

Body Image Disturbance and Psychopathology in Children: Research Evidence and Implications for Prevention and Treatment

Line Tremblay* and Marjolaine Limbos

Laurentian University, Department of Psychology, Ramsey Lake Road, Sudbury, ON, Canada P3E 2C6

Abstract: Body image disturbance has been listed as a diagnostic feature of several psychopathological conditions [1-5]. As body image concerns appear in children as young as 5 years old, it was hypothesized to be an important risk factor for the development of psychopathology, such as Eating Disorders (ED) in adolescence. Results of the current review of the literature support this hypothesis and suggest that young children can (1) estimate as accurately as adults their body size, and (2) show similar cognitive distortions, cognitive biases, and the negative emotions associated with their body image. There is some evidence that children can (1) display severe symptoms of body image distortion such as is present in body dysmorphic disorder (BDD), (2) demonstrate negative stereotypes toward obesity and (3) internalize thin ideal body image. Research suggests that some of the key factors involved in children's body satisfaction is parental perception and direct comments from peers. Body dissatisfaction can predict body image related psychopathology later in development. In conclusion, intervention and prevention of eating disorders with children under the age of 7 is arguably a viable strategy, and cognitive and behavioural training could involve parents, teachers, mental health practitioners as well as the child him/herself. This training and education should cover early manifestation of body image disturbance and their associated risk factors.

Keywords: Literature review, body image, children, research, treatment.

INTRODUCTION

Body image disturbance, misperception, or inaccurate estimation of actual body size and degree of satisfaction with this perception has been listed as a diagnostic feature of several psychopathological conditions including anorexia nervosa and bulimia [1-5]. Body image misperception (also referred to as body image distortion) [6] and dissatisfaction with body image [7] are found in people affected by obesity as well as in non-clinical populations [8, 9, 10, 11,12]. A severe form of body disturbance and excessive concern with a perceived physical anomaly is known as body dysmorphic disorder (BDD).

The etiology of body image disturbance is not yet known [13]. Several research findings support the hypothesis that body image dissatisfaction occurs much in advance of the onset of puberty and can be observed in children as young as 5 to 7 years old [14-24]. Research findings suggest that body image distortion is not caused by sensory deficits but rather associated with non sensory related factors including motivation, attitude, and cognitive biases [7, 9, 17, 25]. Finally, other research suggests that premorbid obesity is a risk factor [11, 26, 27]. The possibility that body image disturbance and overconcern with physical appearance may be risk factors for the development of psychopathology in adolescence will be examined in the present paper. More specifically, the objectives of this paper are as follows: (1) to review research methods used to study body image disturbance and factors predicting its onset; (2) to isolate the cognitive predictors;

(3) to review research evidence that body image disturbance appears as early as 4 years old; (4) to identify the pathways to the development of psychopathology and the mechanisms; and (5) to discuss how research findings and methods can be used in the prevention and treatment of body image disturbance and disordered eating development in adolescence.

DEFINITIONS AND RESEARCH METHODS

Body image disturbance is the misperception (or inaccurate estimation) of actual body image. Body image is defined by Waller & Barnes [10] as the internal visual image of body shape and size. Body image is a multi-dimensional concept that includes "perceptions of appearance, feelings and thoughts about the body, how it feels to be inside the body, and the body functions and capabilities" [28, p.117]. According to Gardner [29], the mental representation of one's body and its characteristics is the perceptual component of our body image. A second component is known as the attitudinal component and it refers to one's feelings about this image and one's physical appearance, and is referred as body satisfaction by researchers.

Empirically, the perceptual aspect of body image is measured by asking a participant to adjust a real image of his body (also referred as body image estimation). Body image estimation is the measure of the discrepancy between a person actual body size and the size she perceives. If the discrepancy is near 0, it means that the person accurately perceives her body size. A significant difference (see Gardner [29] for a detailed description of the method) between the person's current and perceived body is referred as body image distortion or misperception. A distortion could be positive (overestimate) if one's perceived body size is larger than its actual size or negative (underestimate) if the perceived

*Address correspondence to this author at the Laurentian University, Department of Psychology, Ramsey Lake Road, Sudbury, ON, Canada P3E 2C6; E-mail: ltremblay@laurentian.ca

size is smaller than the current actual body size. The attitudinal component of body image is a separate construct measured by asking the participant to adjust his current actual body size to an idealized (or preferred) body image. Again the difference between the current body size estimation and idealized body image is calculated and a difference equal to 0 indicates satisfaction while a significant difference suggests dissatisfaction with current size.

Body image distortion or misperception does not necessarily lead to body image dissatisfaction. A person may perceive herself as being more fitted than he/she is in actuality or may not be affected by their appearance. Conversely, body image dissatisfaction can be found in people who accurately perceive their body but would prefer to look differently. A perfectly fit person may perceive their body as defective and experience dissatisfaction. Then, body image dissatisfaction, with or without distortion, can lead to distress, unhealthy compensatory behaviors, or psychosocial adjustment problems.

Both perceptual (distortion) and attitudinal (emotion) components of body image disturbance are recognized as diagnostic features of anorexia nervosa. The attitudinal aspects of body image disturbance in anorexia nervosa are described as an "intense fear of gaining weight or becoming fat, even though underweight" (diagnostic criteria B) [30] whereas a "disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight" defines the perceptual component (criteria C) [30]. However, contrary to BDD or Bulimia Nervosa, the attitudinal aspect of body image in anorexic patients tends to decrease significantly as the individual reaches the strongest stage of their disorder, or in other words, body dissatisfaction fades as the individual loses weight and attains their thin idealized body image [2]. Thus, in eating disorders there is a changing and dynamic nature of body image disturbance that is associated with true body size that must be considered.

Although there is evidence of body image distortions in bulimia nervosa [31], diagnostic criteria include only the emotional component: "self-evaluation is unduly influenced by body shape and weight" (criteria D) [30]. Contrary to the patient with anorexia nervosa, the bulimic patient is of normal weight or may be slightly overweight and the natural effect of binge eating on weight gain is cancelled by inappropriate compensatory behavior such as self-induced vomiting [30]. The mechanism hypothesized in bulimia nervosa onset and bulimic pathology maintenance is that body dissatisfaction and distortion will lead to excessive dieting which in turn increases the risk of binge eating as a counteraction for the caloric deprivation effect [3].

