.27**	**-.52**	**-.56**	-.14	-													
	7.	Ideal size	.15	.11	.02	-.08	**-.20**	**.43**	-												
	8.	Perceived size	**.31**	**.37**	**.57**	**.55**	.01	**-.78**	**.24**	-											
Computer scale [c]	9.	Dissatisfaction	-.09	.16	**-.39**	**-.45**	-.12	**.59**	**.30**	**-.43**	-										
	10.	Ideal size	.16	.14	.07	.01	**-.25**	**.21**	**.46**	.09	**.51**	-									
	11.	Perceived size	**.25**	**.30**	**.48**	**.47**	-.11	**-.43**	.11	**.55**	**-.59**	**.39**									
12. Body esteem [d]			-.09	-.17	**-.26**	**-.26**	-.04	**.46**	.09	**-.43**	**.41**	.11	**-.33**	-							
Thin-ideal [e]	13.	Internalisation	-.04	.08	**.28**	**.33**	.12	**-.44**	-.15	**.38**	**-.37**	-.14	**.26**	**-.44**	-						
	14.	Awareness	-.18	-.13	.04	.14	.09	**-.21**	-.06	**.19**	**-.24**	-.03	**.23**	**-.33**	**.61**	-					
15. Eating attitudes [f]			**-.18**	-.04	.11	**.18**	.07	**-.28**	-.13	**.20**	**-.34**	-.14	**.24**	**-.46**	**.55**	**.50**					
Eating behaviour [g]	16.	Restraint	.02	.17	**.26**	**.24**	-.00	-.14	-.06	.11	**-.35**	-.10	**.28**	**-.21**	**.33**	**.21**	**.47**	-			
	17.	Emotional	-.08	-.04	.06	.13	.01	-.04	-.07	-.01	-.13	-.06	.08	-.09	.03	.12	.16	-.05	-		
	18.	External	-.16	-.10	-.07	-.02	-.06	.01	-.08	-.06	-.04	-.08	-.03	.01	.05	.10	.02	**-.18**	**.43**	-	
19. Depression [h]			.02	.06	.12	.12	.01	**-.29**	-.12	**.23**	**-.31**	**-.19**	.16	**-.54**	**.24**	**.24**	**.51**	**.20**	**.23**	.03	-

Note. [a] Family affluence Scale (FAS; Boyce et al, 2006), [b] Children's Body Image Scale (CBIS; Truby & Paxton, 2002); [c] Body Manipulation Software (BMS; Evans & Tovée, 2012); [d] Body Esteem Scale (BES; Mendelson & White, 1982); [e] Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-R; Smolak et al, 2001); [f] Dutch Eating Behaviour Questionnaire Child (DEBQ-C; Van Strien & Oosterveld, 2007); [g] Children's Eating Attitude Test (ChEAT; Maloney et al, 1989); [h] Child Depression Inventory (CDI; Kovacs, 1992); significant values marked in boldface, $p < .05$.

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8.7 Body Size Perception

The mean perceived body size category identified by participants on the CBIS corresponds to a BMI range of 15.0 – 16.6 kg/m^2 (see Chapter 3, subsection 3.7.2). Similarly, the mean perceived body size category identified by participants on the BMS corresponds to a BMI range of 15.8 – 16.7 kg/m^2. Figures 8.2 and 8.3 illustrate the spread of data for the CBIS and the BMS perceived categories in comparison with the corresponding category data for the participants' measured BMI.

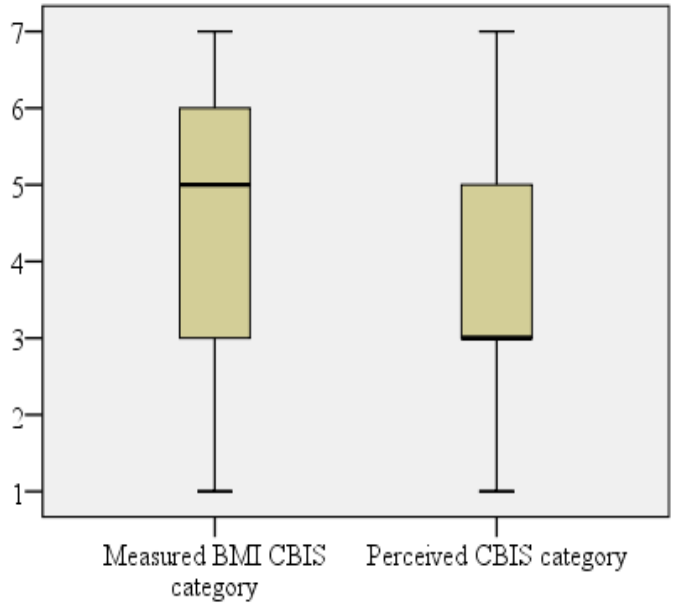

Figure 8.2 Participants' measured body size compared to their perceived body size using Children's Body Image Scale (CBIS) categories. Boxes represent upper and lower hinge whilst whisker endpoints denote the maximum and minimum values or upper inner fence and lower inner fence, whichever is the closest to the median.

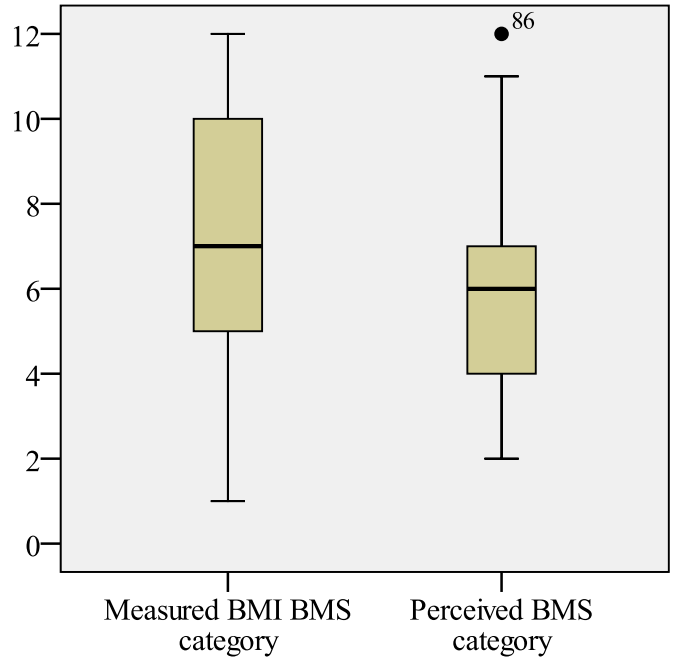

Figure 8.3 Participants' measured body size compared to their perceived body size using Body Manipulation Software (BMS) categories. Boxes represent upper and lower hinge whilst whisker endpoints denote the maximum and minimum values or upper inner fence and lower inner fence, whichever is the closest to the median.

Accuracy of body size perception was determined by calculating the discrepancy between participants' measured body mass index category and their perceived body size category on each of the scales. The difference between the mean measured BMI category on the CBIS (4.5; *SD* = 1.5) and the mean perceived category showed a mean body size underestimation of .7 category (*SD* = 1.5). Similarly, the difference between mean BMS measured BMI category (7.4; *SD* = 2.8) and the mean perceived category indicated that participants underestimated their body size by on average 1.8 categories (*SD* = 2.7). A series of Student's paired t-tests indicated that participants significantly underestimated their body size category on both the CBIS ($t_{(126)} = 5.48$, $p < .01$) and the BMS ($t_{(122)} = 7.35$, $p < .01$).

Non-directional perceptual accuracy was determined by converting directional discrepancy scores to uniformly negative values: in this way, a more negative value indicated greater inaccuracy irrespective of under/overestimation. Non-directional perceptual inaccuracy on the CBIS ranged from -5 to 0 with a mean of -1.3 categories (*SD* = 1.1). Perceptual inaccuracy on the BMS ranged from -9 to 0 with a mean of -2.6 categories (*SD* = 2.0). Non-directional perceptual accuracy values on the CBIS and the BMS were significantly associated with one-another ($r = .29$, $p = .001$), but the association between

directional perceptual accuracy for the CBIS and BMS was stronger (r = .50, p < .001). This suggests that participants were likely not only to inaccurately represent their body on both the CBIS and the BMS, but also to consistently over or under-estimate it on both tests.

Participants with a higher BMI were significantly less accurate at perceiving their body size on both the CBIS (r = -.38, p < .001) and the BMS (r = -.63, p < .001). To further explore the differences in body size perception between participants of different sizes, their data were split into an overweight group and a non-overweight group using the age-specific cut-offs for overweight suggested by Cole et al (2000). The data in Table 8.5 illustrate the differences in perceptual accuracy between non-overweight and overweight participants. Whilst overweight participants perceived themselves as larger than the non-overweight participants, they still consistently underestimated their size to a far greater degree. Ideal body size did not significantly differ with BMI.

Table 8.5 Comparisons of mean measured and perceived body size judgements in non-overweight and overweight participants

	Non-overweight (N = 79)	Overweight (N = 48)	t-statistic ǂ
Body mass index (kg/m^2)	16.7	21.7	
CBIS measured category	3.6	6.0	
CBIS perceived category	3.3	4.5	$t_{(82.6)}$ = - 4.5***
Body size underestimation	-.3	-1.5	$t_{(90.1)}$ = 4.7***
CBIS ideal category	2.6	2.3	$t_{(116.1)}$ = 2.0*
CBIS body dissatisfaction	*-.7*	*-2.3*	$t_{(86.2)}$ = 5.8***
BMS measured category	5.6	10.4	
BMS perceived category	5.2	6.4	$t_{(96.0)}$= - 3.6**
Body size underestimation	-.5	- 4.0	$t_{(100.4)}$ = 9.2***
BMS ideal category	4.4	4.2	$t_{(96.0)}$ = - .37
BMS body dissatisfaction	*-.8*	*-2.3*	$t_{(73.2)}$ = -3.0**

Note. ǂ Independent samples Student's t-test with equal variances not assumed; * p < .05, ** p < .01, *** p < .001.

8.8 Body Size Preference

The 'preferred' body size has been referred to as the 'ideal' body in the vast majority of previous literature (e.g. Smolak, 2004), and so this convention is adopted here. However,

the selection of a thinner ideal body size has been taken as an index of 'thin ideal-internalisation' by some authors (e.g. Truby & Paxton, 2002). For several reasons, the concepts are distinct and should not be conflated either in the present study or elsewhere. Indeed, the conceptual distinctness of the variables is underscored by the non-significant relationship between thin-ideal internalisation and the selection of a smaller ideal body on either the CBIS (r = .15, p = .10) or the BMS (r = .14, p = .12) found in the current sample (data taken from Table 8.4).

The mean ideal body size identified by participants on the CBIS corresponded to a BMI range of 13.6 – 14.9 kg/m^2. Similarly, the mean ideal body size on the BMS corresponded to a BMI of around 15.0 kg/m^2 (see Chapter 3, subsection 3.7.2 for details). The ideal body was, on average, 3.5 categories smaller on the CBIS (SD = 3.5) and 3.2 categories smaller on the BMS (SD = 3.3) than the participant's measured BMI category.

8.9 Body Dissatisfaction and Body Esteem

Body size dissatisfaction was calculated by subtracting the participant's perceived body size from their ideal body size for both the CBIS and the BMS. As illustrated in Table 8.5, overweight and obese participants had significantly higher levels of body size dissatisfaction as determined by both scales.

Body esteem score was also, as expected, positively associated with body dissatisfaction on both the CBIS and the BMS, as shown in Table 8.4. To consider the roots of the shared variation between scales separately it was necessary to look at the weight subscale (3 items) and the global appearance satisfaction subscale (17 items) separately. The weight subscale showed a stronger association with measured BMI (r = .38, p < .001) than did the appearance subscale (r = .23, p = .012), offering some support for the validity of the distinction between the subscales.

Overall, as shown in Table 8.4 and as hypothesised, body esteem score was negatively associated with measured body mass index. However, body esteem was more strongly associated with the *perception* of a larger body size, on both the CBIS (r = -.43, p < .001) and the BMS (r = -.33, p < .001) than with measured BMI (r = -.25, p = .005). This suggests that thinking that one has a larger body may make a greater contribution to low body esteem than simply having a larger body.

8.10 Eating Behaviours, Thin-ideal Internalisation and Awareness

As expected, the data in Table 8.4 indicate that thin-ideal internalisation was positively associated with dietary restraint but not with externally or emotionally cued eating. It was hypothesised that thin-ideal awareness would not be significantly associated with any variables other than thin-ideal internalisation. Whilst thin-ideal awareness was not associated with any of the DEBQ-R eating behaviours (restraint, external and emotional cues) nor with BMI, it nevertheless showed an unexpected association with body dissatisfaction on both the CBIS and the BMS and disordered eating attitudes.

Restrained eating behaviour and emotionally cued eating were also shown to be modestly correlated with depression score, supporting the hypothesis that individuals with higher depression scores would be more likely to engage in eating or refrain from eating in response to non-physiological stimuli, i.e., cognitive prompts to eat in a specific way.

In keeping with expectations, dietary restraint was significantly positively associated with a participant's measured BMI and also with their weight. Similarly, participants with elevated dietary restraint also had higher body dissatisfaction and perceived themselves to having a larger body on the BMS. Although the directional relationships between the CBIS and dietary restraint mirrored those seen with the BMS, they did not reach statistical significance.

8.11 Disordered Eating Attitudes and Depression

Figures 8.4 and 8.5 show the distribution of disordered eating attitudes and depression scores respectively. In both cases, the distribution has a strong positive skew and a long right-hand tail, providing the justification for the transformations detailed in subsection 8.3. Disordered eating attitude scores and depression scores were strongly positively associated, as initially hypothesised. However, the CDI includes one item concerning happiness with one's appearance (item 7 "I look okay / There are some bad things about my looks / I look ugly") so this item was temporarily removed from the analysis and the CDI re-scored. The newly calculated r value of .51 matched exactly the original r as shown in Table 8.4, so item 7 was retained in the analysis on the grounds that the relationship between the two scales could not be explained by the duplication of items.

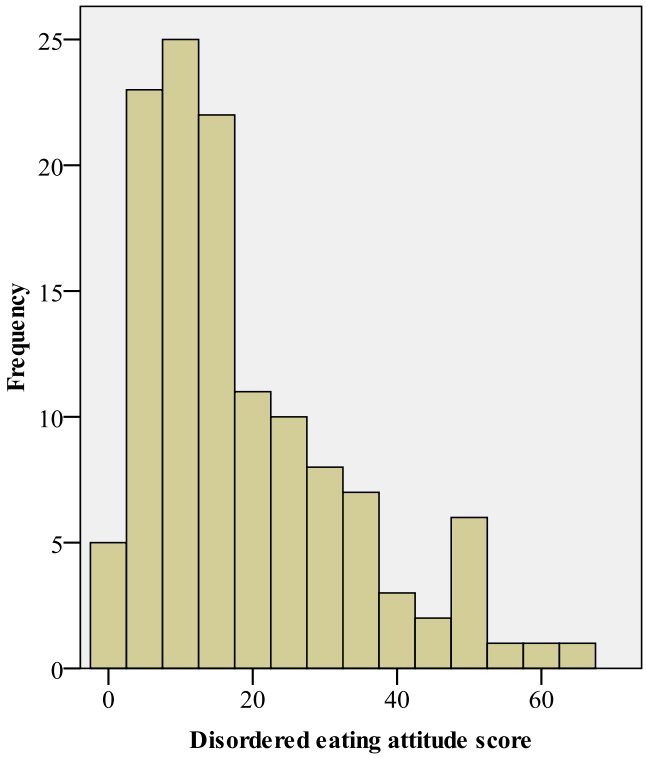

Figure 8.4 Distribution of disordered eating attitude (ChEAT) scores

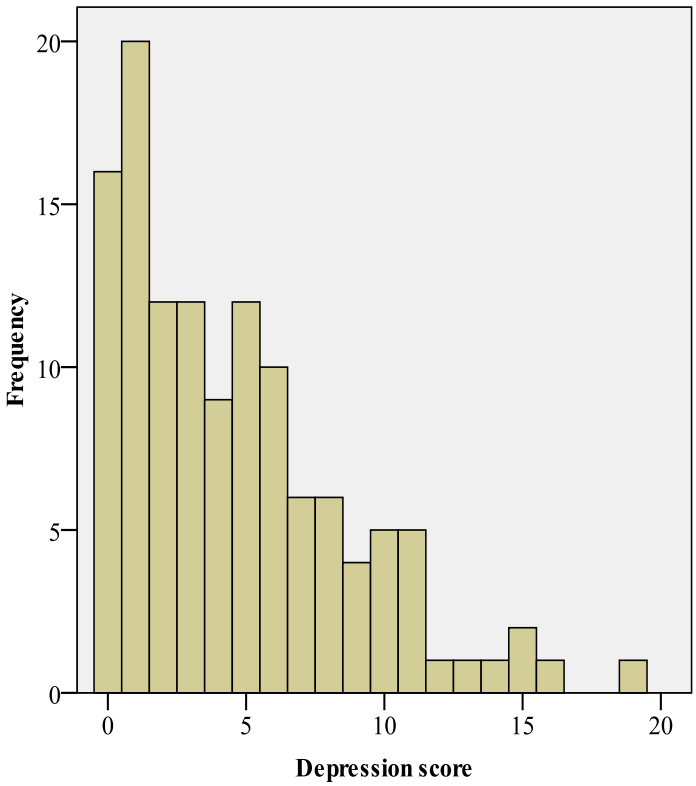

Figure 8.5 Distribution of depression (CDI) scores

As shown in Table 8.6, thin-ideal awareness and thin-ideal internalisation were both positively associated with disordered eating attitudes and, less strongly, with depression score. Although this partially supports the hypothesis that thin-ideal internalisation would be associated with depression and eating attitudes, the relationship with thin-ideal awareness runs counter to prediction.