A diagnosis of Body Dysmorphic Disorder is made when body image disturbance is an intense preoccupation or an excessive concern with an imagined defect in appearance or an exaggeration of a slight anomaly. In this case, the distortion does not only concern the size of a body part but also its shape. Moreover, the 'perceived' defect is the main cause of impairment in important areas of functioning such as social or occupational. It is believed that this disorder is under-recognized and might be present in settings such as cosmetic surgery clinics [8]. The increase of such surgeries in the gen-

eral population may indicate an increase of this disease or may provide a better estimation of its incidence rates, as it is often not diagnosed because patients rarely openly discuss their symptoms with professionals [8, 30].

The link between body image disturbance and actual body size has not been demonstrated. Body image distortions are sometimes found in adults suffering from eating disorders and obesity, but research findings are inconclusive. Some studies show that adults with obesity tend to underestimate their body size, while anorexic and bulimic adults tend to overestimate their body size [1, 25, 31-33]. Other researchers report that individuals with anorexia underestimate their body size [34] and persons who are obese overestimate their whole body image [35]. However, research also shows that participants with anorexia or obesity do not consistently show differences in their perceptions when compared to non-eating disordered or non-obese control subjects [34, 36, 37]. These results suggest that body image distortion and true body size is not a factor specific to eating disorders or obesity [10]. Individuals of varying weight show different degrees of concern with body appearance and accuracy of body perception.

Discrepancies in research findings in adults may also be explained by the variety of methods used to measure body size estimation and satisfaction. These techniques vary in their validity and reliability [29, 38-40] and the sample to which they have been applied (clinical or community) [6]. Typical methods include self report questionnaires, silhouette figure drawings, perception when presented with distorted mirrors, light beam apparatus, and psychophysical procedures. Questionnaires measure the attitudinal component of body image or the perception of one being normal, under or overweight. These methods have been criticized as they do not permit the assessment of body image estimation or accuracy of the perception. They are useful tools for the study of adolescent and adult populations but are not the best choice for children who cannot (for developmental reasons) verbally express their representation and would benefit from visual displays.

For practical reasons, silhouette drawings are often used to measure body size perception and satisfaction within children [15, 21, 38-40]. Current and ideal body sizes in children are typically measured by asking the child to nominate the body shape most like his/her actual current size. Perceived ideal body size is assessed by asking the child to nominate the size he or she aspires to be like. Body satisfaction is defined as the discrepancy between the perceived current and ideal body sizes [15, 39]. Again, silhouette drawings do not measure the respondent's actual body size estimation but only a representation of a body shape. As pointed out by Gardner and colleagues [38], this method does not necessarily reflect the person's perception. Specifically this forced choice technique requires participants "to squeeze or otherwise reduce their latent responses to generate an answer on the scale" (p. 388). However, when appropriately constructed (with a large number of well-distributed stimuli) this method can reduce respondent bias or the tendency to choose the average or middle silhouette (see Gardner, Friedman, and Jackson, [38] for a review). The silhouette method carries the advantage of not being intrusive to children and can provide valid results when carefully and properly constructed.

Tools utilizing distortion of real body image such as mirror or video-computerized techniques permit the measurement of one's body size estimation and avoid the problems associated with Likert-type rating scales [38]. Assessment of body size and satisfaction can be measured using either body site or whole body techniques [29]. Body site techniques consist of asking participants to match the width of the distance between two points on a specific body part. For the whole body technique, participants are asked to manipulate or adjust a real-life image of their actual body size [29]. Using a video-projector interfaced with a computer, Gardner *et al.* [17] showed that this method is quite accurate in children aged 6 to 14 years [29, 38, 40, 41]. Body size satisfaction is the point where the video image appears to the participant to be subjectively equal to his/her perception of actual body size. Here a larger discrepancy between actual and perceived body image yields a higher participant dissatisfaction score. A second score for body size estimation accuracy defines the minimum amount of size distortion that must be present for the sensation to be detected [29]. The disadvantage of the TV-video methodology for young children (particularly less than 6 years of age) is that they will have more difficulty paying attention to such lengthy procedures [40]. The other problem with the use of these techniques in children and adolescents is that they are based on adult body morphology and do not take into account the relative variation in size of body parts due to growth and sexual maturation [42]. The potential advantages of video techniques for young children need to be weighed in terms of their developmental needs and the limited normative data that is currently available.

To summarize, body image disturbance must be seen as a multi-factorial construct having two components: perceptual and attitudinal. Both components are found in clinical samples with ED and BDD, in obese people and also in typically weighing non-clinical populations. The perceptual component refers to the cognitive assessment or accuracy of one's perception of body size and shape and can be measured by tools that utilize the participant's real body size. These tools permit an estimation of one's level of distortion in body image. The attitudinal component refers to the emotional reaction or affect toward the perceived body image and can be measured using questionnaires or silhouette drawings. These tools provide a measure of the participant's body satisfaction. A good definition of body image disturbance and effective tools to measure it will allow researchers and clinicians to propose hypotheses and theories, a topic discussed in the next section.

COGNITIVE PREDICTORS AND THEORIES

Research findings suggest that body image distortion is not caused by a sensory deficit but rather produced by non-sensory factors (motivation, attitude, and cognitive biases such as false beliefs) [7, 9, 17, 25]. Thus, classic cognitive behavioral therapeutic theories such as Beck's Cognitive therapy [43, 44] can be used as a general model explaining body image related psychopathologies. Cognitive theories are based on the general principles that individuals do not react to the events but rather to their cognitive representations of them and that cognition mediates emotional and behavioral functioning. Beck's theory emphasizes the role of cognitive schemas or beliefs. Underlying psychopathology

are fixed false beliefs and automatic thoughts consisting of errors of logic. The most common cognitive distortions are arbitrary inferences (drawing conclusions without facts), overgeneralization (drawing conclusions based on only one event), selective abstraction (attending to a detail while ignoring the context), personalization (erroneously attributing external events to oneself), polarized thinking (thinking in dichotomous ways) and emotional reasoning (reasoning based on emotion rather than on facts) [44, 45]. Thus, according to this model, body image disturbance can be conceptualized as manifested by particular cognitions related to weight and shape concerns. Jakatdar, *et al.* [46] applied the CBT general model to body image disturbance to develop a measure of body image cognitive distortions named the Assessment of Body Image Distortion – ABCD. The ABCD is organized along eight dimensions: 1) *beauty or beast thinking* corresponding to polarized thinking; 2) *unfair-to-compare* referring to body dissatisfaction; 3) *magnifying glass* corresponding to selective abstraction; 4) *blame game* is similar to personalization but the individual believes that the perceived body defect is caused by an external past event; 5) *mind misreading* is one's projection of negative body image perceptions and thoughts onto someone else; 6) *misfortune telling* is the belief that one's perceived defect will cause negative outcomes in the future; 7) *beauty bond* refers to the belief that one cannot do certain things because of appearance; and 8) *moody mirror* refers to negative affect toward appearance. One validation study of the ABCD using an online survey and a sample of university female students found that more distorted appearance related cognitions were significantly associated with more body dissatisfaction, greater concern of becoming overweight, a greater investment in one's appearance, more dysfunctional eating attitudes and a higher Body Mass Index [46].

Another adaptation of cognitive theory to eating disorders is the work of Williamson, Stewart, White, and York-Crowe's [47]. Their cognitive model proposes that a disturbed body image in ED is produced by a person's unconscious misinterpretation of self-relevant events or information. Misperceptions are caused by the use of select pieces of information within the environment that support one's false beliefs coupled with the ignorance of evidence refuting the belief [47]. The Williamson *et al.*'s [47] model hypothesizes that there are additional individual characteristics that place people at risk for body image distortions. These characteristics are: perfectionism, fear of fatness, over concern with body size/shape, and an internalization of thin ideal shape presented by the media. Second, this model suggests that body self schema and the resulting cognitive bias are activated by ambiguous stimuli, body or food related information, or tasks requiring self reflection such as research questionnaires on body image. Body image distortion is produced by the following biases in the following areas: (a) attention, (b) selective memory, (c) selective interpretation, (d) body size estimation, and (e) extreme drive for thinness. Cognitive biases and negative thoughts induce negative emotion toward body image and appearance, which in turn, trigger behaviors to alter the shape and form of the body in order to be in line with that image and support the cognitive biases, thereby creating a positive feedback loop [47]. For example, a woman who is overly concerned about her body image and works in an environment in which her appearance is impor-

tant, such as a modeling agency, may interpret comments on how clothes fit her as a flaw or deficiency of her body (self-relevant information). She will then develop a false belief about her appearance and maintain this misperception by paying attention (attentional bias) to or interpreting situations or events confirming her belief (selective interpretation bias) and ignoring or forgetting facts contradicting it (selective memory bias), such as positive comments on her appearance. These cognitive biases are likely to lead to body dissatisfaction and dysfunctional behaviors such as disordered eating as this person tries to change or control her perceived “defective” body.

In general, the model presented in the previous example is well supported by research [5]. Cognitive biases (attentional and selective memory bias) associated with the eating disorders are quite typically self-referential (as opposed to other referenced) and apply to eating habits and body shape [5, 9, 47]. Using a video-computerized technique, McCabe and colleagues [9] compared the degree of accuracy of adults estimating personal body parts versus a neutral object. They found that both men and women reported higher level of estimation inaccuracy in relation to their own body compared to the neutral object, supporting the specific nature of ED cognitive bias. Unterhalter, Farrell, and Mohr [48] found that both men and women remembered more weight/body shape related words than neutral words after they filled out questionnaires on their own body image perception, satisfaction with body image, and disordered eating behaviors. Previous research also supports the hypothesis that body image distortion and cognitive bias are elicited by body or eating related stimuli (e.g., after eating a meal or wearing a bathing suit or tight clothing) [47]. Research is beginning to demonstrate that body image distortions are cognitive misinterpretations of personally relevant information related to body shape and size.

There is also evidence of attentional bias in individuals with high concern for body image (who are dissatisfied with their body) [10, 49]. Using subliminal verbal cues (participants were exposed to flashed words such as ‘fat’, or ‘thin’) Waller and Barnes [10] compared female with high or low scores on the Eating Disorder Inventory in terms of their body estimation and satisfaction. They found that females scoring high on eating disorder symptoms and exposed to fat-related information showed a deterioration of their body image compared to the comparison group. Janelle and colleagues [49] used a visual gaze tracking system to demonstrate that females highly dissatisfied with their body image tended to avoid looking at the most dissatisfied body areas.

Cognitive biases have also been found in individuals with weight concerns regardless of the presence of clinical symptoms of eating disorders [5, 7, 47]. For instance, persons who perceived themselves or some part of their body as too fat perceived a larger food intake than actually consumed, when compared to control participants who consumed the same meal. [5]. Furthermore, Mountford, Haase, and Waller [50] demonstrated that false cognitions about body checking which consisted of “repetitive, often time consuming and compulsive behaviors, performed to inspect, hide, obtain reassurance about, or fix a perceived defect” [8, p.313], predicted disordered eating behaviors, body image dissatisfac-

tion and severity of ED symptoms (eating, weight and shape concerns).

There is evidence that body image concerns can lead to negative body image perceptions. For example, there is some evidence that body checking and body image exposure (to themselves or ideal body image) can produce negative emotions. Hausenblas and colleagues [51] compared men and women high and low in body satisfaction exposed to ideal body shape slides and slides of themselves in terms of their emotional responses. They found that men and women who were highly dissatisfied with their body reported less pleasure viewing slides of themselves, and also, but to a smaller extent, viewing ideal body slides. Research findings also show that body image schema and negative emotions are labile, that is, triggered by a particular stimuli or situations [47, 52] and that these cues tend to change as individuals develop throughout the lifespan [53, 54, 55]. However, body image distortion does not always lead to body dissatisfaction as demonstrated by McCabe *et al.* [9], who found that when men and women overestimated their body size, men perceived themselves as being more muscular than they actually were, while women perceived themselves as being larger than they were in actuality. For women, any degree of body image distortion seems to lead to dissatisfaction, while for men, body distortion resulted in improved levels of satisfaction with the self. These findings are supported by Unterhalter and her colleagues’ [48] results on selective memory bias, and suggest that degree of body distortion can be used as a cognitive construct in therapy to increase body satisfaction and body esteem [9].

To summarize, research findings support the adaptation of traditional cognitive-behavioral theories to the understanding of eating disorders and postulate that body image dissatisfaction and distortions are prevalent in the population. Body shape and size cognitive distortions are produced and maintained by cognitive bias such as false beliefs, attentional and interpretative bias, selective memory bias, and other judgment biases. Finally, cognitive biases predict body image related symptoms such as disordered eating and the cognitions and behaviors serve to reinforce and exacerbate each other. As such, the most useful agent of change in the treatment of eating disorders includes attitudes, perceptions and emotions

Despite recent progress in the understanding of eating disorder, there is currently a paucity of research on body image in children and several questions remained unanswered. First, researchers and clinicians have failed to provide a satisfactory explanation on how and when body image concerns develop or what specifically may be the etiology of body image disturbance [13]. To date, there are very few studies comparing child and adult populations. Therefore, the majority of clinical approaches and treatment are based on research findings in adults and older adolescents [56]. A second important unanswered question is related to the prediction of body image related pathologies. So far, researchers have failed to determine whether eating disorders cause body image disturbance or whether cognitive distortions precede body image concerns. In order to adequately address this question, longitudinal developmental studies are needed. Currently, existing research in children suggests that prepubertal body image disturbance can be predictive of eating

disorder with an onset later in adolescence. To adequately examine this hypothesis, we need evidence that 1) body image distortion can be observed in childhood and 2) body image distortion is associated with body dissatisfaction which in turn, predicts compensatory behaviors (as well as symptoms of eating disorders or BDDs). Understanding the course of body image disturbances and identifying risk factors is critical for the development of effective prevention programs of eating disorders and body image related pathologies.