8.12 Differences with Age and Socioeconomic Status

8.12.1 Differences with age.

Looking at Table 8.4, it is apparent that height, weight and BMI were positively associated with age in the sample. A larger perceived body size was associated with increased age, measured using both the CBIS and the BMS. On the CBIS only, body dissatisfaction was also associated with age, but the significance of this association disappeared once the contribution of perceived body size was controlled for (r = .08, p = .33). As hypothesised, disordered eating attitude score was negatively associated with age such that younger participants reported higher levels of disordered eating attitudes.

8.12.2 Socioeconomic status.

Again looking at Table 8.4, a higher FAS II score was significantly associated with a smaller ideal figure on both the CBIS and the BMS. It was also modestly positively associated with having a greater height. These associations were compared with the results of a series of independent-samples t-tests, carried out – as in Chapter 4, subsections 4.9.2 and 4.18.2 – to ascertain whether participants from low or high SES schools differed on key variables. The results are shown in Table 8.6. As expected, participants from low SES schools had significantly lower FAS II scores than participants from high SES schools. Participants from low SES schools were shown to differ from participants from high SES schools on just one other variable, their preference for a larger BMS ideal body size. Thus, the other differences based on SES that were suggested by the correlational data in Table 8.4 were not found using this alternative school-wide index.

Table 8.6 Comparisons of participants from schools of low and high socioeconomic status (SES) on key variables, based on proportion of pupils receiving free school meals (FSM)

		Low SES (n = 75)	High SES (n = 52)	t-statistic
Age		9.5	9.4	.7
Height (m)		1.4	1.4	.1
Weight (kg)		35.0	35.7	-.4
BMI (kg/m^2)		18.5	18.8	.7
Family affluence scale [a]		2.1	2.6	-3.6***
Body image				
Paper [b] Scale	Dissatisfaction	-1.3	-1.2	-.2
	Ideal size	2.6	2.4	.9
	Perceived size	3.8	3.6	.8
Computer [c] Scale	Dissatisfaction	-1.1	-1.7	1.3
	Ideal size	4.7	3.7	3.2**
	Perceived size	5.9	5.3	1.5
Body esteem [d]		31.8	32.6	-.8
Thin-ideal [e]				
Internalisation		24.4	24.1	.2
Awareness		20.4	19.0	1.5
Eating attitudes [f] ǂ		19.9	16.9	1.2
Eating behaviours [g]				
Restraint		2.0	1.9	1.2
Emotional cues ǂ		1.5	1.5	-.1
External cues		2.1	2.0	.4
Depression [h]		4.2	5.2	1.3

Note. Independent samples Student's t-test with equal variances assumed except ǂ which denotes equal variances not assumed; [a] Family Affluence Scale (FAS II; Boyce et al, 2006), [b] Children's Body Image Scale (CBIS; Truby & Paxton 2002), [c] Body Manipulation Software (Evans & Tovée, 2011), [d] Body Esteem Scale (Mendelson & White, 1986), [e] Sociocultural Attitudes Towards Appearance Questionnaire (Smolak, Levine & Thompson, 2001), [f] Children's Eating Attitudes Test (ChEAT; Maloney et al 1989), [g] Dutch Eating Behaviour Questionnaire for Children (DEBQ-C; Van Strien & Oosterfeld, 2007), [h] Child Depression Inventory (CDI; Kovacs, 1992); *p < .05 **p < .01 ***p < .001.

8.13 Multiple Regressions: Testing Components of the Sociocultural Model

Multiple regression analyses were used to determine whether hypothesised relationships between discrete sets of variables were consistent with the observed data. In each case data, some of which were logarithmically transformed as specified previously, were entered into a hierarchical forced-entry model in a series of blocks. The order in which the variables were entered into the model was based upon the hypothesis to be tested, which itself was based upon evidence from previous research. Bivariate associations from Table 8.4 were used to gauge the significance of the univariate predictors of a specific outcome, and then all putative significant predictor variables (according to these data) were entered in subsequent blocks in the same analysis.

First, the hypothesis that thin-ideal internalisation would fully mediate the relationship between thin-ideal awareness and body dissatisfaction was tested, in order to determine whether thin-ideal awareness – currently absent from the model – ought to be considered for incorporation.

Second, the sociocultural model was broken down into blocks of outcome and predictors. Each block was examined using a series of regressions. The model, first shown in the Chapter 6, subsection 6.4, is reproduced below in Figure 8.6 for ease of reference. It includes all links between variables proposed by Stice and Agras (1998) and Stice (2001) with the addition of adiposity (measured via BMI) and the exclusion of sociocultural pressures to be thin. The rationale for the selection of this model was detailed previously in Chapter 6, subsection 6.5.

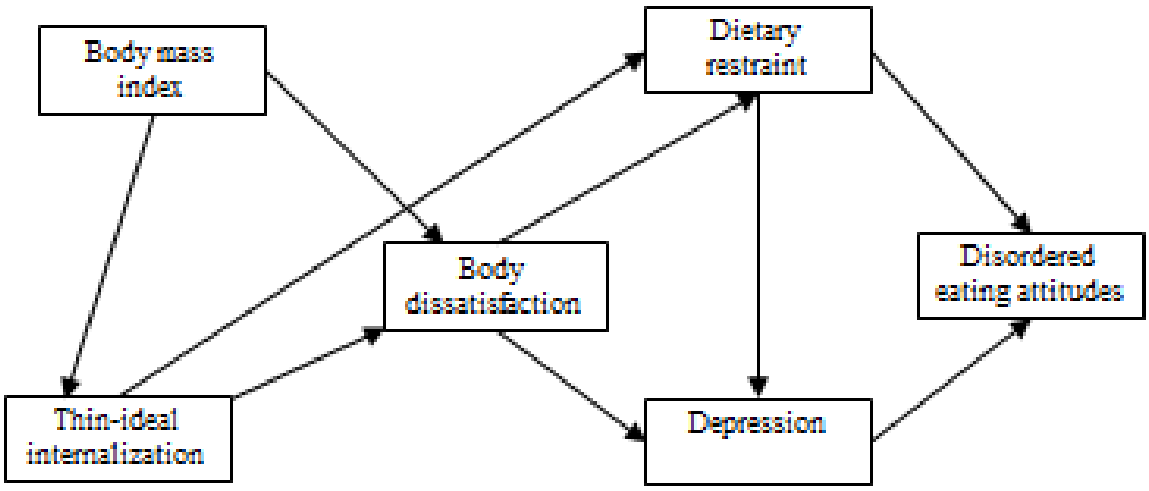

Figure 8.6 Proposed Sociocultural Model of Eating Pathology and Body Dissatisfaction, incorporating adiposity

In this process, the indices of body dissatisfaction and body esteem were examined for their fit with their putative predictors (subsection 8.13.1) according to the model. Next, the predictors of dietary restraint (subsection 8.13.2), depression (subsection 8.13.3) and disordered eating attitudes (subsection 8.13.4) were examined.

Notably, when depression (CDI score) data were entered into analyses, the score for item 7 (I look okay / There are some bad things about my looks / I look ugly) was omitted from the total to avoid inflated associations with the body esteem/dissatisfaction variables due to item similarity. For instance, as shown in Table 8.4, body esteem had a significant negative correlation with depression score, supporting the hypothesis that participants with low body esteem would have concurrently high levels of depression. The removal of item 7 caused the associated Pearson's *r* value to decrease from -.54 to -.51. Missing data comprised fewer than 2% of the dataset, so for the multivariate regression analyses, listwise deletion was utilised.

8.13.1 Predicting body dissatisfaction and body esteem.

First, analyses of the role of thin-ideal internalisation in mediating the relationships between thin-ideal awareness and the various body satisfaction variables were undertaken. The bivariate associations in Table 8.4 show that the prerequisites for mediation analysis were met, as set out by Barron & Kenny (1986), i.e., thin-ideal awareness, thin-ideal

internalisation and the body satisfaction variables were all significantly correlated with one-another.

Body dissatisfaction scores for the CBIS and the BMS, and body esteem as measured by the BES-R, were regressed variable-by-variable upon thin-ideal awareness and thin ideal internalisation. The resultant coefficients for the three regression analyses are shown in Table 8.7. For all three regressions, variables were forced into a hierarchical model in consecutive blocks.

Table 8.7 Coefficients for the regression of Children's Body Image Scale (CBIS) and Body Manipulation Software (BMS) body dissatisfaction, and body esteem (BES-R) upon both thin-ideal awareness and thin-ideal internalisation

	b	*SE b*	*β*	*F*	R^2	*p* ΔR^2
Body dissatisfaction: CBIS						
Step 1						
Constant	.02	.55				
Thin-ideal awareness	-.07	.03	-.21*	5.9	.05	
Step 2						
Constant	.83	.54				
Thin-ideal awareness	.03	.03	.08			
Thin-ideal internalisation	-.11	.02	-.49***	15.09	.20	<.001
Body dissatisfaction: BMS						
Step 1						
Constant	4.79	6.01				
Thin-ideal awareness	-.77	.29	-.24**	6.95	.06	
Step 2						
Constant	11.18	6.09				
Thin-ideal awareness	-.07	.35	-.02			
Thin-ideal internalisation	-.84	.25	-.36**	9.20	.14	.001
Body esteem: BES-R						
Step 1						
Constant	3.87	.33				
Thin-ideal awareness	-.06	.02	-.33***	14.01	.11	
Step 2						
Constant	4.28	.34				
Thin-ideal awareness	-.02	.02	-.10			
Thin-ideal internalisation	-.05	.01	-.38***	14.66	.20	<.001

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

For CBIS body dissatisfaction, BMS body dissatisfaction and also for body esteem, thin-ideal internalisation completely mediated the relationship with thin-ideal awareness. In other words, for each of the body satisfaction variables, thin-ideal internalisation accounted

for the shared variance with thin-ideal awareness. These relationships are depicted in Figure 8.7.

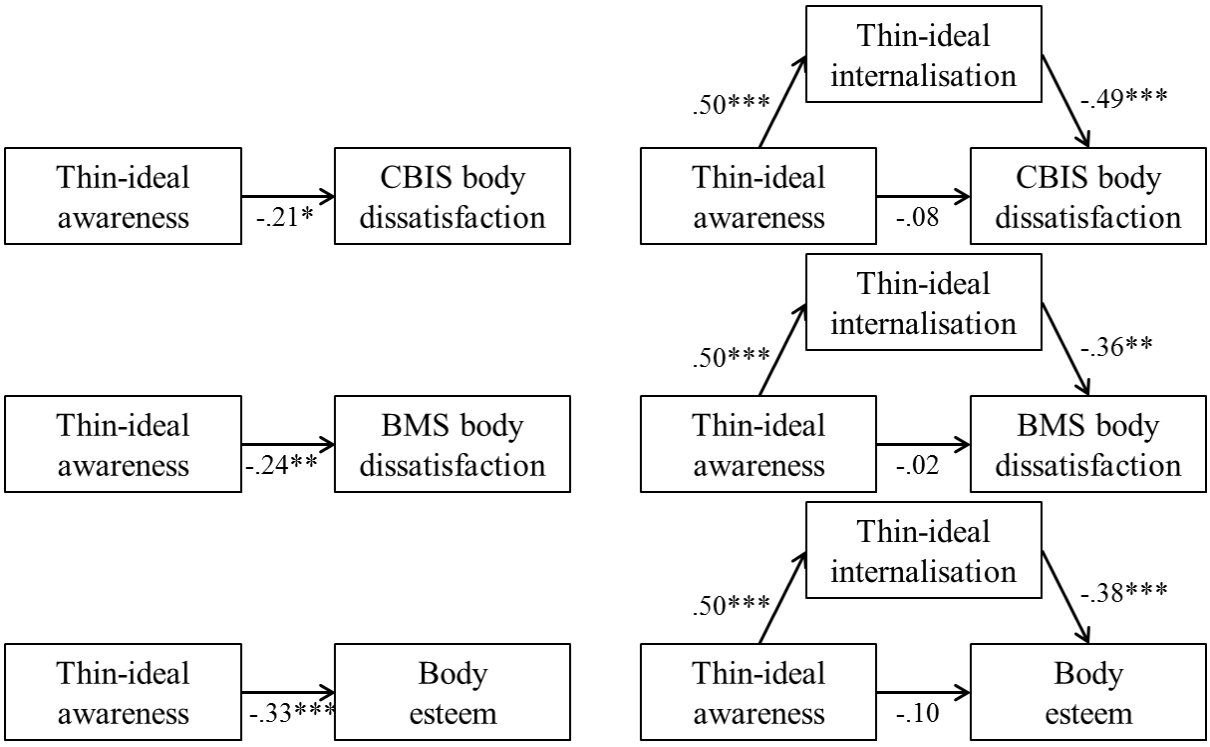

Figure 8.7 Analyses of the role of thin-ideal internalisation in mediating the relationships of Children's Body Image Scale (CBIS) body dissatisfaction, Body Manipulation Software (BMS) body dissatisfaction and body esteem with thin-ideal awareness

The role of thin-ideal internalisation in completely mediating the relationship between each of the body satisfaction variables and thin-ideal awareness supported the exclusion of thin-ideal awareness from the model, and the inclusion of thin-ideal internalisation in the model. The relationship between thin-ideal internalisation and CBIS body dissatisfaction was the strongest of those tested, but thin-ideal internalisation most fully mediated the relationship between BMS body dissatisfaction and thin-ideal awareness.

The sociocultural model posits that body satisfaction is also predicted by BMI. The data in Table 8.4 indicated that CBIS body dissatisfaction, BMS body dissatisfaction and body esteem were all significantly negatively associated with participants' measured BMI. Each of the three body satisfaction variables, therefore, was individually regressed upon both thin-ideal internalisation and BMI. The coefficients for each of these regressions are shown in Table 8.8.

Table 8.8 Coefficients for the regression of Children's Body Image Scale (CBIS) and Body Manipulation Scale (BMS) body dissatisfaction, and body esteem (BES-R) upon both thin-ideal internalisation and body mass index (BMI)

	b	*SE b*	*β*	*F*	R^2	*p* ΔR^2
Body dissatisfaction: CBIS						
Step 1						
Constant	1.06	.45				
Thin-ideal internalisation	-.10	.02	-.44***	29.61	.19	
Step 2						
Constant	14.47	2.20				
Thin-ideal internalisation	-.06	.02	.29***			
BMI	-11.24	1.81	-.47***	38.51	.39	<.001
Body dissatisfaction: BMS						
Step 1						
Constant	10.57	5.13				
Thin-ideal internalisation	-.87	.20	-.37**	18.51	.14	
Step 2						
Constant	123.21	26.64				
Thin-ideal internalisation	-.59	.20	-.25**			
BMI	-94.45	21.97	-.36***	19.87	.25	<.001
Body esteem: BES-R						
Step 1						
Constant	4.11	.28				
Thin-ideal internalisation	-.06	.01	-.44***	28.34	.19	
Step 2						
Constant	6.73	1.56				
Thin-ideal internalisation	-.05	.01	-.40***			
BMI	-2.19	1.28	-.15	15.87	.21	.09

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

For CBIS and BMS body dissatisfaction, both thin-ideal internalisation and BMI accounted for significant proportions of variance. In the case of body esteem, BMI did not make a significant contribution to the model following the addition of thin-ideal

internalisation. Therefore, although CBIS and BMS body dissatisfaction fitted the pattern of relationships described in the sociocultural model, body esteem did not. Body esteem was consequently omitted from further multivariate analyses, whilst CBIS and BMS were taken forward into the next set of analyses.

8.13.2 Predicting dietary restraint

The sociocultural model posits that thin-ideal internalisation and body dissatisfaction contribute to dietary restraint. Dietary restraint was regressed upon CBIS body dissatisfaction and thin-ideal internalisation, then regressed upon BMS body dissatisfaction and thin-ideal internalisation in two separate analyses. The resultant coefficients are shown in Table 8.9.

Table 8.9 Coefficients for the regression of dietary restraint upon Children's Body Image Scale (CBIS) body dissatisfaction and thin-ideal internalisation, followed by Body Manipulation Scale (BMS) body dissatisfaction and thin-ideal internalisation

	B	*SE b*	*β*	*F*	R^2	$p\ \Delta R^2$
CBIS & internalisation						
Step 1						
Constant	1.88	.06				
CBIS body dissatisfaction	-.04	.03	-.14	2.37	.02	
Step 2						
Constant	1.41	.15				
CBIS body dissatisfaction	.01	.03	.02			
Thin-ideal internalisation	.02	.01	-.34**	7.27	.11	.001
BMS & internalisation						
Step 1						
Constant	1.82	.05				
BMS body dissatisfaction	-.01	.00	-.36***	16.72	.13	
Step 2						
Constant	1.44	.14				
BMS body dissatisfaction	-.01	.00	-.25**			
Thin-ideal internalisation	.02	.01	-.27**	13.14	.19	.004

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The significance of the contribution of CBIS body dissatisfaction to variance in dietary restraint was eliminated by the introduction of thin-ideal internalisation to the model. However, BMS body dissatisfaction remained a significant predictor of variance in dietary restraint despite the significant addition of thin-ideal internalisation to the model.

8.13.3 Predicting depression.

In the sociocultural model, it is proposed that depression is predicted by both body dissatisfaction and dietary restraint. The bivariate correlations shown in Table 8.6 indicate that dietary restraint, CBIS body dissatisfaction and BMS body dissatisfaction were all significantly related to depression. Depression was regressed upon CBIS body dissatisfaction and dietary restraint, and then upon BMS body dissatisfaction and dietary restraint in two separate analyses. The resultant coefficients are shown in Table 8.10.