DEVELOPMENTAL PATHWAYS, PREDICTORS AND OUTCOMES

Research on the age of onset of body image concerns is mixed with some researchers reporting the presence of attitudes in children as young as 3 years of age. Similarly, some studies indicate a relationship between the young child's weight, attitude and satisfaction and others reports little or no association. Musher-Eizenman *et al.* [21] and Cramer and Steinwert [16] found that children as young as 3 years display negative attitudes toward being overweight. Those who were overweight were found to show the strongest negative attitudes towards obesity and being overweight [16]. Using a silhouette method and a measure of Body Mass Index (BMI), Tremblay and her colleagues [57] found that, regardless of gender, approximately 50% of the children between the ages of 3 1/2 to 5 years old were satisfied with their weight and chose a silhouette corresponding with their weight status. Several research findings indicate that body image dissatisfaction can be observed in children 5 to 7 years of age [14-24]. There is evidence that 5 year old children have already internalized negative cultural biases against people who are overweight [16, 21]. Birbeck and Drummond [14] reported that 5 and 6 year old girls prefer a thinner female figure. Truby and Paxton [39] found only moderate, but significant, correlations between current Body Mass Index (BMI) and perceived body size in girls and small but significant correlations in boys 7 to 12 years of age. Generally, the rate of body dissatisfaction reported in research varies from 40 to 50 % in children aged 13 years of age and younger [57-60] and it seems that the presence of body shape and weight concerns are already present in the preschool child.

Other evidence indicates that body image disturbance appears before the onset of eating disorders and therefore can be considered as a risk factor in the identification of BDD in children as young as 6 years of age [61, 62]. Albertini *et al.* [62] reported the case of a 6 year-old boy who displayed symptoms similar to adults with BDD. This child was 5 years old when he became concerned with his appearance, such as his hair, his teeth and his stomach and displayed typical obsessive behaviors such as checking body parts and excessive grooming. Although very limited, BDD case reports in children suggest that young children can hold false beliefs and display cognitive biases similar to those of adults. Moreover, it is likely that BDD has been under-diagnosed in children, as it has been in adults, that due in part to patients' failure to report symptoms [63] or assumptions by mental health care professionals that children do not have sufficient cognitive development to display the symptoms of this disorder. To summarize, research findings as well as clinical case reports suggest that young children can perceive their body image as accurately as adults, can show body dissatis-

faction, and can internalize thin ideal body image, and that this understanding is likely to appear as early as the preschool years. Research findings support the hypothesis that body image disturbance appears before the onset of ED.

Similarly, large scale experimental studies also suggest a link between body image concerns at a young age and later occurrence of an ED [11, 12, 18, 64, 65]. In their retrospective study of 200 adults with BDD, Ruffolo and his colleagues [65] found that more than a third of their participants have a current or a lifetime history of ED and among those, the majority have developed a body image disturbance before or the same year of the onset of their ED. These findings are supported by Krahnstoever *et al.*'s [18] longitudinal study in which it was reported that body weight and shape concerns at 5 years of age predicted body image concerns at 7 and 9 and body image dissatisfaction at 5 and 7 predicted restrictive eating behaviors and attitude toward eating at 9 years of age.

Of note, not all research has found an onset of preschool age for body image concerns, dissatisfaction with appearance and compensatory behaviors and other body or shape-related cognitions in young children. Lowes and Tiggeman [22], for example, did not find significant differences between current and ideal body sizes in 5 year-old children. Musher-Eizenman *et al.* [21] found no significant correlation between BMI and body perception in young children (4 to 7 years old) and concluded that young children were not reliable in assessing their own body size. The inconsistency in results among the various studies signals possible methodological and theoretical issues that are yet unresolved. The identification of cognitive distortions at this age is challenging as errors of logic characterize preschool children and it is difficult to know what is "typical" at a particular age. According to Piaget's cognitive development theory, 3 to 5 year old children are at the pre-operational stage of thinking and concrete, one-dimensional, semi-logical, and non-reversible thinking dominates. Children at this age possess only a partial understanding of cause and effect relationships and have a short attention and memory span [54]. The need to develop a testable theoretical model and to establish representative developmental norms that will help determine appropriate baseline to which children can be compared is an important and a necessary next step in the understanding of typical and atypical thinking about eating and body image in children.

The field of body image development in children is also affected by variations in the type and validity of measurement methods used. There currently are no measurement tools that have established psychometric properties. Many of the aforementioned studies used questionnaire or silhouette methods and qualitative methods have been deemed to be the more accurate of all methods. Silhouette methods are limited to the extent that they do not represent the respondent actual or real image, but only depict a representation of the individual's body image. Using a video-projection of a real life size image to measure body image distortion, Gardner *et al.* [17] demonstrated that children as young as 6 years of age were quite accurate in perceiving their body size. Authors that have used the silhouette method (e.g., Tremblay, Lovsin, Zecevic & Serresse) have found that it can be accurate provided that the child understands the task and can understand abstract concepts such as "similarity", "difference" and

“ideal”. In fact, research shows that not only do children not distort their body image more than adults [55], but qualitative studies demonstrate that children as young as 4 years of age can provide important and accurate information about their health [56] and that they can understand the links between behaviors (food intake), health, and weight [57]. Other research on cognitive development in children supports the possibility that weaknesses in measurement may help explain why children are sometimes found not to be accurate informants on their own body image. Birbeck and Drummond [14], who reviewed relevant literature of research findings, demonstrated that mistakes children made were not related to the accuracy of the facts but rather to omissions of pieces of information related to their shorter memory span. Such limitations in memory span can be prevented by an interview protocol designed to motivate participation and develop a good rapport [14].

Aside from body image cognitions, research in non-clinical populations as well as in adolescents and adults diagnosed with BDD or ED reveals that several factors contribute to body image disturbances [66]. These factors can generally be grouped into the following categories: individual characteristics, family and interpersonal influences, and cultural practices and background.