Table 8.10 Coefficients for the regression of depression upon Children's Body Image Scale (CBIS) body dissatisfaction and dietary restraint, followed by Body Manipulation Scale (BMS) body dissatisfaction and dietary restraint

	b	*SE b*	*β*	*F*	R^2	$p\ \Delta R^2$
CBIS & dietary restraint						
Step 1						
Constant	1.19	.09				
CBIS body dissatisfaction	-.10	.04	-.21*	5.37	.04	
Step 2						
Constant	.71	.29				
CBIS body dissatisfaction	-.09	.04	-.19*			
Dietary restraint	.25	.15	.15	4.71	.07	.09
BMS & dietary restraint						
Step 1						
Constant	1.18	.08				
BMS body dissatisfaction	-.01	.00	-.26**	8.25	.06	
Step 2						
Constant	.87	.30				
BMS body dissatisfaction	-.01	.00	-.22**			
Dietary restraint	.17	.16	.10	4.71	.06	.28

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

CBIS body dissatisfaction significantly predicted depression, and this significance remained despite the non-significant addition of dietary restraint to the model at step 2. Similarly, dietary restraint did not significantly increase the amount of variance in depression for which BMS body dissatisfaction accounted. These results suggested that the pathway between dietary restraint and depression might be a candidate for deletion in the path model, given the mixed body of evidence supporting its role (see Chapter 6, subsection 6.5.2).

8.13.4 Predicting disordered eating attitudes

The sociocultural model posits that disordered eating attitudes are directly predicted by dietary restraint and depression, the so-called 'dual pathway'. These two predictors of

disordered eating were tested using multiple regression, as were two other putative predictors of disordered eating attitudes in preadolescents – thin-ideal internalisation and thin-ideal awareness. All of these variables had significant associations with disordered eating attitudes, as shown in Table 8.4. It was possible that the significant association between dietary restraint and disordered eating attitude score might be influenced by a ChEAT item specifically referring to dieting (item 23: I have been dieting). Consequently, this item was temporarily removed from the analysis and the correlation re-calculated. This resulted in a very slightly decreased *r* value of .45 as compared to .46, which suggested that the association between the scores could not be explained by the similarity of this item to those of the DEBQ-C restraint subscale. Consequently, the complete ChEAT score was retained in all analyses. The resultant regression coefficients are shown in Table 8.11.

Table 8.11 Coefficients for the regression of disordered eating attitude (ChEAT) score upon thin-ideal awareness, thin-ideal internalisation, depression and dietary restraint

	b	*SE b*	*β*	*F*	R^2	*p* ΔR^2
Step 1						
Constant	1.17	.48				
Thin-ideal awareness	.15	.02	.51***	41.90	.26	
Step 2						
Constant	.62	.47				
Thin-ideal awareness	.08	.03	.28**			
Thin-ideal internalisation	.08	.02	.39***	32.60	.36	<.001
Step 3						
Constant	-.78	.54				
Thin-ideal awareness	.08	.03	.27**			
Thin-ideal internalisation	.06	.02	.29***			
Depression	1.01	.23	.32***	31.42	.45	<.001
Step 4						
Constant	-.91	.49				
Thin-ideal awareness	.06	.02	.21**			
Thin-ideal internalisation	.05	.02	.25**			
Depression	.91	.21	.29***			
Dietary restraint	.66	.13	.34***	35.55	.55	<.001

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

All the variables significantly contributed to variance in disordered eating attitude score, even when their mutual contributions were taken into account. These results suggested that a pathway between thin-ideal internalisation and disordered eating attitudes might be considered as an addition to the path analytic model given the potential theoretical justification for its role (see Chapter 6, subsection 6.5.3).

The significant contribution of thin-ideal awareness to variance in disordered eating attitude scores was more problematic here, given the absence of a pre-existing rationale for its inclusion. It would need to be positioned adjacent to thin-ideal internalisation in the model to allow their substantial multicolinearity to be taken into account. However, doing so would effectively invalidate the contribution of thin-ideal awareness to the model, since the significance of its contribution to body dissatisfaction (the next 'outcome' in line with thin-

ideal internalisation) was shown to be fully mediated by thin-ideal internalisation earlier on in the Chapter (subsection 8.13.1). Consequently, thin-ideal awareness remained excluded from further analyses.

8.14 Path Analyses

8.14.1 Introduction.

Having summarised the basic relationships between discrete sets of outcome and predictor variables in the sociocultural model using multiple regression analyses, the fit of the data with the proposed model was examined using path analysis. In contrast to multiple regression methods, exploratory path analysis indicates the size of associations – direct and indirect - between variables in the context of all other variables. This enables comparison of the observed and the predicted data matrices and allows for explicit estimates of error variance parameters associated with the observed variables (Byrne, 2010). The fit between the data and the models was assessed using the generalised least squared (GLS) estimation method of path analysis with the AMOS 17™ statistical package, in keeping with the recommendations made for small sample sizes by Fan, Thompson, and Wang (1999). Maximum-likelihood estimation (ML) was used to handle missing data as recommended by Schafer and Graham (2002).

8.14.2 Fit indices.

Several different fit indices were used to assess the extent to which the model provided a good fit with the data, chosen on the basis of statistical rigour, penalties for model complexity and responsiveness to sample size (Bentler & Bonnet, 1980; Byrne, 2010).

Chi square.

The Chi-square statistic represents the goodness of fit. This statistic is presented along with associated degrees of freedom and *p* value, which represents the "likelihood of obtaining a χ^2 value that exceeds the given χ^2 value when the null hypothesis is true" (Byrne, 2010; p76). In short, a large and non-significant *p* value is, in this case, desirable and indicative of good fit. Since sample size affects this value to a considerable degree, it is generally presented alongside other fit indices.

The Comparative Fit Index (CFI).

The CFI is the ideal member of a family of fit indices that assess complete covariation in the data, comparing the hypothesised model with the null model. Bentler (1990) advises using this instead of the normed fit index (NFI) because the CFI takes into account the sample size and has a low level of sampling variability. Values between .95 and 1 are considered good, whilst values over .90 are considered acceptable.

The Tucker-Lewis Index (TLI).

The Tucker-Lewis Index (TLI), unlike the CFI, is non-standardised and was also reported: as with the CFI, values above .95 indicate good fit. The TLI penalises the introduction of additional parameters to the model proportional to their contribution to explaining overall data covariation, i.e., it penalises unwarranted complexity.

The Root Mean Square Error of Approximation (RMSEA).

The RMSEA assesses the extent to which an optimally constrained proposed model fits the hypothetical population covariance matrix (Browne & Cudeck, 1993). Values less than .08 are considered adequate and < .05, good. The RMSEA is appropriately sensitive to model misspecification. The associated PCLOSE value provides a significance test of the hypothesis that RMSEA is no greater than .05 in the population: unlike a *p* value, however, the test is of closeness as opposed to of exact fit (Browne & Cudeck, 1993).

The Browne-Cudeck Criterion (BCC).

This is a parsimony index, and is used in preference to the Akaike's Information Criterion (AIC) because it imposes greater penalties for model complexity. This statistic should be substantially smaller than the BCC value for the null model and the saturated model (Browne & Cudeck, 1989).

Hoelter's Critical N.

This index of fit focuses specifically upon the adequacy of the sample size to the hypothesised model. Specifically, it presents the maximum sample size (at both the $p < .05$ and $p < .01$ level) at which the proposed model is acceptable: the higher the value, the stronger the model. A minimum value of 200 is usually used as the cut-off for a model that successfully represents the sample data (Hoelter, 1983).

Model parsimony was also a key requirement: the model should contain the minimum possible number of paths between variables. Consequently, a path was deleted if it did not make a statistically significant ($p < .05$) contribution to the overall model. This was assessed using both the significance of the beta coefficient and the significance of the change to the χ^2 value when the path was omitted or reintroduced. The ratio of the χ^2 value to the *df* should be around 1. A ratio higher than 2 indicated an unsatisfactory model in which too many paths had been dropped.

8.14.2 Variables included in / excluded from models.

After examining the characteristics of the data and the multivariate analyses in subsection 8.13, body dissatisfaction data from the BMS were entered into the path analysis but body dissatisfaction data from the CBIS were not. This decision was based on the fact that both measures showed very similar associations to one another other than the association of the BMS with dietary restraint, which was significantly stronger than the CBIS association. Thin-ideal awareness was not included in the model because there was no pre-existing theoretical justification for its introduction.

8.14.3 Models to be tested.

Model 1 comprised the original sociocultural model, shown in Figure 8.6. Models 2 and 3 introduced minor modifications to the original based on previous research and statistical significance. At each stage the model was assessed for its fit with the data using path analytic techniques, the summary data for which are presented in Table 8.12. On the basis of the regression calculations as well as the pre-existing rationale set out in Chapter 6, subsection 6.5, the proposed relationship between dietary restraint and depression was considered for exclusion from the path model as its contribution to variance had became non-significant in the context of other model variables (original sociocultural model with path deleted shown in Figure 8.8, i.e., Model 2). A direct relationship between disordered eating attitudes and thin-ideal internalisation was considered for inclusion in the model for similar reasons (Model 2 with path introduced shown in Figure 8.9, i.e., Model 3).

8.14.4 Model summaries: fit indices.

Table 8.12 summarises the fit indices for each version of the model tested; these indices are discussed in detail subsections 8.14.5, 8.14.6 and 8.14.7 but have been presented here for ease of reference.

Table 8.12 Fit indices for path analytic models 1, 2 and 3

Model	Description	Figure	χ^2	*df*	CFI	TLI	RMSEA	90% CI	BCC	HOELTER	$\Delta\chi^2$
1	Original sociocultural model	8.8	23.16***	6	0.72	0.31	.15	.09 - .22	54.93	69	
2	Depression-restraint path deleted	8.9	24.60***	7	0.72	0.39	.14	.08 - .20	54.24	73	1.44
3	Internalisation-disordered eating path added	8.10	4.54	6	1.00	1.06	.00	.00 - .10	36.31	350	-20.06***

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; 90% CI = confidence interval; BCC = Browne-Cudeck Criterion, BCC for saturated model = 44.47, BCC for null model = 89.42; HOELTER = Hoelter's Critical *N* to $p < .05$; *** $p < .001$.

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8.14.5 Model 1.

Model 1 consisted of the relationships as presented in Figure 8.6, i.e., the original sociocultural model. The fit indices, shown in Table 8.11, indicated a poorly fitting model. The chi squared was highly significant, whilst the CFI and the TLI values were far below the threshold for acceptability. The RMSEA value was too large, whilst the associated 90% confidence interval was unacceptably wide. The BCC value did not exceed that of the null model, but exceeded that of the saturated model, suggesting some pathway redundancy. The Hoelter value was unacceptably low. Scrutiny of the parameter coefficients, shown in Figure 8.8, showed that each path functioned in the expected direction and accounted for a significant proportion of variance ($p < .05$) except the path between dietary restraint and negative affect ($p = .27$). As expected from the regression analyses, this pathway did not significantly explain variance in the model. Model 1 accounted for 42% of variance in disordered eating attitudes and 23% of variance in body dissatisfaction.

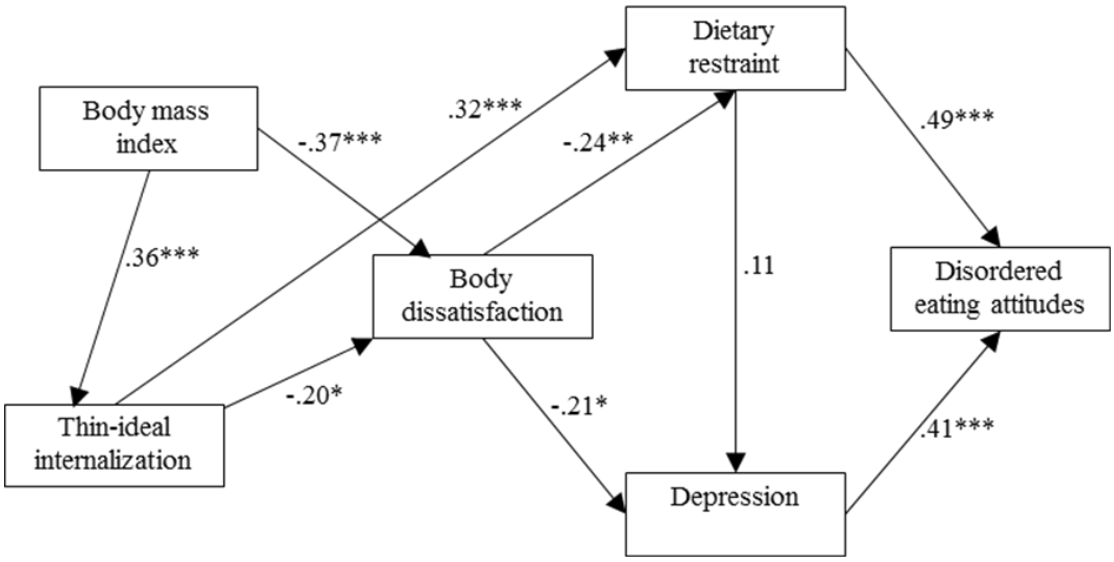

Figure 8.8 Model 1: The original Sociocultural Model of Body Dissatisfaction and Disordered Eating Attitudes, incorporating adiposity

8.14.5 Model 2.

Model 2 consisted of the sociocultural model (Model 1, shown in Figure 8.8) with the non-significant pathway between dietary restraint and depression deleted. The fit indices indicated a slight improvement to the model (increased TLI, decreased RMSEA and increased Hoelter value) but all values remained outside the required

boundaries (see Table 8.11). All parameter coefficients for the paths in Model 2 were significant and the removal of any of the links shown in Model 2 significantly (p < .0001) worsened the model (see Figure 8.9). Additional parameters were required for the model to show a good fit to the data.

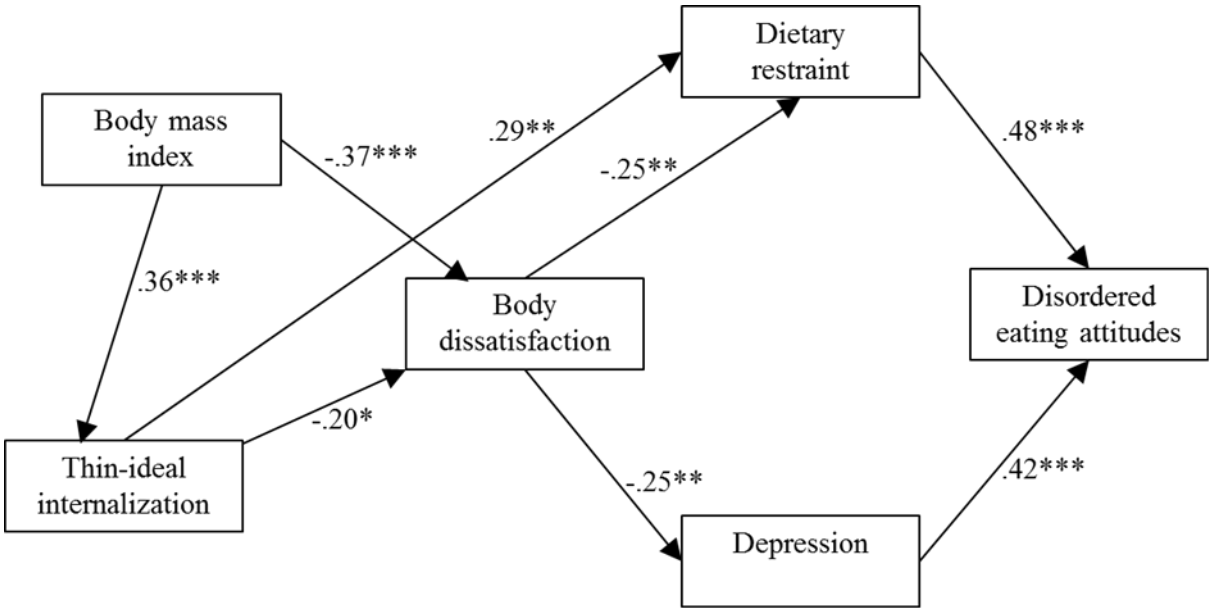

Figure 8.9 Model 2: The original Sociocultural Model of Body Dissatisfaction and Disordered Eating Attitudes, incorporating adiposity, with the pathway between dietary restraint and depression removed

8.14.6 Model 3

Model 3 consisted of Model 2 with the addition of a pathway between disordered eating attitudes and thin-ideal internalisation introduced on the basis of previous findings with young populations (Vander Wal, et al., 2008). The resulting model showed excellent fit indices (see Table 8.11) and is depicted in Figure 8.10. All the individual parameters of Model 3 were statistically significant and the removal of any of the pathways shown in model 3 significantly (p < .0001) worsened the model. Moreover, as shown by the χ^2 change value, the addition of the pathway had significantly improved it. The fit statistics included a large and non-significant p value for the χ^2 statistic and optimal CFI and TLI values. The RMSEA value was also optimal and had a narrow associated 90% confidence interval. The BCC value was lower than that of the null model and the independence model, indicating adequate parsimony. The Hoelter value greatly exceeded both the sample size and the cut-off of 200, indicating a very well fitting model. Model 3 accounted for 50% of variance

in disordered eating attitudes and 26% of variance in body dissatisfaction, 12% of variance in thin-ideal internalisation, 8% of variance in depression and 16% of variance in dietary restraint.

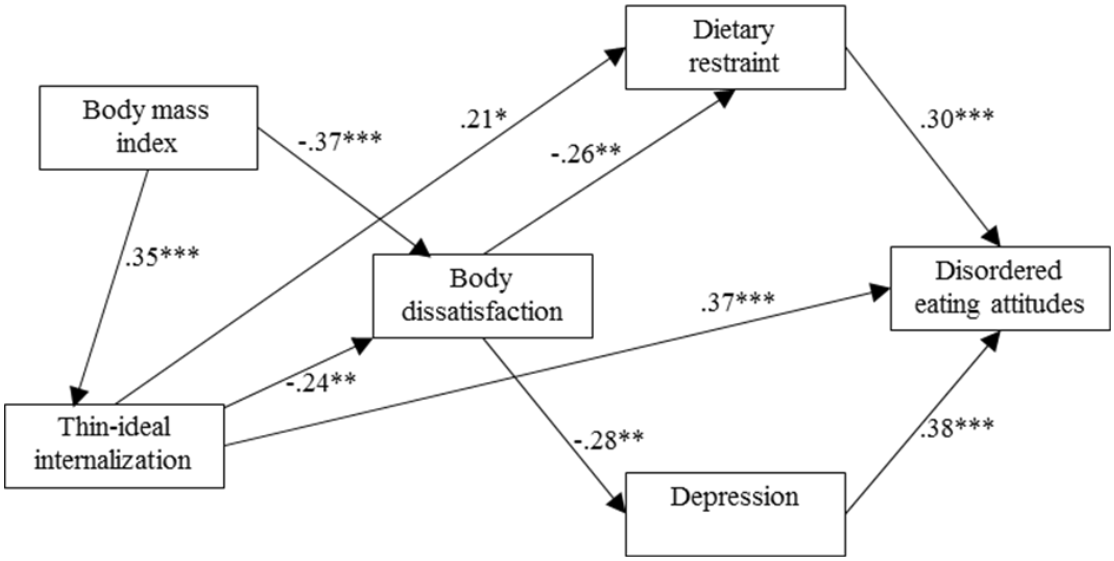

Figure 8.10 Model 3: The original Sociocultural Model of Body Dissatisfaction and Disordered Eating Attitudes, incorporating adiposity, with the pathway between dietary restraint and depression removed and a pathway between thin-ideal internalisation and disordered eating attitudes added

8.14.7 Summary.

In the final revision of the sociocultural model of body dissatisfaction and disordered eating attitudes, derived from the preceding regressions and path analyses, thin-ideal internalisation predicted disordered eating attitudes indirectly via body dissatisfaction, dietary restraint, and depression; it also predicted disordered eating attitudes directly. Dietary restraint and depression served as two separate paths between body dissatisfaction and disordered eating attitudes, but dietary restraint did not significantly predict depression itself. Adiposity significantly predicted higher body dissatisfaction and thin-ideal internalisation. The usefulness of Stice's original sociocultural model (Stice, 2001; Stice & Agras, 1998) with this population was largely supported, whilst the revisions undertaken for models 2 and 3 were underpinned both by previous research and by the preceding regression analyses.

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Chapter 9: Study 2 Discussion

9.1 Introduction

Despite considerable recent research attention, the way in which sociocultural, physical and psychological factors interact to place certain girls at greatest risk of body dissatisfaction and disordered eating attitudes has remained substantially unelucidated. This study sought to explore these interactions in a preadolescent sample using, as a template, the well-supported adult sociocultural model of disordered eating development (Stice & Agras, 1998). These findings strongly support the usefulness of this framework as a starting point for understanding the probabilistic development of eating and body image disturbance in 7- to 11-year-old girls. Furthermore, these findings support the premise that many of the processes underlying disturbances of eating and body image in young girls are largely established well before adolescence (Clark & Tiggemann, 2006; Sands & Wardle, 2003), possibly even by the age of 7 years. The cross-sectional nature of this study means that these results do not indicate longer-term causal risk factors for disordered eating attitudes and body dissatisfaction. They nevertheless provide a detailed description of how key variables work together in the 'here and now' to influence the expression of these phenomena, and point to important similarities between findings with children and adolescents.

9.2 Thin-ideal Internalisation, Thin-ideal Awareness and Body Dissatisfaction

Previous authors have hypothesised that early exposure to an obesogenic environment in which extreme thinness is highly valued may result in the rapid emergence of thin-ideal internalisation and body dissatisfaction in childhood, particularly amongst overweight girls (Gordon, 2000). In keeping with this, we found thin-ideal internalisation and body dissatisfaction at similar levels to those found in older samples (Sands & Wardle, 2003; Smolak, et al., 2001) and slightly higher than those found by Murnen et al. (2003). Body and appearance schemata, therefore, appeared to be in place amongst even the youngest girls in this sample. We specifically examined whether awareness of the thin-ideal affects body dissatisfaction via thin-ideal internalisation. On the basis of previous work with older girls (Austin

& Smith, 2008) it had been predicted that thin-ideal internalisation would fully mediate the separate relationship of thin-ideal awareness with body dissatisfaction. This would support the assertion that simple exposure to thin-ideal promotion could not, on its own, account for resultant body dissatisfaction. As expected, the significant association between body dissatisfaction and thin-ideal awareness became non-significant when thin-ideal internalisation was taken into account. Since full mediation was observed for two different indices of body dissatisfaction and one of body esteem, it is possible to conclude that this hypothesis was fully supported with the current sample.

9.3 Adiposity and Body Dissatisfaction

Scrutiny of the regression analyses and the path analytic relationships shown in Figure 8.10 shows that measured body mass index predicted body dissatisfaction both directly and via thin-ideal internalisation. This was in keeping with the sociocultural model and with findings from older children (Sands & Wardle, 2003). Therefore, girls with elevated adiposity experienced elevated levels of body dissatisfaction – an almost ubiquitous finding, see Smolak (2004b) – and some but not all of that dissatisfaction could be accounted for by thin-ideal internalisation. This prompts one to consider whether age-related increases in adiposity explained its relationship with body dissatisfaction and thin-ideal internalisation. However, age's significant relationship with BMI, but not with the latter two variables, indicated that it cannot account for the relationship. Instead, being of elevated adiposity relative to one's age group appeared to explain greater thin-ideal internalisation and body dissatisfaction in these girls. In keeping with numerous previous studies (Ricciardelli & McCabe, 2001; see also subsection 5.2), however, I found that body dissatisfaction was not confined to overweight or obese participants, nor indeed those who perceived themselves to be overweight. Specifically, the average ideal figure chosen was extremely slender, and had lower levels of simulated adiposity than either the girls' perceived or measured adiposity. Participants consistently selected a perceived figure that was more slender than their measured adiposity would suggest, using both the CBIS and the BMS. This tendency towards underestimation of actual body size was most marked in participants with elevated BMI, but was not associated with participants' age, and is discussed further in Chapter 10.

The data from the two body dissatisfaction scales (CBIS and BMS) shared a number of key associations with the data from the body esteem scale (BES-R) but the analyses show that the variables were by no means interchangeable. Importantly, body esteem was not significantly predicted by BMI once the contribution of thin-ideal internalisation had been taken into account, whereas both variables significantly predicted body dissatisfaction on the CBIS and the BMS. The likely basis of this non-significant relationship is the fact that the body esteem scale consists of many items assessing global appearance satisfaction, and only a few assessing weight and shape specifically. Conversely, the body dissatisfaction scales are primarily focused upon the participant's desired weight and shape. Body esteem was therefore excluded from the model on the basis that the preceding variable in the model (thin-ideal internalisation) was essentially weight and shape specific, as indeed was dietary restraint, the variable that followed it, so a weight and shape specific operationalisation of the body dissatisfaction concept was in keeping with the remainder of the framework.

9.4 Dietary Restraint

The mean dietary restraint score was similar to that obtained from the scale's normative population (Van Strien & Oosterveld, 2007), and indeed from other samples of girls of this age (Van Strien & Bazelier, 2007). The significant relationships depicted in Figure 8.10 show that body dissatisfaction partially mediated the path between thin-ideal internalisation and dietary restraint. This partial meditational role corresponds to findings with adolescent and adult females (Stice, 2001; Stice, Mazotti, Weibel, & Agras, 2000) but has not, to my knowledge, been previously reported in young children. In some cases, therefore, body dissatisfaction may arise as a consequence of the comparison of one's own body with a socially-prescribed thin-ideal body, giving root to restrained eating behaviour. In other cases, however, dietary restraint in pursuit of the thin-ideal, occurs even in the absence of reported body dissatisfaction, i.e., the thin-ideal on its own is enough to prompt restraint, even when no explicit unfavourable comparison has been made between the individual's own body and the ideal body they pursue. To account for this, Stice (2002) suggested that social approval may motivate dieting efforts out with explicit discontent with one's perceived body. In these terms, girls may assimilate and pursue

the thin-ideal as an end unto itself, rather than as an explicitly thinner, 'better' version of their current body, because of the social capital it affords and the status implications of attaining the ideal.

9.5 Disordered Eating Attitudes

Turning to disordered eating attitudes themselves, the mean level in this sample was higher than is typical of general-population samples of children (e.g. Lattimore & Halford, 2003; McVey, et al., 2004). However, the current participants were both younger and more overweight than most previous samples, limiting comparability. As hypothesized, younger girls reported slightly higher levels of disordered eating attitudes than older girls, in keeping with previous findings. Explanations for this include the limitations of the ChEAT itself (Erickson & Gerstle, 2007) or genuine reductions in eating pathology that occur over the pre-adolescent period.

It was expected that thin-ideal internalisation would fully account for shared variance between disordered eating attitudes and thin-ideal awareness, in keeping with the findings for body dissatisfaction (subsection 9.2) and also with previous research (Austin & Smith, 2008). This hypothesis was only partially supported: thin ideal internalisation accounted for a significant amount of variance in the relationship but thin ideal awareness also continued to do so (Table 8.11). The persistence of the relationship between disordered eating attitudes and thin-ideal awareness might be explained using body dissatisfaction as an intervening variable. In other words, body dissatisfaction might account for the proportion of variance in disordered eating attitudes that thin-ideal internalisation did not (Cash, 2005).

9.6 Depression and Dual Pathways

Participants' depression scores were towards the higher end of the normal range seen previously in girls aged 7 to 11 years (Banerjee & Watling, 2010; Erickson, et al., 2000). Both body dissatisfaction and dietary restraint were hypothesised to contribute to depression, but only body dissatisfaction did so. As expected, depression significantly predicted disordered eating attitudes. Consequently, as shown in Figure 3, dietary restraint and depression provided two

separate paths of mediation between body dissatisfaction and disordered eating attitudes, in keeping with the dual pathway model (Stice, 2001).

These findings are in keeping with the theory that body dissatisfaction motivates weight reduction intentions and their translation into restrained cognitions and behaviours around food (dietary restraint). Dietary restraint may then lead to disordered eating behaviours as more extreme weight reduction efforts are exerted in an effort to reduce body dissatisfaction and attain appearance ideals (Stice, 2002). The link between body dissatisfaction and depression has been explained with recourse to the salience of appearance in girls' self-evaluation. In particular, girls whose appearance schemata are rigid, entail high levels of thin-ideal internalisation and whose attainment is strongly linked to their sense of self-worth may be particularly vulnerable to responding to body dissatisfaction with negative affect (Stice & Bearman, 2001).

The finding that negative affect then strongly predicted disordered eating attitudes is also in keeping with the theory that such attitudes (and concomitant behaviours) might be adopted as a strategy to relieve negative affect, particularly that which has its basis in weight and shape (Stice & Agras, 1998). The various relationships between body dissatisfaction, depression and disordered eating attitudes were similar to those found by Phares, Steinberg and Thompson (2004) in their sample of 8 to 10-year-old girls. The dietary restraint pathway between body dissatisfaction and disordered eating attitudes has not, to my knowledge, been reported before in young children although it corresponds to findings with adults (Stice, 2001).

9.7 Fit with the Sociocultural Model

When examining the model as a whole, path analyses indicated that the original model (Model 1, see Figure 8.8) provided a poor fit to the data. Notably, as suggested by the analyses in subsection 8.10, the path between dietary restraint and depression did not significantly contribute to the model, although it was in the predicted direction. Notwithstanding equivocal evidence for the significance of this pathway in studies of adults and adolescents (Chen, et al., 2009; Stice, 2001; Stice, Hayward, et al., 2000) it may be that the pathway is not important amongst preadolescents. The additional path that was introduced to the model between thin-

ideal internalisation and disordered eating attitudes (Model 3; see Figure 8.10) is not a feature of Stice's (2001) original model, but nor is it without precedent. In a number of previous studies with adults and older children (Heinberg, et al., 1995; Vander Wal, et al., 2008) thin-ideal internalisation has accounted for unique variance in disordered eating above and beyond that explained by the other variables in the model. It has been suggested that expectations of the benefits of being extremely thin – such as social acceptance and self-esteem – are necessarily internalised alongside the thin-ideal (Thompson & Stice, 2001). Fears of the consequences of not being thin – such as social rejection, failure and loneliness – are also internalised with the thin-ideal (Harrison, 2001). It is feasible that these cognitions motivate pathological eating behaviours even in the absence of elevated BMI, body dissatisfaction, dietary restraint or depression. This addition to the model, therefore, is both empirically and theoretically justifiable.

9.8 Limitations

Since the sample size was small and the design cross-sectional, extension and replication of these findings in a larger, longitudinal study is required before any prognostic inferences can be drawn. The use of an exploratory path analytic approach leaves open an increased possibility of a type I error. Although the author purposefully recruited participants from schools in areas that varied widely in their material affluence, the study's low participation rate (34.8%) may limit the extent to which the sample was socially representative of contemporary preadolescents. This notwithstanding, the prevalence of obesity and overweight in the sample closely resembled the national and regional prevalence (National Health Service Information Centre, 2010).

9.9 Implications

The prevalence of body dissatisfaction and disordered eating attitudes in the 7- to 11-year-old age group is well-documented, as are the concomitant and prospective risks to girls' wellbeing and development. The present study has contributed to the growing literature on how body image and eating disturbance develop by examining the sociocultural model for the first time in a preadolescent population. Support was found for the role of thin-ideal internalisation in predicting disordered eating attitudes

both directly, and indirectly via body dissatisfaction, dietary restraint, and depression. Adiposity predicted body dissatisfaction, partially mediated by thin-ideal internalisation. The sociocultural model, with minor modifications, provides a useful and well-fitting account of the expression of body dissatisfaction and disordered eating attitudes in this group. These findings suggest that eating attitude and body image intervention programs (e.g. Stice, Marti, Rohde, et al., 2011) might profitably focus upon younger girls than has previously been considered necessary given that the 'building blocks' of disordered eating patterns appear to be in place several years before the onset of puberty. They also suggest that girls that are overweight or obese and who internalize the socially-prescribed thin ideal body to a high degree may be particularly vulnerable to experiencing body image and eating disturbances.

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Chapter 10: General Discussion

10.1 Summary of Findings and Relationship to the Existing Literature

The overarching aim of these studies was to investigate the sociocultural and psychological context in which preadolescent girls' disordered eating attitudes and body dissatisfaction develop, incorporating (for the first time) an explicit consideration of adiposity. The extant literature, which purported to investigate disordered eating from a nominally developmental perspective, suggested a number of risk factors needing further investigation. These included adiposity, perfectionism, anxiety, body dissatisfaction, thin ideal internalisation, dietary restraint and depression (Bardone-Cone, et al., 2007; Stice, 2002; Striegel-Moore & Bulik, 2007). This broad constellation of factors had not previously been simultaneously investigated in preadolescents, and few studies had addressed the role of any of these factors across time (Wertheim, et al., 2009). Furthermore, the few existing longitudinal studies with preadolescents seldom put in place adequate statistical controls for initial levels of the outcome variable and subsequent levels of the predictor variables (Field, et al., 2001 is a notable exception); within-time relationships between predictor and outcome were similarly rarely considered. This meant that the scarce existing data on prospective predictors of disordered eating attitudes and body dissatisfaction in this population stood upon uncertain inferential foundations.

In the previous literature there were also minimal in-depth data capturing the dynamics of disordered eating attitudes and body dissatisfaction in girls during the specific period of middle childhood (7 to 11 years). This dearth existed despite evidence to suggest the importance of this developmental interval in the emergence of some of the components of disordered eating attitudes and body dissatisfaction (e.g., Schur, et al., 2000; Van Strien & Bazelier, 2007) and despite the finding that young adolescent girls express levels of disordered eating attitudes comparable to those of adult women, which strongly suggests that at least part of their developmental course occurs prior to adolescence (Wichstrøm, 2000). Moreover, the utility of the leading existing framework of disordered eating in adults and adolescents, the sociocultural model (Stice, 1994, 2001; Stice & Agras, 1998), remained largely unexplored with younger populations. Thus the research contained in this thesis sought to fill a

number of important research gaps in the developmental understanding of the aetiology of disordered eating attitudes and body dissatisfaction in girls.

The first study was a longitudinal comparison of a cohort of girls at two time points, two years apart, in which initial predictors of subsequent eating attitudes and body dissatisfaction were investigated. Analyses showed that at each point in time ('within-time'), disordered eating attitudes were predicted by body dissatisfaction, anxiety and perfectionism. However, the only significant longitudinal ('across-time') predictors of subsequent eating attitudes were initial eating attitudes and initial perfectionism once other sources of variance were adjusted for.

A notable finding of the across-time analyses was the lack of a predictive relationship between initial evaluative body dissatisfaction and subsequent disordered eating attitudes. This contrasts sharply with the majority consensus in the literature that evaluative body dissatisfaction is a risk factor for almost all eating pathology (Stice & Shaw, 2002). However, this conclusion primarily originates with research involving participants in early adolescence and beyond; findings with younger girls are mixed and their interpretation is complicated by the failure to adjust for initial levels of disordered eating attitudes (Davison, et al., 2003; Gardner, et al., 2000). The findings of Study 1, then, call into question the distal developmental importance of evaluative body dissatisfaction to disordered eating attitudes in middle childhood, despite the strong within-time associations found between the variables. More broadly, this finding highlights the hazards inherent in conflating "factors that place individuals on pathways probabilistically leading to later disturbances" with "factors and processes which maintain individuals on, or deflect them from, such pathways once enjoined" (Sroufe, 1997, p. 251). In preadolescent girls, body dissatisfaction feasibly acts as a proximal stressor to motivate and perpetuate disordered eating attitudes but may not form a significant part of the diathesis that renders some girls more vulnerable to these problems in the longer term, i.e., further downstream.

A second important point to take from Study 1 is that disordered eating attitudes were relatively stable across time, i.e., initial and subsequent levels were strongly associated, despite previous concerns about whether such constructs can be reliably assessed in children (Erickson & Gerstle, 2007). As such, girls tended to maintain their rank comparative to their peers across the two-year interval, a level of stability which is consistent with data from adolescent populations, including those in which initial disordered eating attitude score was the only (Wichstrøm, 2000) or the

strongest (Calam & Waller, 1998; Leon, et al., 1995) significant predictor of subsequent disordered eating attitude score. This finding indicates that many of the behaviours and cognitions inherent in disordered eating attitudes show continuity across middle childhood. Consequently, it is possible that the self-schemata that underlie the development, enactment and maintenance of children's attitudes towards eating and the body (Altabe & Thompson, 1996) are present (in some enduring form) from 7 years old.