Individual Characteristics There are some common personality traits observed in individuals with body image disturbance (with or without co morbid ED) such as perfectionism [67, 68], shyness, and anxiety [7, 63]. Individuals with BDD have also been found to be more ‘aesthetically sensitive’ than other individuals [63], or over concerned or over-invested with physical appearance as an important part of self-worth and identity [7]. Not surprisingly, individuals with body image disturbance, with or without co morbid ED often show low self esteem [67, 68], and that is particularly the case in girls [58]. Body dissatisfaction in children is also associated with low self-esteem [55, 69] and low body self-esteem [20]. There is also a greater incidence of childhood abuse, neglect, and trauma in individuals with high body image dissatisfaction, ED, and BDD [63, 66, 70-72].

In addition, individual differences such as gender appear to have an impact on body image, with studies consistently show gender differences with girls being more dissatisfied than boys [7, 17, 59, 73-75]. As they grow, both boys and girls want to have a body size thinner than their perceived one [17] and express increasing concerns about being or becoming overweight [24, 55]. The increasing trend of concerns with age is moderated by a child’s initial level of body weight concerns which predicts body dissatisfaction at 7 and 9 years old [18]. However, body satisfaction in boys tends to improve with age while it seems to decrease in girls [55].

Other individual differences include the perception of body flaws or false beliefs about body image such as the perception of being overweight [76]. These factors have been shown to predict body dissatisfaction and objective physical characteristics also seem to play a role in the onset of body image disturbance and related psychopathology. Early onset of obesity and higher BMI [7, 27, 58, 73, 76-78] are risks factors for developing body image disturbances and ED [11, 26]. A history of traumatic or genetic physical disfigurement or skin disorders such as psoriasis is frequent in individuals with BDD or with high body image dissatisfaction [63, 66].

Family and Interpersonal (Social) Influences

Observations that BDD occurs more frequently in relatives of affected individuals suggests that there is a genetic predisposition or intergenerational transmission for body image concerns and cognitions [63]. Several research findings show that negative biases toward obesity, such as beauty being associated with a thin silhouette, are transmitted to the children by their parents and by their teachers [79, 80, 82]. For example, Adams, Hicken, and Salehi [80] demonstrated that 4 year old children prefer attractive, normal weight or non handicapped pictorial representations of peers and adults and tend to associate more positive personality characteristics to these pictures compared to those of unattractive, overweight or handicapped peers and adults. Further, the attitudes the children demonstrated were significantly positively associated with their parents and teachers’ expectations.

Some research indicates that parents’ perceptions of own and their child’s weight might be “passed” on to their children, and that this is particularly true for girls. Agras and colleagues [64] found that factors predicting body weight and shape concern in *normal* weight children included being female, father’s high personal body dissatisfaction when the child was less than 5 years of age, poor eating habits at 6-7 years of age, and parent concerns and intervention for their child’s weight at 8-9 years of age [64]. Parents’ perception of their child’s body has been shown to have an impact on the child’s satisfaction with their own body [22, 83]. In research studies, body satisfaction in children has been found to be correlated with children’s perception of their mother’s satisfaction with their child’s body [22, 55]. Davison, Markley, and Birch [83] reported that greater weight concerns in mothers regarding their daughters was associated with more weight concerns in their daughters, independent of girls’ personal body dissatisfaction or weight status.

Related, some interesting research suggests that body image distortion in children might be implicitly learned from parents’ “misperception” of their child’s weight [57, 84]. Carnell *et al.* [84] reported that only 1.9% of parents with overweight children and 17.1% of those with obese children described their child as overweight. The majority (94%) of parents of overweight or obese children who participated in their study did not classify them correctly, although two thirds of them were concerned that their child would become overweight in the future. In Tremblay *et al.*’s [57], study, one parent out of three was inaccurate in their perception of their child’s weight and all of the parents with an overweight child perceived them as normal weight. Carnell *et al.* [84] provided an explanation of parental misperception indicating that it might be fueled by a parent providing “encouragement” of their child’s growth. In other words, parents of young children might be more prone to think that having a thin child is an indicator of bad parenting. This research suggests that faulty or inaccurate cognitions originating in parents might be passed on to their offspring to influence the body self-images of their offspring.

Other research points to the role of parents’ feeding practices on their child’s eating habits and perception of their own weight and body shape [57]. Parental modeling of body image-related concerns such as dieting and negative perceptions of their own weight are related to body image concerns

in children [58]. Agras, Bryson, Hammer & Kraemer (2007) found that parental control of eating at 3 years was a significant predictor for childhood obesity [64]. According to Costanzo and Woody [85], parents' perceptions are embedded in a domain-specific belief system including eating, feeding, and parenting. Indeed, parents' perceptions of their own body size, their feeding practices and their concerns about their children's weight are associated with pressure to eat, food restriction and the use of food to control the child's behavior [86]. Parental pressure for the child to eat has been found to be correlated with the child's perception of being underweight, regardless of actual weight [57]. Furthermore, parents' control over their child's dietary intake is associated with the child's difficulty in learning satiation cues [86]. Correctly interpreting body sensation of satiation or hunger is an important factor in preventing the development of an overeating habit, typically observed in overweight individuals [87-89]. Taken together, it may be that parental perceptions of their own and their child's body size and shape influence their own feeding and eating practices; these attitudes and practices are consequently internalized by their own children and translated in cognition and emotions that children acquire about their personal body self-image.

Cultural Practices and Background

There is some research evidence that body image dissatisfaction is related to exposure to media ideal body images [73] and that these images produce negative emotions and depression in adults [51, 90]. In children, research is limited despite the fact that they, like adults, are exposed to idealized image and stereotypes of beauty and thinness. "Children and adolescents are taught that physical attractiveness is necessary for success and are bombarded by advertisements for cosmetic products and surgery to achieve this goal" [66, p.29]. Children are also exposed to these stereotypes through their toys. As commented by Smolak [58, p. 71], "Barbie dolls represent a shape that is not representative of an average body and [there are] unrealistic muscular body shapes found in action figure for boys". Physical appearance stereotypes are also reinforced in movies and TV programs, in which overweight or obese characters are underrepresented and when they appear, are less likely to be portrayed as successful or attractive [91].

The few available research papers on the effect of media in children and young adolescents suggests that, similar to adults, idealized body image exposure produces higher body dissatisfaction [73, 92] regardless of the young viewer's actual weight status [7]. The tendency to internalize body image ideal increases with age and is also a predictor in the maintenance of body dissatisfaction [92, 93]. In elementary school children, there was a significant association between weekly time watching television, playing videogames, reading magazines, negative attitude toward obesity [94], negative weight-related stereotypes toward females [95] and increased drive for muscularity in preadolescent boys [96]. Conversely, girls who identified with a normal weight/healthier TV characters reported healthier body image attitude [95]. Research in older adolescents of both genders also reveals that body dissatisfaction is predicted by exposure and internalization of media body ideals [97, 98]. While both boys and girls are affected, the effect is larger in girls [98].

Social pressures, such as direct comments on the child's appearance or body, as well as peer teasing are recognized as factors predicting body image dissatisfaction, BDD and ED onset [12, 58, 66, 76, 98]. Perceived peer pressure to achieve media body ideal predicts dissatisfaction with appearance in adolescent boys and girls [98]. Parental pressure on the child to maintain or lose weight is associated with more symptoms of disordered eating [12]. Childhood history of teasing by peers and bullying is often reported by individuals with BDD [66]. These findings support the hypothesis that body image distortions in BDD are internalizations of peers' or relatives' negative comments about physical appearances. The internalization hypothesis is also supported by Mills and Miller's [81] experimental study showing that false negative weight-related feedback from peers elicits body dissatisfaction and depressed mood in undergraduate college female students.

Finally, there is some research to show the influence of more proximal factors, including race and sexual orientation. Caucasians have been found to express more dissatisfaction with their bodies than other minority groups [7, 78]. Finally, some studies have shown that sexual orientation is a predictive factor, with homosexuals demonstrating more body image dissatisfaction than heterosexuals [7].

TREATMENT AND PREVENTION

As there is sufficient research evidence that body image disturbance and dissatisfaction with appearance has an onset prior to the occurrence of eating disorders, intervention and prevention of eating disorders with children under the age of 7 is arguably a viable prevention or early intervention strategy [56]. Addressing body image disturbance in children is critical to prevent co-morbid conditions and negative outcomes. BDD has been found to be associated with major depressive disorder, delusional disorder, social phobia, and obsessive compulsive disorder [8]. Patients with ED are at greater risk for anxiety, depression, and low self-esteem [67, 68, 71, 99] and suicide [8, 100, 101]. A recent study showed that body image disturbance in both genders predicted suicidal ideation above and beyond the effect of depression, hopelessness and past suicidal behaviors and supported the idea that body image is an important and independent risk factor for future suicide ideation [102].

In terms of the existing empirical research for adults, there is some consensus for the effectiveness of cognitive behavior therapy and interpersonal therapy for binge eating disorder and bulimia nervosa and behavior therapy and/or behavior therapy plus hypnosis in the treatment of obesity [103]. In terms of body image disturbance, the literature is inconsistent and it is not clear whether CBT that includes an emphasis on body image disturbance is effective. While the programmes by Rosen [104] and Cash [105] provide strong empirical support in favour of addressing body image disturbances directly, other research is not as convincing [106, 107]. One research study found that full cognitive behavioral treatment addressing body image disturbance for bulimia nervosa resulted in significantly greater improvement of the eating disorder symptoms at the end of treatment and at follow up than the more general behavioral version which did not address body image disturbance [108]. The programmes by Rosen [104] and Cash [105] target three key aspects of body image disturbance: size perception (overestimation of

overall size or size of a particular part, exaggeration of the extent of the particular defect); cognition and affect (negative, unrealistic, and overvalued thoughts and emotions about the body, and thought about the consequences of perceived defects); and behavior (avoidance of anxiety provoking situations, checking and grooming behaviors, reassurance seeking). Unfortunately there is a lack of data on the efficacy of the *individual* components of treatment programmes for eating disorders and the majority of studies have not been designed to evaluate the specific body-image-related components. A review of treatments for eating disorder [109] and obesity [110, 111] in adults can be found elsewhere. Studies that use the highest level of research design, randomized controlled designs, indicate that indeed cognitive behavior therapy is an effective treatment for BDD [13,112].

With respect to children, however, there is a paucity of research on effective treatments for this subgroup, with the exception of behavior therapy, for which there is some consensus of its effectiveness in the treatment of pediatric obesity [103, 113]. Behavior therapy in the case of young children typically takes place within the context of the family [114-117]. These behavioural programmes are more likely to emphasize family lifestyle changes such as being active as a way to be healthy and fit, and do not specifically target body image disturbance. A recent trend in family treatment has also been to create tailored programs for subgroups of families and several factors have been put forth as worthy of empirical examination including parenting style, family stress and family emotional climate [118]. These factors may moderate treatment outcomes by altering the effectiveness of various treatment programs and show promise for the future. In light of the previous research evidence or risk factors presented above, prevention and early intervention programs for children would likely be effective if they target individual, family, and social cultural factors. Prevention programs could target parents, teachers, as well as mental health practitioners and provide training and education about childhood cognition and emotions, BDD and early manifestation of body image concerns as well as associated risk factors. Within the context of a multidisciplinary approach, there is the need for increased awareness among all professionals working with the child and his/her family about the early indicators of eating disorders. Child and adolescent's psychiatrists, psychologists, pediatricians, daycare workers, school nurses and other mental health practitioners should be informed about children's early signs of body image disturbances, such as expressed concerns about appearance. Such concerns should not be overlooked but rather discussed openly and explicitly with the child, who may not spontaneously raise particular issues without being asked. It is not only the child with a disability or a skin disorder that is at risk for body image disturbances, but children with average weight (who do not demonstrate any other physical signs) are also at risk. Consequently, professionals should routinely investigate body image concerns in children with generalized anxiety disorder or among those who display symptoms such as withdrawal, excessive shyness, depression or externalizing problem behaviors (which may in fact mask an internalizing disorder). Practitioners should be aware that although girls are at increased risk for body image disturbances, both

genders are equally at risk for its more severe corollary, Body Dysmorphic Disorder.

It is also important for professionals to be aware that children with body image disturbance and co-morbid anxiety or depression are more likely to exhibit academic difficulties and problems interacting with peers. As the child matures physically, particularly during the pubertal development period, a time characterized by a normative unsynchronized body development (with limbs growing faster than the head and the trunk), he/she is at increased risk for worsening of preexisting difficulties. Mental health professionals should be particularly careful about young adolescents wanting cosmetic surgeries as it is generally well known that surgeries are generally ineffective in reducing body dysmorphic conditions. Conversely, cognitive behavior treatments and selective serotonin reuptake inhibitors (SSRIs) are more appropriately the treatment of choice for adults, if the underlying condition is body image-related [63]. The possible presence of an eating disorder must also be assessed in these youth and the practitioners should recognize the importance of including a body image component in the intervention plan. Indeed, although body distortion and dissatisfaction is the most important predictor of eating disorder onset and a major predictor of relapse after weight restoration, body image therapy is not currently included or emphasized in the treatment of many eating disorders [2].