Third, the finding that initial perfectionism significantly predicted subsequent disordered eating attitudes is both novel and important. These analyses support the premise that perfectionism constitutes a distal risk factor whose influence on future disordered eating attitudes is exerted by shaping behavioural and cognitive patterns of maladaptation over middle childhood (Sroufe, 1997). The within-time analyses also suggest that perfectionism is important in maintaining such attitudes once they have arisen. There is very limited previous research with preadolescents with which to compare this finding, save that of Salling et al (2005) who assessed rather different outcomes (weight and muscle concerns) over a shorter timescale but nevertheless found a null association in girls. Tentatively, however, the finding is in keeping with those derived from several prospective population-based adolescent studies (Killen, et al., 1994; Tyrka, Waldron, Graber, & Brooks-Gunn, 2002; Wood, Waller, Miller, & Slade, 1992) as well as numerous others focused on clinical groups (Bardone-Cone, et al., 2007; Striegel-Moore & Bulik, 2007). There is very good cause, therefore, to consider research into the relationship between disordered eating attitudes and perfectionism in preadolescents a future priority. Furthermore, I would argue that these findings emphasise the importance of using a full-length, validated multidimensional index of perfectionism such as the CAPS (Flett, et al., 1997) in such investigations with children, given the disappointing performance of the MASC perfectionism subscale in reflecting this construct in the current study. Whilst there is no consensus about the single best way to conceptualise perfectionism in non-clinical populations of children, there is good evidence that the CAPS is at least sensitive to variations in perfectionism in children that exist in conjunction with other forms of psychological distress (Flett, et al., 2002; Hewitt, et al., 2002).

When considering body dissatisfaction as an outcome, Study 1 found that Time 2 adiposity (as assessed via BMI) was the only significant predictor of Time 2 body dissatisfaction although the significance of the contribution of Time 1 adiposity

was borderline. This finding contrasts with previous assertions that initial adiposity is the primary longitudinal predictor of subsequent body dissatisfaction in preadolescent children; none of these previous studies, however, controlled for the role of subsequent adiposity (Allen, et al., 2008; Shunk & Birch, 2004; Sinton & Birch, 2005). The distinction between the relative roles of adiposity at two different points in time might appear unimportant. However, from a developmental perspective, these results imply that girls' size, in both the past and the present, contributes to the degree of body dissatisfaction expressed, i.e., the variable exerts its influence both distally and proximally. This is in keeping with evidence to suggest that the earlier the onset of young girls' overweight or obesity, the greater the negative impact upon their long-term body dissatisfaction (Smolak, 2004a). This may be because the earlier the child commences the largely negative social learning experiences (e.g. appearance comparisons) that shape the body schemata of overweight or obese girls, the more intransigent and deeply embedded the components of these schemata become. Since middle-childhood is a key period for the development of self-concept (Cole, et al., 2001) and, early on, for the initiation of rule- or contingency-bound thinking, early and continued experiences of this nature are likely to form potent, heavily reinforced maintenance patterns of negative self-evaluation of size, shape and – potentially – concomitant self-worth (Boyce, et al., 2002).

Presented second in this thesis was a cross-sectional study (Study 2) in which the sociocultural model of eating pathology was assessed as a model of related attitudes to eating and the body in pre-adolescent girls. The sociocultural model has gained prominence in the literature, first, due to a large body of supporting research and second, because it addresses the culturally-embedded nature of disordered eating itself, i.e., the common 'vocabulary of discomfort' that underpins the full spectrum of eating attitudes (Bart, 1968; Gordon, 2000). The findings showed that the original model, as proposed by Stice and others (Stice, 1994, 2001; Stice & Agras, 1998) was a poor fit to the data; however, two minor modifications produced good fit. These modifications were the removal of a pathway between dietary restraint and depression and the introduction of a pathway between thin-ideal internalisation and disordered eating attitudes, both of which were justifiable on the basis of previous research. Also in keeping with a number of previous studies and with previous versions of the model itself (Blowers, et al., 2003; Phares, et al., 2004; Sands & Wardle, 2003; Stice, 1994; Vander Wal, et al., 2008) adiposity was included as a predictor of thin ideal

internalisation and body dissatisfaction. These findings suggest that measured adiposity is an important component of the sociocultural model when considering young girls.

It may seem initially surprising that Study 1 strongly supports the importance of body dissatisfaction and negative affect in the expression of disordered eating attitudes, given evidence from Study 2 that these are not significant across-time predictors of disordered eating attitudes. There are two potential ways to explain this apparent inconsistency between the within-time relationships (observed in both studies) and the across-time relationships. First, factors not included in the longitudinal study, such as dietary restraint, may be important in mediating longitudinal relationships between body dissatisfaction and eating attitudes over time: the omission of these factors may have resulted in the non-significant direct relationship between the two. More likely, however, is the scenario suggested earlier on in this chapter, namely the suggestion that distal risk factors – in this case, early perfectionism and disordered eating attitudes – work to create the long-term psychological context in which the components of the sociocultural model come to bear.

In keeping with discussions earlier in this chapter, too, the findings of both studies together indicate that adiposity functions as both a distal factor ("past events, attitudes and experiences that predispose or influence how people come to think, feel and act in relation to their body") and a proximal factor ("precipitating and maintaining influences on body image [and disordered eating] experiences") in predisposing body dissatisfaction; its significance in predicting body dissatisfaction in both studies is fully in keeping with this conceptualisation (Cash, 2004, p. 38). Turning to body dissatisfaction's contribution to disordered eating attitudes in the sociocultural model, which contrasts with the lack of a prospective predictive role in the longitudinal study discussed earlier, the variable might be understood to have a non-significant predisposing role over this relatively long period of time, particularly when its strong within-time role as a precipitant of 'here and now' disordered eating attitudes is taken into account. In contrast, perfectionism, as suggested previously, seems to function on both levels, providing both a risk and a maintenance factor for disordered eating attitudes. Whether the mechanism of its action varies depending on when, and how, it is experienced remains unclear; the developmental principles of multi- and equifinality, allow for the possibility that the mechanisms may vary

depending on the developmental context in which they act (Cicchetti, 2004; Cicchetti & Rogosch, 1996).

A related issue, when considering various distal versus proximal relationships suggested by these findings, is the indication that anxiety is a longitudinal product of, rather than a risk factor for, body dissatisfaction and disordered eating attitudes in Study 1. Whilst the within-time associations between disordered eating and anxiety are a widely-recognised finding, the majority of studies indicating the directionality of across-time risk are retrospective (Kaye, 2004) and of relatively poor quality (Godart, Flament, Perdereau, & Jeammet, 2002). Given the psychological and physical stress potentially associated with negative cognitions and behaviour around eating, weight and shape, it is unsurprising that negative affect has emerged as a downstream correlate of eating disorder symptoms and body dissatisfaction amongst adolescents (Cattarin & Thompson, 1994; Stice & Bearman, 2001). Notably, one might reflect on the particular subtypes of anxiety involved in the current study: physical symptoms, and social anxiety. Physical symptoms of anxiety include an enhanced awareness of somatic events and catastrophic thinking related to physiological arousal. Such feelings of acute, negative body-consciousness may be related to self-objectification and disordered eating behaviours in adult women; similarly, feelings of dread and anxiety in social situations appear intimately intertwined with the experience of body shame and body surveillance (Cash, Theriault, & Annis, 2004; Tiggemann & Kuring, 2004). As Cash (2004) and Gordon (2000) point out, the behaviours involved in incipient pathologies of body image and eating give rise to damaging but powerfully addictive experiences, against which a common reaction is an escalation of the trigger behaviour itself, i.e., a maintenance cycle of affect and behavioural response is established. Further research with young girls should include, for anxiety and other variables, a full consideration of the various potential directionalities of putative causal relationships and their likely mechanisms, since the relationships between outcomes, risk factors and maintenance factors may not be directional in the manner that cross sectional studies have been taken to imply. This need is particularly marked given the marked dearth of prospective empirical data on which to build causal inferences.

10.2 Theoretical and Methodological Implications of the Thesis.

Previous developmental research in this area has tended to conflate chronological age with development, i.e., it has been assumed that age trends across populations can be viewed as a proxy for linear increases in symptomology over time within the individual (Littleton & Ollendick, 2003; Striegel-Moore, Schreiber, et al., 2000). This has led, in some cases, to the expectation of consistent, predictable differences between individuals of different ages which map directly onto longitudinal patterns seen within individuals. This tendency can be seen beyond eating disorder research across the full range of developmental psychopathology. The results of the studies contained in this thesis however, challenge this view and necessitate consideration of how the individual and the cohort may show disparate trends.

With these issues in mind, it is worth briefly reflecting on the outcome variables of the studies in relation to age. At Time 1 in Study 1 older girls reported greater dissatisfaction with their bodies, but at Time 2 they did not. However, longitudinal analyses found that individual levels of body dissatisfaction did not increase over the two year time scale, despite the fact that the girls' ages ranged across only two years on each occasion of measurement, i.e., excessive variance in age was unlikely to have obscured such effects. These findings are, as explored in greater detail in Chapter 5, subsection 5.2, part of a disparate research picture in which cohorts have variously shown overall increases, decreases (Davison, et al., 2003) and stability (Dohnt & Tiggemann, 2006; Harrison & Hefner, 2006; McCabe, et al., 2005) of body dissatisfaction over time. Similarly, the prevalence and population distribution of body dissatisfaction was similar at each timepoint, despite suggestions that body dissatisfaction should show an overall shift in severity as children age and integration of body schemata with the thinness ideal becomes more consolidated. This is in keeping with the findings of Davison et al. (2003) who found that girls maintained their relative rank in body dissatisfaction over the course of their four year study. Thus it seems highly unlikely that the across-participant age differences seen, on occasion, in body dissatisfaction in these and other data are a result of uniform, across-time shifts within cohort members as they age. Instead, the Time 2 across-time analyses and indeed the associations observed in the cross-sectional study hint at an alternative developmental dynamic, where the within-individual association between measured size and both perceived and ideal size

increases as the individual grows – i.e., as suggested in subsection 5.2, it is becoming bigger rather than becoming older that provides the catalyst for change.

A different pattern, in which within- and across-individual trends with age appear similarly disparate, can be observed in the disordered eating attitude data. As discussed in Chapter 5, despite showing no within-time correlation with age at either Time 1 or Time 2, individual levels of disordered eating attitudes significantly decreased over the two course of the study. Furthermore, despite suggestions in the literature (Maloney, et al., 1989) that older girls within the sample may be more likely to inhabit the pathological right hand extremity of the distribution (which shows a characteristic positive skew), not only was the shift across time in the opposite direction, but the shape of the distribution within the cohort remained very similar, i.e., the number of participants whose scores inhabited the right-hand tail of the distribution did not increase although the age of every girl in the cohort did so. As previously discussed in Chapter 5, subsection 5.4, the net decrease in across-individual levels of disordered eating attitudes between subsequent points of assessment in prospective studies is a common finding. Researchers have typically assumed this might be evidence of poor reliability in the measure of disordered eating attitudes – the ChEAT – itself. However, considered in the light of the between versus within-individual patterns also seen in body dissatisfaction, it becomes clear that assumptions of simple linear changes in symptomology over time with age, rather than in relation to a range of other risk factors, may be premature and lack conceptual support.

Mean body dissatisfaction levels in both studies were very similar: the mean CBIS dissatisfaction score was -0.8 at T1 for Study 1 and -1.0 at T2, whilst it was -1.3 for Study 2. This indicates that, across the studies and timepoints, participants' ideal body was one CBIS category smaller than their perceived body. This level of dissatisfaction is consistent with previous studies of similarly aged populations of girls using the CBIS, including Truby and Paxton (2002: mean score 1.1) and Truby and Paxton (2008: mean score 0.9). Similarly, the mean participant BMS dissatisfaction score was -1.3 in both Study 1 at T2 and Study 2, again indicating an ideal body one category smaller than the perceived body. The body dissatisfaction expressed in the current studies, therefore, was in keeping with that found in previous studies.

The proportion of participants identifying a thinner ideal body was 69% in Study 2, 60% in Study 1 at T1 and 67% in Study 1 at T2. Similarly, the proportion of participants endorsing a thinner ideal on the BMS was 64% for both Study 2 and Study 1, T2. In each study, therefore, around two thirds of participants had a thinner ideal body than their perceived body. Although this proportion is at least 10% higher than the typical range of 28-55% identified in Ricciardelli and McCabe's (2001) review, and also exceeds more recent findings with similar populations (e.g. Ricciardelli et al, 2003: 47%; Truby & Paxton, 2008: 52%), its directionality and implications are in keeping with previous findings. Overall, these findings offer further support for the premise that preadolescent body dissatisfaction, and the specific wish to have a thinner body, occurs at a similar level to that found with adults and adolescents (Dohnt & Tiggemann, 2006; Phares, Steinberg, & Thompson, 2004).

Considering next the levels of disordered eating attitudes in the study samples, the mean ChEAT scores obtained were very similar in Study 2 (18.7: *SD* = 14.3) and Study 1 at T1 (17.3: *SD* = 12.6; T2 non-participants excluded). The mean score for Study 1 at T2 was somewhat lower at 13.8 (*SD* = 10.9). However, for both studies, the mean scores exceeded the 'norm' of 8 (*SD* = 7) by the scale's authors (Maloney et al, 1988; 1989), and the corresponding standard deviations are markedly higher. Subsequent studies have produced scores that markedly vary from this mean, including Davison et al's (2002) sample mean of 5.3 (*SD* = 4.8) and Erikson and Gerstle's (2007) sample mean of 12.4 (*SD* = 9.8), both with 9-year-old girls. It appears, therefore, that the disordered eating attitude scores in Study 2 and Study 1, T1, are both higher and more dispersed than seen in studies with similar populations. However, these comparisons are complicated by the widespread use of different versions of the ChEAT (23, 25 and 26 item versions exist), different scoring systems as suggested in Smolak and Levine (1994) and by the non-normal distribution of ChEAT data that frequently arises, as in the studies reported in this thesis. As such, the median, transformed or standardised scores would likely be measures of central tendency for the ChEAT of greater use for comparison, but these data are rarely reported.

The frequency of specific eating behaviours and attitudes as reported using the ChEAT was very similar, both between studies and between timepoints: for example, purging behaviours were very rare, but worries about being fat were very common (see Appendix T). Unfortunately, the continuing lack of consensus about how

responses to the ChEAT should be divided into subcategories (Kelly, et al., 1999; Lynch & Eppers-Reynolds, 2005; Ranzenhofer, et al., 2008; Smolak & Levine, 1994), in which no factor solution accounting for more than 50% of data variance has been reached, means that breaking down the current data into themes was too problematic to attempt. Whilst a more satisfactory solution may yet emerge, the fact that different structural models fit different populations (varying on age, weight and background culture) calls into question the intrinsic value of categorizing behaviours and cognitions as 'bulimic' or 'anorexic-like' in the context of subclinical eating behaviours. It may be that a hallmark of subclinical disordered eating attitudes in children is their relatively diagnostically diffuse nature: the homogeneity of clinically disordered eating has been long overstated (Wilfley, et al., 2007) and so symptom heterogeneity within inherently more heterogeneous populations (in terms of weight, age, ethnicity, socioeconomic status etc.) should not come as a surprise. Future research should seek to discern possible structures within children's attitudes to eating using approaches that move beyond imposing adult nosologies on children's experiences: qualitative work such as that undertaken by Schur, Sanders and Steiner (2000) might provide a useful starting point for this.

Both samples in this thesis showed high levels of overweight and obesity. In Study 1, at T1, 7% of girls were obese and 17% were overweight, whilst at T2, 5% of girls were obese and 18% were overweight. In Study 2, 8% of girls were obese and 30% were overweight; as such overweight but not obesity was more prevalent in Study 2 than Study 1. For both studies, I used International Obesity Taskforce (IOTF) cut-offs for overweight and obesity. These cut-offs are defined to extrapolate to a BMI at age eighteen of 17, 25 and 30 kg/m^2 respectively, and are age specific to the nearest 6 months (Cole, et al., 2000; Cole, Flegal, Nicholls, & Jackson, 2007). They remain the most widely-used and recommended tools for identifying overweight and obesity in research and clinical settings (Cole & Lobstein, 2012). The extent to which the current samples are representative of the North-East of England region from which the population was recruited is, however, unclear. National surveillance of child obesity and overweight prevalence in the UK is carried out using alternative cut-offs for overweight and obesity derived from the UK90 reference dataset (Cole, Freeman & Preece, 1995). Using these cut-offs of > 85^{th} centile for overweight and >95% for obesity, 21% of 10 and 11 year olds girls are obese in North East England and 14% are overweight. At first glance, therefore, the participants involved in both

studies appear to be unrepresentative of their local population. However, the IOTF cut-offs approximate to the 89th and 99th centiles of the UK90 reference for overweight and obesity, respectively, so will usually tend to produce lower overall prevalence estimates and, within the overweight/obese bracket, will designate a higher proportion of individuals overweight (Cole & Lobstein, 2012). The extent to which the current samples were comparable to the North-East population consequently remains unclear and so, therefore, does the extent to which the results can be generalised more widely.

In both studies perceptual inaccuracy increased with increasing distance from average adiposity, with thinner girls overestimating their size and larger girls underestimating their size. The phenomenon of underestimation amongst overweight girls has been previously reported (Saxton, et al., 2009) and has been suggested as a maintenance factor in adiposity amongst children; overestimation amongst lower-weight girls has received less attention. While larger girls could be experiencing genuine perceptual distortion, as a consequence of a normative visual diet of larger-than-ever children and adults around them in the general population, or as a psychological defence mechanism against the stigma of adiposity, this does not necessarily explain why slim girls (exposed to a similar visual diet and fatness stigma) overestimate their size. Alternatively, the illusion of perceptual inaccuracy may simply arise in the data as a consequence of participants' scores regressing to the mean as an artefact of scale design (Ben-Tovim & Walker, 1991, 1997). In other words, as girls' real size nears the extremes of the scale, well established tendencies to avoid endorsing the extreme anchors may be manifest. This possibility has yet to be fully investigated although small-scale attempts to vary the order of stimulus presentation have produced encouraging results (Dowdney, Woodward, Pickles, & Skuse, 1995; Williamson & Delin, 2001).

The cross-sectional data indicate that awareness and internalisation of the thin-ideal in the sample were not more prevalent amongst the older participants than the younger ones: in fact, the data in Table 8.4 show a marginally significant trend towards younger girls having a greater awareness of the thin-ideal. How might one interpret these findings, which – at first glance – appear counter-intuitive? Murnen et al (2003) also found no relationship between grade (as a proxy for age) and scores on the SATAQ; Sands and Wardle (2003) found that older girls in their sample reported greater awareness of the thin-ideal (but this effect was only significant when

comparing 11-year-olds to 12-year-olds). As regards the rather younger sample involved in Study 2, it is feasible that the weak negative link between 'awareness' and age might be attributable to the tendency of younger girls to reiterate cultural messages about the ideal body shape ad verbatim, since they are poorly placed to actively challenge or reject these messages compared to their older peers.

Briefly, two key relationships emerge from the cross-sectional data in particular need of further investigation. The observed association between thin-ideal internalisation and body dissatisfaction serves to underscore the conceptual relationship between accepting the thin-ideal as personally meaningful and desirable, and comparing one's own body to it unfavourably. This is in keeping with some previous research (Blowers, et al., 2003; Sands & Wardle, 2003). However, analyses also showed that thin-ideal internalisation was linked to dietary restraint even in absence of body dissatisfaction, and to disordered eating attitudes even in the absence of all intervening variables in the sociocultural model. These two sets of relations are novel in this age group, and in particular merit further investigation. Initially, both associations seem to bypass altogether key elements of our understanding of how thinness schemata emerge. It is plausible that girls might pursue the thin-ideal for reasons other than dissatisfaction with their current body: the attainment of the thin-ideal has a range of powerful positive connotations, such as increased social capital, personal fulfilment and career opportunities. This might lead directly to alterations in eating behaviours and changes to the way in which the relationship between food and the body is constructed by the individual, whether or not they occur via dietary restraint.

Both in the cross-sectional study and at the second time point in the longitudinal study, a novel computer-graphic body dissatisfaction scale was used. This scale was developed in order to answer criticisms of existing figure choice scales for children. In particular, the majority of previous scales feature line-drawn bodies, such as the widely-used Collins (1991) figure choice scale, and so depict figures which do not directly correspond to a measurable level of adiposity, i.e., body mass index. This has made it impossible to accurately judge the relationship between the adiposity of the child's perceived figure and the adiposity of the child. Furthermore, the range of most scales is quite limited, including a typical total of 7 figures from which to make selections. This provides relatively few figures from which to choose, representing only a small number of points on the spectrum of adiposity and usually

doing so in a non-equidistant fashion. Moreover, the presentation of this limited range of figures in a complete array – rather than individually, or in a randomised order – may enhance problems associated with avoidance of extremes in scales, as discussed previously in this Chapter. Finally, the line-drawn figures that feature in figure choice scales often lack realism e.g., they are black and white, two-dimensional, lack anatomical detail and are rather small. Whilst Truby and Paxton's (2002) Children's Body Image Scale (CBIS) features photographs of children of known BMI range, these images are published in black and white and lack depth and definition. Gardner et al (1999) sought to avoid some of these pitfalls by using photographs of the participants themselves, projected onto a large screen, to assess their perceptual accuracy. However, they used a subjective equality signal-detection methodology, in which they horizontally stretched the image and asked participants to recognise the point at which the image was no longer distorted. Since physiological increases in adiposity consist of a complex mosaic of various topological changes, horizontal expansion of the image did not adequately simulate this process, an omission that the development of the BMS sought to address.

The BMS presented 13 full-colour, three dimensional, computer-generated, realistically rendered figures of known (simulated) adiposity one-by-one on a large screen, and allowed the child to determine which was presented at any moment and for how long. Additional analyses on the combined data from the longitudinal data and the cross-sectional data (see Appendix U) showed that slightly fewer participants incorrectly selected the central (i.e., 50th percentile) perceived figure on the BMS than on the CBIS, i.e., there appeared to be less regression to the mean on the scale (88% vs 84%). As such the BMS might feasibly represent an improvement on the CBIS, but the statistical difference is small and further data are required to examine the BMS in greater detail. Needed further development of the BMS presents a promising opportunity to ensure that visual assessment tools used to capture evaluative body dissatisfaction are optimally designed and based around children's capabilities at this early age. As it stands, the BMS appears to represent a valuable step forward in the visual assessment of body dissatisfaction.

Continuing this examination of measurement methodologies, socioeconomic status (SES) was assessed in both the cross-sectional and longitudinal studies using two different methods. School-wide rates of free school meal (FSM) uptake were recorded on each occasion that data were gathered, whilst the individual-level Family

Affluence Scale (FAS II) was administered to the longitudinal sample at Time 2 (but showed ceiling effects, leading to exclusion of the variable) and to the cross-sectional sample.

On both the individual level and the school-wide level, in Study 2, no association between SES and eating attitudes was found, in keeping with a number of previous studies (DeLeel, et al., 2009; O'Dea, 1994; Story, et al., 1995). In contrast, on a school-wide level, higher levels of disordered eating attitudes were found in sample participants from lower SES schools at both timepoints of Study 1, in keeping with other previous research (Ghaderi, et al., 2005; Robinson, et al., 2001). To complicate the picture further, a smaller ideal figure was identified by participants attending higher SES schools for the CBIS but not the BMS at Time 2 in the longitudinal study, whilst the same result emerged in the cross sectional study for the BMS but not the CBIS data; no differences in overall body dissatisfaction were found. In conclusion, data from the current studies have done very little to clarify the current understanding of the relationship between SES, body dissatisfaction and disordered eating attitudes. Neumark-Sztainer et al (1999a) and others (e.g.,Gordon, 2000) have proposed that elevated dietary restriction in higher SES participants but elevated binge/purging behaviour in lower SES participants might explain the patterns of heterogeneity seen in non-clincal populations. This was not supported by the findings of Study 2, which indicated that dietary restraint scores were similar in both groups.

Two key conclusions emerge from the current studies as regards the role of participants' SES. First, the anecdotal presupposition that girls of higher SES express and enact greater levels of eating pathology was not supported. It has been argued that girls of higher SES are more attuned to cultural messages about the social desirability of thinness, exercise and stringent weight control, and are more likely to take these behaviours to extremes in pursuit of social status (O'Dea, 1994). Given that this rationale has been firmly refuted by the evidence regarding the eating attitudes of adult women (Gard & Freeman, 1996) it might be time to seek new explanations for the observed patterns in younger participants too. Second, more reliable yet feasible methods of assessing the socioeconomic status of young children are needed if research in this area is to move forward. FSM uptake has been criticised as an inadequate proxy because it describes the whole school, not just the participants, and receipt of FSM itself is not strongly associated with deprivation (Hobbs & Vignoles, 2007). The FAS II may represent an improvement, since it assesses

affluence at the level of the individual and their family, but the low levels of internal consistency and ceiling effects in UK populations are not unique to the current studies (Boudreau & Poulin, 2009; Currie, et al., 2008) and present notable concerns.

10.3 Key Contributions and Future Research

To summarise the overall impact of the research contained in this thesis, it is first and foremost a successful application of the developmental approach to phenomena which rarely receive adequate developmental scrutiny. Its strengths lie in contributing to a detailed and multifactorial picture of girls' cognitions about eating, weight and shape in middle childhood. The findings emphasise the wide variety of 'normative' experiences of body image and eating attitudes that arise in middle childhood, a variety that is compatible with a wide range of eventual endpoints. From this it is possible to extrapolate, not only to clinical conditions, but to the full spectrum of disordered eating and related behaviours and cognitions. As such, the findings of this thesis constitute important groundwork in developing an understanding of the origins of the various pathways of adaptation and maladaptation through different experiences of these phenomena.

The developmental approach adopted has highlighted proximal and distal risk factors that may be involved in the very early stages of the aetiological process. This has been achieved by utilising a younger group than most previous studies, by adopting age-appropriate measures and by employing longitudinal methods. Moreover, the use of theoretically-substantiated variables and appropriate statistical methods which effectively test the hypotheses in question – whilst also testing alternative, feasible hypotheses – means that the conclusions reached stand upon a firm conceptual and statistical basis.

Together the studies address a wider range of biopsychosocial variables than other studies have attempted. Study 2 uniquely established the sociocultural model as relevant to the preadolescent period. Furthermore, participants were recruited from the youngest age at which reliable instruments for measuring these constructs exist; as such the studies began as far 'downstream' as currently possible in the development of these phenomena. This notwithstanding, further research to consolidate, elaborate and build upon the findings herein is undoubtedly required.

One of the primary aims of this thesis was to examine closely whether middle childhood might be the earliest age at which multiple behavioural, cognitive and

attitudinal components of a child's relationship with eating weight and shape begin to develop. Whilst this was to a large extent supported insofar as developmental change in the variables was observed, the absence of overall age effects in the two primary outcome variables may suggest the need to look to even younger populations for their origins. Indeed, scores in some measures were already high by 7 years of age: disordered eating attitude scores, as well as levels of thin-ideal awareness and internalisation are particular examples of this.

When evaluating the meaningfulness and practicality of working with even younger age groups than those included in these studies, it is essential to consider whether new instruments are required or even feasible. Not only do the instruments used here lack validation in any younger age group, but in much younger children (e.g., 4 year olds) complex concepts such as dieting or binge-eating likely cease to be meaningfully understood in the way that adult and older children do so (Smolak, 2004b). One approach to compensate for, and indeed ascertain the extent of, this problem would be to proceed in a manner relying less on standardised quantitative measures and instead adopt a structured qualitative approach. A more inductive methodology might be one in which data were not constrained to pre-defined structures derived from older populations of potentially lesser relevance, but rather emergent from a process in which the child could both define their own understanding of issues around food and body, and also elaborate on the implications of these issues. This has been attempted before in relation to girls' body dissatisfaction from age 3, using novel play-based observational methodologies and in-depth interviews alongside more traditional assessment methods, but the studies are too few to be in any way conclusive (Hayes & Tantleff-Dunn, 2010; Tremblay, et al., 2011).

Whilst work with younger children is certainly merited, it should also be noted that the tendency to interpret an absence of age effects in older populations as an indication that younger groups should be assessed may fall into the trap of conflating age and development, as discussed previously in subsection 10.2. In the longitudinal study population, we were able to observe individual level change which may be more informative than cross sectional age-effects, and as such provides another fruitful avenue for future research. Furthermore, the absence of within-time age effects may underscore the importance of examining multiple trajectories.

A number of methodological improvements could be made to the current studies and would serve to underpin some of the research suggested above. The

longitudinal study in this thesis consisted of measures taken at only two time points. The acquisition of data at further time points – be it annually or more frequently – would enable developmental trajectories to be more accurately mapped. Indeed, some authors (Singer & Willett, 2003; Stice, Marti, & Durant, 2011) regard three time points as a minimum for any longitudinal analysis and specific analytical approaches have been developed to take account of repeated measurement and allow for non-linear developmental patterns. In addition to increasing the number of time points, the inclusion of a measure of pubertal status, e.g. Tanner stage, would have allowed for consideration of physical and endocrine development and how this may interact with both body image and eating attitudes. Smolak et al (Smolak, et al., 1996) and others (Wertheim, et al., 2009) have proposed that the experience of puberty within the psychological context developed during preadolescence provides a critical interaction in the development of eating and body image pathology.

Looking further at measurement and methodological issues, it is also apparent that the BMS requires further validation and development. While it performed well for the purposes of these studies, the validation data presented here is based on a small sample of only 50 children. A larger sample should be used not only to more firmly establish test-retest reliability but also to compare the BMS and other scales to one-another on tendencies towards regression to the mean, to investigate various test-completion factors that may influence perceptual accuracy, and to establish construct validity. Furthermore, it is important to establish whether the apparent improvement in realism that the colourful, three dimensional, large images sought to attain, is reflected in participants' subjective experiences of using the scale. Focus group with girls would enable discussion of this and other related issues. A revised version of the scale might also include an even greater number of figures to provide finer grained data, and might involve the refinement and simplification of the verbal instructions provided within the test program.

Finally, these and other studies (Anton, et al., 2006; Lynch & Eppers-Reynolds, 2005; Sancho, Asorey, Arija, & Canals, 2005) provide a considerable weight of argument that the ChEAT requires revision, in terms of the elimination of items, the refinement of existing items and possible even the introduction of new items. These revisions are necessary, first and foremost, in order to arrive at a stable factor structure for the scale. Other advantages of revision would include rewording ambiguous items and considering the removal of items with low internal consistency.

10.4 Prevention Strategies and Concluding Comments

The current studies, alongside previous research, may pave the way to the introduction of programs aimed at preventing body dissatisfaction and disordered eating attitudes in young girls. The current findings evidence the necessity of such programs, since high levels of these phenomena were found in even the youngest participants. Few effective interventions exist aimed at the prevention of disordered body image and eating attitudes in adolescents (Pratt & Woolfenden, 2004), and there are none at all for preadolescents. The findings of this thesis suggest that interventions with preadolescents might profitably target many of the same risk factors addressed by interventions for older girls. Notably, Stice et al (2010) have developed an 'activism based' intervention program based upon the sociocultural model which focuses upon reduction of thin-ideal internalisation in order to concomitantly reduce body dissatisfaction, dieting, negative affect and eating pathology. The finding that the sociocultural model usefully summarises variables which contribute to body dissatisfaction and disordered eating attitudes in young girls indicates that future research might be directed at developing and piloting age-appropriate versions of this intervention program for use in this population.

To conclude, then, the findings in this thesis suggest that important elements of the diathesis for problems with body image and eating really are set up – or begin to be set up – during childhood. The stress that triggers the onset of more acute problems may come, if it comes at all, at one or more developmental 'crunch' points further downstream including, for instance, the onset of puberty or leaving home for the first time (Gordon, 2000). Plausible mechanisms and pathways via which the diathesis and the stressor together result in disordered eating or negative body image are suggested by the sequence of variables involved in the sociocultural model. Thus perhaps the most important contribution of the developmental conceptualisation of the process that stems from this research has been to emphasise the need for early intervention and to suggest a range of relationships and risk factors that ought to be targeted in childhood. Such endeavours have the potential to reduce the development of active eating disorders in adolescence and adulthood, but may also improve children's experiences of, and satisfaction with, their weight, shape and eating over preadolescence itself.

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Appendices

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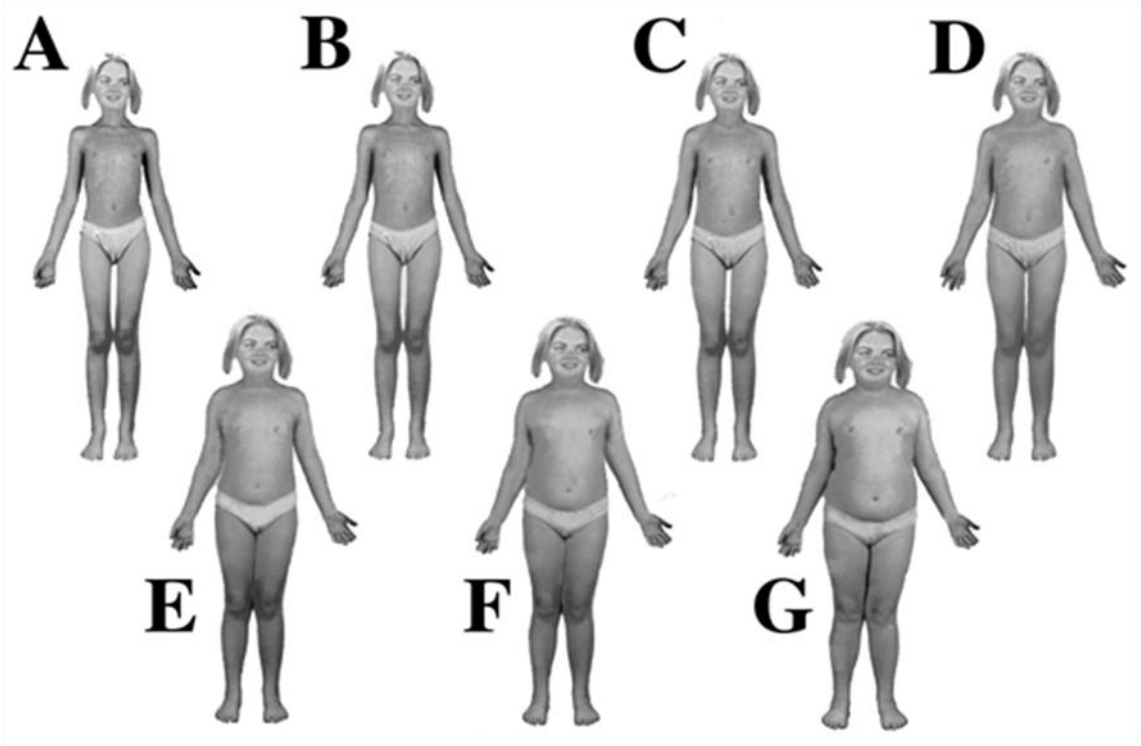
Appendix A Children's Body Image Scale (CBIS)

The Children's Body Image Scale: Girls' Version



Which picture looks closest to the way your body looks?

Write the letter here ☐

Which picture looks closest to the way you would most like your body to look?

Write the letter here ☐

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Appendix B Children's Eating Attitude Test (ChEAT)

Children's Eating Attitude Test

Please place a tick or a cross to indicate how often you experience what is described in the sentence.