Parent education should emphasize the importance of the child's mental representation of their body on other areas of functioning and how comments may have a negative impact on their child's well being and self-esteem. Children also develop a healthy positive body image through observation of their parents' behaviors and own perception and satisfaction with their appearance. Parents must be aware that they may transmit their own concerns and body image dissatisfaction to their children. They serve as models for their children who are more likely to imitate unhealthy behaviors such as dieting, excessive body checking and negative self comments towards their body. Parents should also be aware that a positive body image is also related to healthy eating and physical activity. There is compelling evidence demonstrating that a child's home environment is critical to promoting healthy eating and exercise practices [119, 120]. Specifically, parental influence can be a critical factor in promoting healthy eating practices. It has been documented that effective parenting practices (e.g., setting of boundaries and structure, communication of clear expectations) can reduce the risk of childhood obesity, a risk factor for body image disturbance and eating disorders, and that parental *monitoring* of children's diet and physical activity is linked to children's positive health practices [121-123]. In contrast, some negative findings have been documented when parents have used *controlling* child-feeding tactics, such as restricting the amount of food the child eats during meals, as these strategies are counterproductive to the development of the child's ability to self regulate (e.g., Birch and Fisher [124]).

Finally, we should collectively address our values as a society regarding over-valorization of body image and appearance, particularly in girls. Like adults, children are exposed to ideal body images presented by the media. The media is an important source of information where children acquire all types of stereotypes including those on beauty,

thinness, and physical appearance. Parents and teachers must be aware that social stigma and sexism are present in elementary schools. The impact of children teasing behaviors should not be dismissed as pointed out by Smolak [58] who argues that elementary school boys' teasing and comments about girls bodies (boys commenting on girls' appearance, flipping their skirts, calling them ugly), are behaviors reflecting an objectification of the female body and it can serve as a precursor to later sexual harassment (which is associated with body dissatisfaction and poorer body esteem in girls). Boys can also be affected by idealized, unrealistic and very muscular male models. Similar to campaigns denouncing violence presented in the media because of its negative modeling effect on children, parents and health professionals should advocate for banishing messages portraying emaciated unhealthy youth.

REFERENCES

- [1] Bell C, Kirkpatrick SW, Rinn RC. Body image of anorexic, obese, and normal female. *J Clin Psychol* 1986; 42: 431-439.
- [2] Garner DM. Body image and anorexia nervosa. In Cash TF, Pruzinsky T. Eds, *Body image: A handbook of theories, research and clinical practice*. New York, Guilford Press 2004; 295-303.
- [3] Stice E. Body image and bulimia nervosa. In Cash TF, Pruzinsky T. Eds, *Body image: A handbook of theories, research and clinical practice*. New York, Guilford Press 2004; 304-11.
- [4] Vocks S, Legenbauer T, Rüdell H, Troje NF. Static and dynamic body image in bulimia nervosa: Mental representation of body dimensions and biological motion patterns. *Int J Eat Disord* 2007; 40: 59-66.
- [5] Williamson DA, Muler SL, Reas DL, Thaw JM. Cognitive bias in eating disorders: Implications for theory and treatment. *Behav Modif* 1999; 23: 556-77.
- [6] Cash TF, Pruzinsky T. *Body image: A handbook of theories, research and clinical practice*. New York, Guilford Press 2004.
- [7] Schwartz MB, Brownell KD. Obesity and body image. *Body Image* 2004; 1: 43-56.
- [8] Phillips KA. Body image and body dysmorphic disorder. In Cash TF, Pruzinsky T. Eds, *Body image: A handbook of theories, research and clinical practice*. New York, Guilford Press 2004; 312-21.
- [9] McCabe MP, Ricciardelli LA, Sitaram G, Mikhail K. Accuracy of body size estimation: Role of biopsychosocial variables. *Body Image* 2006; 3: 163-71.
- [10] Waller G, Barnes J. Preconscious processing of body image cues impact on body percept and concept. *J Psychosom Res* 2002; 53: 1037-41.
- [11] Killen JD, Taylor CB, Hayward CH, *et al*. Weight concerns influence the development of eating disorders: A four-year prospective study. *J Consult Clin Psychol* 1996; 64: 936-40.
- [12] Littleton HL, Ollendick T. Negative body image and disordered eating behavior in children and adolescents: What places youth at risk and how can these problems be prevented? *Clin Child Fam Psychol Rev* 2003; 6: 51-66.
- [13] Rosen JC, Reiter R, Orosan P. Cognitive-behavioral body image therapy for body dysmorphic disorder. *J Consult Clin Psychol* 1995; 63: 263-9.
- [14] Birbeck D, Drummond M. Interviewing, and listening to the voices of, very young children on body image and perceptions of self. *Early Child Dev Care* 2005; 176: 579-96.
- [15] Collins ME. Body figure perceptions and preferences among pre-adolescent children. *Int J Eat Disord* 1991; 10: 208-17.
- [16] Cramer P, Steinwert T. Thin is good, fat is bad: How early does it begin. *J Appl Dev Psychol* 1998; 19: 429-51.
- [17] Gardner RM, Friedman BN, Stark K, Jackson NA. Body-size estimations in children six through fourteen: A longitudinal study. *Percept Mot Skills* 1999; 88: 541-55.
- [18] Krahnstoever Davison K, Markey CN, Birch LL. A longitudinal examination of patterns in girls' weight concerns and body dissatisfaction from ages 5 to 9 years. *Int J Eat Disord* 2003; 33: 320-32.
- [19] Melin LM, Irwin CE, Scully S. Prevalence of disorders eating in girls: A survey of middle-class children. *J Am Diet Assoc* 1992; 92: 851-53.
- [20] Mendelson BK, White DR. Relation between body-esteem and self-esteem of obese and normal children. *Percept Mot Skills* 1982; 54: 899-905.
- [21] Musher-Eizenman D, Holub S, Edwards-Leeper L, Persson A, Goldstein S. The narrow range of acceptable body types of preschoolers and their mothers. *J Appl Dev Psychol* 2003; 24: 259-72.
- [22] Lowes J, Tiggeman M. Body dissatisfaction, dieting awareness and the impact of parental influence on young children. *Br J Health Psychol* 2003; 8: 135-47.
- [23] Tiggemann M. Children's body image: It starts sooner than you think. *Virtually Healthy* 2001; 19: 3.
- [24] Thelen MH, Powell AL, Lawrence C, Kuhnert ME. Eating and body image concerns among children. *J Clin Child Psychol* 1992; 21: 41-6.
- [25] Smeets MAM, Ingleby JD, Hoek HW, Panhuysen GEM. Body size perception in anorexia nervosa: A signal detection approach. *J Psychosom Res* 1999; 46: 465-77.
- [26] Ackard DM, Peterson CB. Association between puberty and disordered eating, body image, and other psychological variables. *Int J Eat Disord* 2001; 29: 187-94.
- [27] Davis E, Furnham A. Body satisfaction in adolescent girls. *Br J Med Psychol* 1986; 59: 279-89.
- [28] Fallon P, Ackard DM. Sexual abuse and body image. In Cash TF, Pruzinsky T. Eds, *Body image: A handbook of theories, research and clinical practice*. New York, Guilford Press 2004; 117-24.
- [29] Gardner RM. Methodological issues in assessment of the perceptual component of body image disturbance. *Br J Psychol* 1996; 87: 327-37.
- [30] *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. American Psychiatric Association 2000.
- [31] Szymanski LA, Seime RJ. A re-examination of body image distortion: Evidence against a sensory explanation. *Int J Eat Disord* 1997; 21: 175-80.
- [32] Smeets MAM. The rise and fall of body size estimation research in anorexia nervosa: A review and reconceptualization. *Eur Eat Disord Rev* 1997; 5: 75-95.
- [33] Valtolina GG. Body size estimation by obese subjects. *Percept Mot Skills* 1998; 86: 1363-74.
- [34] Gardner RM, Moncrieff C. Body image distortion in anorexics as a non sensory phenomenon: A signal detection approach. *J Clin Psychol* 1988; 44: 101-7.
- [35] Collins JK, McCabe MP, Jupp JJ, Suttan JE. Body percept change in obese females after weight reduction therapy. *J Clin Psychol* 1983; 39: 507-11.
- [36] Gardner RM, Morrell JA, Watson DN, Sandoval SL. Eye movements and body size judgments in the obese. *Int J Eat Disord* 1990; 9: 537-44.
- [37] Gardner RM, Gallegos V, Martinez R, Espinza T. Mirror feedback and judgments of body size. *J Psychom Res* 1989; 33: 603-7.
- [38] Gardner RM, Friedman BN, Jackson N.T. Methodological concerns when using silhouettes to measure body image. *Percept Mot Skills* 1998; 86: 387-95.
- [39] Truby H, Paxton S J. Development of the children's body image scale. *Br J Clin Psychol* 2002; 41: 185-203.
- [40] Gardner RM. Body image assessment in children. In Cash TF, Pruzinsky T. Eds, *Body image: A handbook of theories, research and clinical practice*. New York, Guilford Press 2004; 127-34.
- [41] Gardner RM, Stark K, Friedman BN, Jackson NA. Predictors of eating disorder scores in children ages 6 through 14: a longitudinal study. *J Psychosom Res* 2000; 49: 199-205.
- [42] Aleong R, Duchesne S, Paus T. Assessment of adolescent body perception: Development and characterization of a novel tool for morphing images of adolescent bodies. *Beh Res Methods* 2007; 39: 651-666.
- [43] Beck AT. *Depression: Causes and treatment*. Philadelphia, University of Pennsylvania Press 1967.
- [44] Beck AT. *Cognition and therapy: Basics and beyond*. New York, Guilford Press 1984.
- [45] Chaloult L, Ngo T-L, Goulet J, Cousineau P. *La thérapie cognitivo-comportementale; théorie et pratique [Cognitive-Behavioral Therapy; Theories and Practices]* (Chap. 7). 2008 Montreal; Gaetan Morin eds.
- [46] Jakatdar TA, Cash TF, Engle EK. Body-image thought processes: The development and initial validation of the assessment of body-image cognitive distortions. *Body Image* 2006; 3: 325-333.