	Always	Very Often	Sometimes	Rarely	Never
1. I am scared about being overweight	❍	❍	❍	❍	❍
2. I stay away from eating when I am hungry	❍	❍	❍	❍	❍
3. I think about food a lot of the time	❍	❍	❍	❍	❍
4. I have gone on eating binges where I feel that I might not be able to stop.	❍	❍	❍	❍	❍
5. I cut my food into small pieces	❍	❍	❍	❍	❍
6. I am aware of the energy (calorie) content in foods I eat	❍	❍	❍	❍	❍
7. I try to stay away from foods such as breads, potatoes, and rice	❍	❍	❍	❍	❍
8. I feel that others would like me to eat more	❍	❍	❍	❍	❍
9. I vomit after I have eaten	❍	❍	❍	❍	❍
10. I feel very guilty after eating	❍	❍	❍	❍	❍
11. I think a lot about wanting to be thinner	❍	❍	❍	❍	❍
12. I think about burning up energy (calories) when I exercise	❍	❍	❍	❍	❍
13. Other people think I am too thin	❍	❍	❍	❍	❍
14. I think a lot about having fat on my body	❍	❍	❍	❍	❍
15. I take longer than others to eat my meals	❍	❍	❍	❍	❍
16. I stay away from foods with sugar in them	❍	❍	❍	❍	❍
17. I eat diet foods	❍	❍	❍	❍	❍
18. I think that food controls my life	❍	❍	❍	❍	❍
19. I can show self-control around food	❍	❍	❍	❍	❍
20. I feel that others pressure me to eat	❍	❍	❍	❍	❍
21. I give too much time and thought to food	❍	❍	❍	❍	❍
22. I feel uncomfortable after eating sweets	❍	❍	❍	❍	❍

	Always	Very Often	Often	Sometimes	Rarely	Never often
23. I have been dieting	❍	❍	❍	❍	❍	❍
24. I like my stomach to be empty	❍	❍	❍	❍	❍	❍
25. I enjoy trying new rich foods	❍	❍	❍	❍	❍	❍
26. I have the urge to vomit after eating	❍	❍	❍	❍	❍	❍

THE END

Appendix C Child and Adolescent Perfectionism Scale (CAPS)

Child and Adolescent Perfectionism Scale

When you are ready, read each sentence and pick your answer by placing a 'X' in the circle.

	False	Very False	Slightly Neither	True	Slightly True	Very
1. I try to be perfect in everything I do.	❍	❍	❍	❍	❍	❍
2. I want to be the best at everything I do.	❍	❍	❍	❍	❍	❍
3. My parents don't always expect me to be perfect in everything I do.	❍	❍	❍	❍	❍	❍
4. I feel that I have to do my best all the time.	❍	❍	❍	❍	❍	❍
5. There are people in my life that expect me to be perfect.	❍	❍	❍	❍	❍	❍
6. I always try for the top score in a test.	❍	❍	❍	❍	❍	❍
7. It really bothers me if I don't do my best all the time.	❍	❍	❍	❍	❍	❍
8. My family expects me to be perfect.	❍	❍	❍	❍	❍	❍
9. I don't always try to be the best.	❍	❍	❍	❍	❍	❍
10. People expect more from me than I am able to give.	❍	❍	❍	❍	❍	❍
11. I get mad at myself when I make a mistake.	❍	❍	❍	❍	❍	❍
12. Other people think I have failed if I do not do my very best all the time.	❍	❍	❍	❍	❍	❍
13. Other people always expect me to be perfect.	❍	❍	❍	❍	❍	❍
14. I get upset if there is even one mistake in my work.	❍	❍	❍	❍	❍	❍
15. People around me expect me to be great at everything.	❍	❍	❍	❍	❍	❍
16.						
16. When I do something, it has to be perfect.	❍	❍	❍	❍	❍	❍
17. My teachers expect my work to be perfect.	❍	❍	❍	❍	❍	❍
18. I do not have to be the best at everything I do.	❍	❍	❍	❍	❍	❍
19. I am always expected to do better than others.	❍	❍	❍	❍	❍	❍
20. Even when I pass, I feel that I have failed if I didn't get one of the highest marks in the class.	❍	❍	❍	❍	❍	❍
21. I feel that people ask too much of me.	❍	❍	❍	❍	❍	❍
22. I can't stand to be less than perfect.	❍	❍	❍	❍	❍	❍

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Appendix D Multidimensional Anxiety Scale for Children (MASC)

Multidimensional Anxiety Scale for Children

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please tell us how often the statement is true for you. If a sentence is true about you a lot of the time, place an 'X' under 'often'. If it is true about you some of the time, place an 'X' under 'sometimes'. If it is true about you once in a while, place an 'X' under 'rarely'. If a sentence is not ever true about you, place an 'X' under 'never'.

Remember, there are no right or wrong answers, just answer how you have been feeling recently.

	Never true of me	Rarely true of me	Sometimes true of me	Often true of me
1. I feel tense or uptight	❍	❍	❍	❍
2. I usually ask permission	❍	❍	❍	❍
3. I worry about other people laughing at me	❍	❍	❍	❍
4. I get scared when my parents go away	❍	❍	❍	❍
5. I keep my eyes open for danger	❍	❍	❍	❍
6. I have trouble getting my breath	❍	❍	❍	❍
7. The idea of going away to camp scares me	❍	❍	❍	❍
8. I get shaky or jittery	❍	❍	❍	❍
9. I try to stay near my mom or dad	❍	❍	❍	❍
10. I'm afraid that other kids will make fun of me	❍	❍	❍	❍
11. I try hard to obey my parents and teachers	❍	❍	❍	❍
12. I get dizzy or faint feelings	❍	❍	❍	❍
13. I check things out first	❍	❍	❍	❍
14. I worry about getting called on in class	❍	❍	❍	❍
15. I'm jumpy	❍	❍	❍	❍
16. I'm afraid other people will think I'm stupid	❍	❍	❍	❍
17. I keep the light on at night	❍	❍	❍	❍
18. I have pains in my chest	❍	❍	❍	❍
19. I avoid going to places without my family	❍	❍	❍	❍

		true of me	true of me	true of me	true of me
20.	I feel strange, weird, or unreal	❍	❍	❍	❍
21.	I try to do things other people will like	❍	❍	❍	❍
22.	I worry about what other people think of me	❍	❍	❍	❍
23.	I avoid watching scary movies and TV shows	❍	❍	❍	❍
24.	My heart races or skips beats	❍	❍	❍	❍
25.	I stay away from things that upset me	❍	❍	❍	❍
26.	I sleep next to someone from my family	❍	❍	❍	❍
27.	I feel restless and on edge	❍	❍	❍	❍
28.	I try to do everything exactly right	❍	❍	❍	❍
29.	I worry about doing something stupid or embarrassing	❍	❍	❍	❍
30.	I get scared riding in the car or on the bus	❍	❍	❍	❍
31.	I feel sick to my stomach	❍	❍	❍	❍
32.	If I get upset or scared, I let someone know right away	❍	❍	❍	❍
33.	I get nervous if I have to perform in public	❍	❍	❍	❍
34.	Bad weather, the dark, heights, animals, or bugs scare me	❍	❍	❍	❍
35.	My hands shake	❍	❍	❍	❍
36.	I check to make sure things are safe	❍	❍	❍	❍
37.	I have trouble asking other kids to play with me	❍	❍	❍	❍
38.	My hands feel sweaty or cold	❍	❍	❍	❍
39.	I feel shy	❍	❍	❍	❍

THE END

Appendix E Parental consent letter: Study 1 Time 1

Dear parent, guardian or carer,
We would like to ask you if your child can take part in a research project run by Mrs Elizabeth Evans of Durham University, in which a number of schools in the North East are currently participating.

The research explores girls' attitudes to eating and choosing food. They will also be asked about their opinions and feelings about how they look. Children sit in small groups in a separate classroom and privately fill in questionnaires. Mrs Evans also measures children's weight and height privately. Children's questions are answered carefully and sensitively at each step of the study. Your child will never be made to participate in anything that they do not understand or do not wish to do.

If you are **willing** to allow your child to participate, we ask that you **sign the attached consent form** and **return it to the school** by *(give date here).*

If you are **not willing** to allow your child to participate, we ask that you **do nothing**, and do not return the consent form.

No information will be collected until signed consent forms are collected. Children receive an explanation of the study before participation and give their consent. If you or your child change your mind, you can pull out at any time.

After taking part, children are debriefed and receive written information to take home with them. The information collected is stored safely and anonymously (in accordance with the Data Protection Act). Your child's details will be kept totally privately and will not be published or released to anyone at all.

If you have any questions, please contact Mrs Evans on e.h.evans@durham.ac.uk or on 01913343251 (office) / 07725524143 (mobile). **Thank you.**

I agree to allow my child, _____ (child's name),

born _____ (child's date of birth) to participate.

I have received information about the study's aims and method: Y / N

I understand that Mrs Evans will answer / has answered any questions I have: Y / N

I know that my child or I may change my mind at any time about taking part: Y / N

I know that the information gathered is confidential & will be kept anonymously: Y / N

Signed: _____

Print name: _____ Date: _____

Appendix F Parental consent letter: Study 1 Time 2

Dear parent, guardian or carer,

You may remember that your daughter took part in a study about healthy eating with Mrs E. Evans of Durham University in spring 2008. At the time I explained that we hoped to work again with this group of girls in spring 2010. I would like to ask you if your daughter can take part in this final stage of the study.

Your daughter's role in the initial stage was very much appreciated: a lot of very useful information was obtained from 200 children that will help us understand more about children's attitudes to eating. However, we are especially interested in how your daughter's views and attitudes have changed in the last two years. This is why your continued participation in the study is so valuable.

In 2008, girls completed questionnaires about their views and attitudes. Girls were also weighed and measured. Exactly the same methods and questionnaires will be used in this final stage: girls will do exactly the same thing as they did in 2008. The only difference is that I will also ask girls to use a computer programme about body image for about 5 minutes.

As in 2008, girls will work in small groups in a separate classroom. Children's questions are answered at each step of the study. Your child will never be made to participate in anything that they do not wish to. All data remain anonymous and confidential.

If you are **willing** to allow your child to participate, please **sign the attached consent form** and **return it to the school** by *(give date here)*
If you are **not willing** to allow your child to participate, please still **sign the attached consent form** and **return it to the school** by *(give date here)*

Mrs Evans holds advanced Criminal Records Bureau (CRB) clearance and has a BSc in Psychology and an MA in Developmental Psychology (Research Methods). She has four years' experience carrying out research of this kind with children in nineteen Durham schools, in order to explore the topical and important issue of how girls' attitudes to eating, weight and their appearance change over time.

Before and after taking part, children receive verbal and written information about the study to take home with them, and give their own consent. The information collected is stored safely and anonymously (in accordance with the Data Protection Act). Your child's details will be kept totally privately and will not be published or released to anyone at all. If you or your child change your mind, you can pull out at any time.

If you have any questions, please contact Mrs Evans on e.h.evans@durham.ac.uk or on 01913343251 (office) / 07725524143 (mobile). **Thank you.**

I DO / DO NOT agree to allow my child, _____ (child's name) born _____ (child's date of birth) to participate.

I have received information about the study's aims and method:	Y / N
I understand that Mrs Evans will answer / has answered any questions I have:	Y / N
I know that my child or I may change my mind at any point about taking part:	Y / N
I know that the information gathered is confidential & will be kept anonymously:	Y / N

Signed: _____

Print name: _____ Date: _____

Appendix G Child assent form Study 1

Thank you for deciding to take part in this study today.

The study looks at the views and attitudes of girls aged between seven and eleven, like you.

I am particularly interested in your views about eating, food and how you look. You will be asked to fill in some questionnaires, and to have your height and weight measured.

Your views are private and secret – your friends and teachers will not find out anything about them. I will keep them safe, and your name will not be on them. Your name will only be on this form.

If you have any questions at any time during the study, please ask them. You can ask questions in private, without your friends hearing your question, if you would like. You can ask questions after the study has finished too.

You are allowed to pull out of the study at any point – before it, during it or after it. Please just tell me, as it is absolutely fine and I will not mind at all.

Now I will ask you to give us a few details, and ask you to let me know that you understand what I am asking you to do.

Date _____ **REF NO.** _____

Name _____

Age _____ years

Birthday _____ (date) of _____ (month) ____ (year)

Mrs Evans has explained to me what I will be asked to do and why.

I have had the chance to ask questions and I have had them answered.

I understand that I can ask more questions at any time.

I understand that I can stop taking part in the study at any time I want to (before, during or after). I don't have to say why I am stopping.

I understand that my answers are private and that they will be kept very safely: my teachers, friends and parents won't see what I write.

Signed _____

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Appendix H Standard definitions

Standard definitions and paraphrasing used in the longitudinal and cross-sectional studies

Original item	Alternative phrasing	Notes
ChEAT		
4. I have gone on eating binges where I feel that I might not be able to stop.	I have eaten a lot all at once, very much more than a child like me would normally eat, and I felt like I couldn't stop eating.	Children may request an example of 'a lot' of food.
6. I am aware of the energy (calorie) content in foods I eat	I know how much energy is in the food I eat.	If necessary, clarify: Energy is the fuel that food provides to your body. It enables your body to work.
9. I vomit after I have eaten	I am sick after I have eaten.	Disambiguate: This doesn't include times when you have had a stomach bug or other illness that made you sick.
10. I feel very guilty after eating	I feel ashamed and like I have done something wrong after I have eaten something.	If necessary, elicit an example from the child of a time they felt guilty to check understanding.
12. I think about burning up energy (calories) when I exercise	I think about using up the energy / fuel that food provides to my body when I exercise.	See Q6
17. I eat diet foods	I eat foods that can help people become thinner, in order that I can become thinner.	Give examples of diet foods if necessary. Disambiguate: if it's not a food that you chose to eat because it can make you thinner, it doesn't count.
19. I can show self-control around food	I am good at not eating when I want to, or stopping eating when I want to, even if I am still feeling hungry or still want the food.	
25. I enjoy trying new rich foods	I enjoy trying foods that are filling, like cheese, chocolate, cake, biscuits, cream or similar.	If necessary, elicit another example of a rich food from the child to check understanding.
CAPS		
5. There are people in my life that expect me to be perfect.	Other people that I know, such as my mum and dad or my friends, expect me to be perfect.	
10. People expect more from me than I am able to give.	Other people think I will do better than I can; they think I can do things which are not possible for me.	
MASC		
1. I feel tense or uptight	I feel like I can't relax, wound up and stressed.	
6. I have trouble getting my breath	I feel out of breath and like I can't slow down my breathing.	Disambiguate: not in the context of exercising
8. I get shaky or jittery	My hands or knees, or other bits of my body, feel wobbly and unsteady	

13. I check things out first	I check things are safe before I do them.	
23. My heart races or skips beats	My heart goes really fast or doesn't beat with a steady rhythm	Disambiguate: not in the context of exercising
30. I feel sick to my stomach	I get butterflies in my tummy; my tummy feels uneasy and uncomfortable	Disambiguate: not in the context of illness.
SATAQ		
5. I tend to compare my body to people in magazines and on TV	I look at the bodies of people on TV and in magazines and worry about how similar or different my body is to theirs.	
6. In our society, fat people are regarded as unattractive	People around me – including those I know and those I don't – think that fat people are not good looking.	
8. Attractiveness is very important if you want to get ahead in our culture	Being good looking is very important if you want to do well and be successful.	
9. It's important for people to work hard on their Figures/ physiques if they want to succeed in today's culture	It's important for people to work hard to make their body look really good if they want to be a success.	
12. In today's society, it is important to always look attractive	At the moment, most people around me – including those I know and those I don't – would say that it's important to always look good.	
DEBQ-R		
2. If you feel depressed do you get a desire for food?	If you feel sad, does the feeling make you want to eat?	
3. If you feel lonely do you get a desire for food?	If you feel lonely / sad about being alone, does the feeling make you want to eat?	
4. Do you keep an eye on exactly what you eat?	Do you pay a lot of attention to what you eat to make sure you don't eat too much?	
5. Does walking past a candy store make you feel like eating?	Candy store = sweet shop	
6. Do you intentionally eat food that helps you lose weight?	Do you eat food on purpose in order to become thinner?	
11. Do you intentionally eat less to avoid gaining weight?	Do you eat food on purpose in order to stop yourself getting fatter?	
15. Do you have a desire to eat when you feel restless?	If you feel unable to relax and unsettled, does the feeling make you want to eat?	
18. Do you ever think that food will be fattening or slimming when you eat?	Do you ever think about whether a food might make you become fatter or thinner before you eat it?	
19. If you feel sorry do you feel like eating?	If you feel guilty and like you've done something wrong, does the feeling make you want	

		to eat?
20.	If somebody prepares food do you get an appetite?	If somebody is cooking or getting food ready, does the sight or smell make you feel hungry?

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Appendix I Information for participants and their parents, longitudinal (debrief)

Thank you very much for taking part in our study today.

I am very grateful that you and your parent / guardian said that you would take part. I hope I have answered your questions, but you might think of other questions later. You might also want to know more about the study.
This information sheet explains why I am doing the study, how I will use the answers that you gave us and what you can do to get answers to any extra questions you have. **Please take it home for your parent / guardian to see.**

Who are you? What qualifications and clearance do you hold?

I am a doctoral researcher at Durham University Psychology Department. I hold advanced Criminal Records Bureau (CRB) clearance. I have a BSc in Psychology and an MA in Developmental Psychology (Research Methods). I also have four years' experience carrying out research of this kind with children in fifteen Durham schools. I am carrying out this research in order to explore the topical and important issues of girls' attitudes to eating, weight and their appearance, in the context of other personality factors.

What is the study about? What are the questionnaires for?

The study looked at the attitudes towards eating and appearance that girls of your age hold, and also asked you about other parts of your behaviour and personality. You probably recognised the questionnaires that you completed – this is because you completed them in 2008 too. I am interested to see how your answers might have changed over time. We gave you a sheet of pictures AND used a computer programme to show you a picture that you could make bigger or smaller. In both cases, we asked you to show us how you think you look, and how you would most like to look. We also weighed and measured you, in the presence of another adult but without anyone but the researcher seeing your measurements.

What will you do with my answers? Are they private? Will my friends know?

Your answers are COMPLETELY PRIVATE and your friends and teachers will not know anything about the answers you gave. Your name was not put on any of your answer sheets, and all your answer sheets will be kept somewhere completely secure. Anyone reading a questionnaire would not be able to tell who wrote the answers. We will add up the answers you gave, and then add up the total with the answers other people gave. Our final calculations (sums) will be done using EVERYONE'S answers all together, so it will be impossible to tell the answers you gave. If you are at all worried about this, please get in touch with us and we can explain it further to you.

What if I have more questions? What if I change my mind?
We will be very happy to answer any questions or worries that you have, at any time at all. This is how you can get in touch with us to ask questions, or let us know that you have changed your mind. It is absolutely okay if you change your mind, even after you have filled in the questionnaires (your data for both years would be completely removed from the study and your personal details would be securely deleted):

Mrs Elizabeth Evans, MA (Durham University)
e.h.evans@durham.ac.uk / 07725524143 (mobile) / 0191 3343251 (office)
Dr Robert Drewett, PhD (supervisor of project)
r.f.drewett@durham.ac.uk 01913343242 (office)

Alternatively, you can pass your name and/or query to the head teacher, who will make sure it reaches us. **Thank you once again for your help.**

Appendix J Family Affluence Scale (FAS II)

Family Affluence Scale

Boyce and Dallago, 2004

Please answer the following questions about you and your family.

Please place a tick or a cross against the answer that applies to you.

1. Does your family own a car, van or truck?
- ☐ No
- ☐ Yes, one
- ☐ Yes, two or more

2. Do you have your own bedroom for yourself?
- ☐ Yes
- ☐ No

3. During the past 12 months, how many times did you travel away on holiday with your family?
- ☐ Not at all
- ☐ Once
- ☐ Twice
- ☐ More than twice

4. How many computers does your family own?
- ☐ None
- ☐ One
- ☐ Two
- ☐ More than two

Appendix K Body Manipulation Scale (BMS) stimuli

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

Appendix L Internal consistency values (α) for the ChEAT for children of different ages: longitudinal and cross-sectional data

	7-year-olds	8-year-olds	9-year-olds	10-year-olds	11-year-olds
Longitudinal					
Time 1	.84	.83	.84	.61	-
Time 2	-	-	.76	.84	.83
Cross-sectional	.83	.84	.89	.82	.93

Note. Age-group denotes number of completed years of age, to nearest whole year. All internal consistency data = Cronbach's α.

Appendix M Parental consent letter: Study 2

Dear parent, guardian or carer,

We would like to ask you if your child can take part in a research project run by Mrs Elizabeth Evans of Durham University Psychology Department, in which a number of schools in the North East are currently participating.

The research explores girls' attitudes to eating and choosing food. They will also be asked about their opinions and feelings about how they look. Children sit in small groups in a separate classroom and anonymously fill in questionnaires. Mrs Evans also measures children's weight and height anonymously. Finally, children will also use a computer programme for about 5 minutes. Children's questions are answered at each step of the study.

Mrs Evans holds advanced Criminal Records Bureau (CRB) clearance and has a BSc in Psychology and an MA in Developmental Psychology (Research Methods). She has four years' experience carrying out research of this kind with children in fifteen Durham schools. She is carrying out this research in order to explore the topical and important issues of girls' attitudes to eating, weight and their appearance, in the context of other personality factors.

If you are **willing** to allow your child to participate, we ask that you **sign the attached consent form** and **return it to the school** by *(give date here*).

If you are **not willing** to allow your child to participate, we ask that you **do nothing**, and do not return the consent form.

No information will be collected until signed consent forms are collected. Children receive an explanation of the study before participation and give their consent. If you or your child change your mind, you can pull out at any time.

After taking part, children are debriefed and receive written information to take home with them. The information collected is stored safely and anonymously (in accordance with the Data Protection Act). Your child's details will be kept totally privately and will not be published or released to anyone at all.

If you have any questions, please contact Mrs Evans on e.h.evans@durham.ac.uk or on 01913343251 (office) / 07725524143 (mobile). **Thank you.**

I agree to allow my child, _____ (child's name),

born _____ (child's date of birth) to participate.

I have received information about the study's aims and method: Y / N

I understand that Mrs Evans will answer / has answered any questions I have: Y / N

At any time I know that my child or I may change my mind about taking part: Y / N

I know that the information gathered is confidential & will be kept anonymously: Y / N

Signed: _____

Print name: _____ Date: _____

Appendix N: Body Esteem Scale – Revised (BES-R)

Body Esteem Scale - Revised

Please tick YES or NO to indicate whether or not you agree with the sentence.
Tell us how you feel about the way you look for most of the time. There are no right or wrong answers

		YES	NO
1.	I'm pretty happy about the way I look	❍	❍
2.	I often wish I looked like someone else	❍	❍
3.	I like what I see when I look in the mirror	❍	❍
4.	I'm looking as nice as I'd like to	❍	❍
5.	I worry about the way I look	❍	❍
6.	I wish I looked better	❍	❍
7.	I like what I look like in pictures	❍	❍
8.	My looks upset me	❍	❍
9.	I often feel ashamed of how I look	❍	❍
10.	I think I have a good body	❍	❍
11.	I'm as nice looking as most people	❍	❍
12.	There are lots of things I'd change about my looks if I could	❍	❍
13.	I'm proud of my body	❍	❍
14.	I really like what I weigh *	❍	❍
15.	I wish I were thinner *	❍	❍
16.	My weight makes me happy *	❍	❍
17.	Other people make fun of the way I look	❍	❍
18.	Kids my own age like my looks	❍	❍
19.	Most people have a nicer body than I do	❍	❍
20.	My parents like my looks	❍	❍

THE END

Appendix O Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-R)

Sociocultural Attitudes Towards Appearance Questionnaire

Please place a tick or cross in the circle to show how much you agree or disagree with each sentence. Here is an example – try it. Answer to show how you feel and think most of the time.

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
Example: Watching TV is a waste of time	❍	❍	❍	❍	❍

Now please start.

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1. Women who appear in TV shows and movies have the type of appearance that I see as my goal	❍	❍	❍	❍	❍
2. I believe that clothes look better on thin models	❍	❍	❍	❍	❍
3. Music videos that show thin women make me wish that I were thin	❍	❍	❍	❍	❍
4. I would like to look like the models in the magazines	❍	❍	❍	❍	❍
5. I tend to compare my body to people in magazines and on TV	❍	❍	❍	❍	❍
6. In our society, fat people are regarded as unattractive	❍	❍	❍	❍	❍
7. Photographs of thin women make me wish I were thin	❍	❍	❍	❍	❍
8. Attractiveness is very important if you want to get ahead in our culture	❍	❍	❍	❍	❍
9. It's important for people to work hard on their Figures/ physiques if they want to succeed in today's culture	❍	❍	❍	❍	❍
10. Most people believe that the thinner you are, the better you look	❍	❍	❍	❍	❍
11. People think that the thinner you are, the better you look in clothes	❍	❍	❍	❍	❍
12. In today's society, it is important to always look attractive	❍	❍	❍	❍	❍

13. I wish I looked like a swimsuit model	❍	❍	❍	❍	❍
14. I often read magazines like Cosmopolitan, Vogue, and Glamour and compare my appearance to the models	❍	❍	❍	❍	❍

THE END

Appendix P Dutch Eating Behaviour Questionnaire for Children (DEBQ-C)

Dutch Eating Behaviour Questionnaire for Children

Instructions
Below you'll find 20 questions about eating.
Please read each question carefully and tick the answer that suits you best.
Only one answer is allowed. Don't skip any answer.
There are no incorrect answers; it's **your opinion** that counts.

1.	Do you feel like eating whenever you see or smell good food?	No	Sometimes	Yes
2.	If you feel depressed do you get a desire for food?	No	Sometimes	Yes
3.	If you feel lonely do you get a desire for food?	No	Sometimes	Yes
4.	Do you keep an eye on exactly what you eat?	No	Sometimes	Yes
5.	Does walking past a candy store make you feel like eating?	No	Sometimes	Yes
6.	Do you intentionally eat food that helps you lose weight?	No	Sometimes	Yes
7.	Does watching others eat make you feel like eating too?	No	Sometimes	Yes
8.	If you have eaten too much do you eat less than usual the next day?	No	Sometimes	Yes
9.	Does worrying make you feel like eating?	No	Sometimes	Yes
10.	Do you find it difficult to stay away from delicious food?	No	Sometimes	Yes
11.	Do you intentionally eat less to avoid gaining weight?	No	Sometimes	Yes
12.	If things go wrong do you get a desire for food?	No	Sometimes	Yes
13.	Do you feel like eating when you walk past a snack bar or fish and chips stand?	No	Sometimes	Yes
14.	Have you ever tried not to eat in between meals to lose weight?	No	Sometimes	Yes
15.	Do you have a desire to eat when you feel restless?	No	Sometimes	Yes
16.	Have you ever tried to avoid eating after your evening meal to lose weight?	No	Sometimes	Yes
17.	Do you have a desire for food when you are afraid?	No	Sometimes	Yes
18.	Do you ever think that food will be fattening or slimming when you eat?	No	Sometimes	Yes
19.	If you feel sorry do you feel like eating?	No	Sometimes	Yes
20.	If somebody prepares food do you get an appetite?	No	Sometimes	Yes

THE END

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Appendix Q Children's Depression Inventory – Short Form (CDI-S)

Child Depression Inventory

Kids sometimes have different feelings and ideas. This form lists the feelings and ideas in groups. From each group of three sentences, pick one sentence that describes you *best* for the past two weeks. After you pick a sentence from the first group, go on to the next group.

There is no right answer or wrong answer. Just pick the sentence that best describes the way you have been recently.

Put a mark like this **X** next to your answer. Put the mark in the circle next to the sentence that you pick.

Here is an example of how this form works. Try it. Put a mark next to the sentence that describes you best.

Example: I read books all the time ❍
I read books once in a while ❍
I never read books ❍

Remember, pick out the sentences that describe you best in the **past two weeks**.

CDI-S

1. I am sad once in a while ❍
   I am sad many times. ❍
   I am sad all the time ❍

2. Nothing will ever work out for me ❍
   I am not sure if things will work out for me. ❍
   Things will work out for me O.K. ❍

3. I do most things O.K. ❍
   I do many things wrong ❍
   I do everything wrong. ❍

4. I hate myself ❍
   I do not like myself ❍
   I like myself ❍

5. I feel like crying every day ❍
   I feel like crying many days ❍
   I feel like crying once in a while ❍

6. Things bother me all the time ❍
   Things bother me many times ❍
   Things bother me once in a while ❍

7. I look okay ❍

There are some bad things about my looks ❍
I look ugly ❍

8. I do not feel alone ❍
I feel alone many times ❍
I feel alone all the time ❍

9. I have plenty of friends ❍
I have some friends but I wish I had more ❍
I do not have any friends ❍

10. Nobody really loves me ❍
I am not sure if anybody loves me ❍
I am sure that somebody loves me ❍

THE END

Appendix R Child assent form Study 2

Thank you for deciding to take part in this study today.

The study looks at the views and attitudes of girls aged between seven and eleven, like you.

We are particularly interested in your views about eating, food and how you look. You will be asked to fill in some questionnaires, and to have your height and weight measured. You will also complete some questions using the computer.

Your views are private and secret – your friends and teachers will not find out anything about them. We will keep them safe, and your name will not be on them. Your name will only be on this form.

If you have any questions at any time during the study, please ask them. You can ask questions in private, without your friends hearing your question, if you would like. You can ask questions after the study has finished too.

You are allowed to pull out of the study at any point – before it, during it or after it. Please just tell me, as it is absolutely fine and I will not mind at all.

Now we will ask you to give us a few details, and ask you to let us know that you understand what we are asking you to do.

Date _____ **REF NO.** _____

Name _____

Age _____ years

Birthday _____ (date) of _____ (month) ____ (year)

Mrs Evans has explained to me what I will be asked to do and why.

I have had the chance to ask questions and I have had them answered.
I understand that I can ask more questions at any time.

I understand that I can stop taking part in the study at any time I want to (before, during or after). I don't have to say why I am stopping.

I understand that my answers are private and that they will be kept very safely: my teachers, friends and parents won't see what I write.

Signed _____

Appendix S Information for participants and their parents, cross-sectional (debrief)

Thank you very much for taking part in our study today.

I am very grateful that you and your parent / guardian said that you would take part. I hope I have answered your questions, but you might think of other questions later. You might also want to know more about the study.
This information sheet explains why I am doing the study, how I will use the answers that you gave us and what you can do to get answers to any extra questions you have. **Please take it home for your parent / guardian to see.**

Who are you? What qualifications and clearance do you hold?

I am a doctoral researcher at Durham University Psychology Department. I hold advanced Criminal Records Bureau (CRB) clearance. I have a BSc in Psychology and an MA in Developmental Psychology (Research Methods). I have an enhanced Criminal Records Bureau check and permission to carry out this study from my departmental Ethics Committee. I also have four years' experience carrying out research of this kind with children in fifteen Durham schools. I am carrying out this research in order to explore the topical and important issues of girls' attitudes to eating, weight and their appearance, in the context of other personality factors.

What is the study about? What are the questionnaires for?

The study looked at the attitudes towards eating and appearance that girls of your age hold, and also asked you about other parts of your behaviour and personality. We gave you a sheet of pictures AND used a computer programme to show you a picture that you could make bigger or smaller. In both cases, we asked you to show us how you think you look, and how you would most like to look. We also weighed and measured you, in the presence of another adult but without anyone but the researcher seeing your measurements. You also did some questionnaires about your views and feelings. Which looked at your feelings of happiness and your lifestyle.

What will you do with my answers? Are they private? Will my friends know?

Your answers are COMPLETELY PRIVATE and your friends and teachers will not know anything about the answers you gave. Your name was not put on any of your answer sheets, and all your answer sheets will be kept somewhere completely secure. Anyone reading a questionnaire would not be able to tell who wrote the answers. We will add up the answers you gave, and then add up the total with the answers other people gave. Our final calculations (sums) will be done using EVERYONE'S answers all together, so it will be impossible to tell the answers you gave. If you are at all worried about this, please get in touch with us and we can explain it further to you.

What if I have more questions? What if I change my mind?

We will be very happy to answer any questions or worries that you have, at any time at all. This is how you can get in touch with us to ask questions, or let us know that you have changed your mind. It is absolutely okay if you change your mind, even after you have filled in the questionnaires (your data would be completely removed from the study and your personal details would be securely deleted):
Mrs Elizabeth Evans, MA (Durham University)
e.h.evans@durham.ac.uk / 07725524143 (mobile) / 0191 3343251 (office)
Dr Robert Drewett, PhD (supervisor of project)
r.f.drewett@durham.ac.uk 01913343242 (office)

Alternatively, you can pass your name and/or query to the head teacher, who will make sure it reaches us. **Thank you once again for your help.**

Appendix T Frequency (and proportion) of participants endorsing each item on the ChEAT for all studies

Item	Longitudinal T1 (%) *N* = 194	Longitudinal T2 (%) *N* = 138	Cross-sectional (%) *N* = 125
I am scared about being overweight	82 (42)	72 (53)	53 (42)
I stay away from eating when I am hungry	40 (20)	28 (20)	24 (19)
I think about food a lot of the time	68 (35)	25 (12)	35 (28)
I have gone on eating binges where I feel that I might not be able to stop	35 (18)	17 (13)	17 (13)
I cut my food into small pieces	106 (54)	60 (43)	59 (47)
I am aware of the energy (calorie) content in foods I eat	77 (39)	59 (43)	59 (47)
I try to stay away from foods such as breads, potatoes, and rice	31 (16)	20 (15)	29 (23)
I feel that others would like me to eat more	57 (29)	36 (25)	39 (31)
I vomit after I have eaten	16 (8)	6 (4)	14 (12)
I feel very guilty after eating	29 (15)	17 (12)	23 (18)
I think a lot about wanting to be thinner	86 (44)	52 (37)	59 (47)
I think about burning up energy (calories) when I exercise	71 (36)	53 (38)	48 (38)
Other people think I am too thin	55 (28)	36 (26)	28 (22)
I think a lot about having fat on my body	59 (30)	53 (38)	58 (46)
I take longer than others to eat my meals	96 (49)	62 (45)	60 (48)
I stay away from foods with sugar in them	43 (22)	19 (13)	31 (25)
I eat diet foods	68 (35)	35 (25)	31 (25)
I think that food controls my life	46 (23)	27 (20)	33 (26)
I can show self-control around food	86 (44)	56 (41)	63 (50)
I feel that others pressure me to eat	49 (25)	32 (23)	33 (26)
I give too much time and thought to food	36 (18)	20 (14)	31 (25)
I feel uncomfortable after eating sweets	59 (30)	25 (18)	40 (32)
I have been dieting	47 (24)	17 (12)	30 (24)
I like my stomach to be empty	36 (18)	18 (13)	27 (21)
I enjoy trying new rich foods	97 (49)	84 (60)	74 (59)
I have the urge to vomit after eating	30 (15)	10 (9)	21 (16)

Appendix U Frequency (and proportion) of accurate / inaccurate figure endorsement on body image scales

Perceived figure	Selected by (*n*)	Accurately (%)		Inaccurately (%)	
Children's Body Image Scale					
1	14	1	(7)	13	(93)
2	29	6	(21)	23	(79)
3	97	28	(28)	69	(72)
4	**49**	**6**	**(12)**	**43**	**(88)**
5	35	5	(14)	30	(86)
6	22	8	(36)	14	(64)
7	18	4	(29)	14	(71)
Body Manipulation Software					
1	1	0	(0)	1	(100)
2	14	1	(7)	13	(93)
3	26	6	(24)	20	(76)
4	49	12	(24)	37	(76)
5	40	8	(25)	32	(75)
6	**50**	**8**	**(16)**	**42**	**(84)**
7	**35**	**6**	**(17)**	**29**	**(83)**
8	21	4	(19)	17	(81)
9	10	1	(10)	9	(90)
10	4	0	(0)	4	(100)
11	1	1	(100)	0	(0)
12	4	2	(50)	2	(50)

Note. Body typeface denotes central Figure (s) of array; $N = 286$.