- [47] Williamson DA, Stewart TM, White MA, York-Crowe E. An information-processing perspective on body image. In Cash TF, Pruzinsky T. Eds, *Body image: A handbook of theories, research and clinical practice*. New York, Guilford Press 2004; 47-54.
- [48] Unterhalter G, Farrell S, Mohr C. Selective memory biases for words reflecting sex-specific body image concerns. *Eat Behav* 2007; 8: 382-389.
- [49] Janelle CM, Hausenlas HA, Fallon EA, Gardner RE. A visual search examination of attentional biases among individuals with high and low drive for thinness. *Eat Weight Disord* 2003; 8: 138-44.
- [50] Mountford, V, Haase A, Waller G. Body checking in the eating disorders: Associations between cognitions and behaviors. *Int J Eat Disord* 2006; 39: 708-15.
- [51] Hausenblas HA, Janelle CM, Gardner RE, Hagan AL. Effects of exposure to physique slides on the emotional responses of men and women. *Sex Roles* 2002; 47: 569-75.
- [52] Cash TF. Beyond traits: Assessing body image states. In Cash TF, Pruzinsky T. Eds, *Body image; a handbook of theories, research and clinical practice*. New York, Guilford Press 2004; 163-70.
- [53] Tiggemann M. Body image across the adult life span: Stability and change. *Body Image* 2004; 1: 29-41.
- [54] Miller PH. *Theories of developmental psychology*. 4th ed. New York, Worth Publishers 2002.
- [55] Gardner RM, Sorter RG, Friedman BN. Developmental changes in children's body images. *J Soc Behav Pers* 1997; 12: 1019-36.
- [56] Irwin LG, Johnson J. Pearls, pith, and provocation. Interviewing young children: explicating our practices and dilemmas. *Qual Health Res* 2005; 15: 821-31.
- [57] Tremblay L, Aubin N, Lajoie C. Understanding of food quantity and quality concepts in pre-school children and its link with the development of obesity. Paper presented to the 26th International Congress of Applied Psychology, July 16-21, 2006, Athens, Greece. 2006.
- [58] Smolak L. Body image in children and adolescent: Where do we go from here? *Body Image* 2004; 1: 15-28.
- [59] Schur EA, Sanders M, Steiner H. Body dissatisfaction and dieting in young children. *Int J Eat Disord* 2000; 27: 74-82.
- [60] Veron-Guidry S, Williamson DA. Development of a body image assessment procedure for children and adolescents. *Int J Eat Disord* 1996; 20: 287-93.
- [61] Albertini R, Phillips KA. Thirty-Three cases of boy dysmorphic disorder in children and adolescents. *J Am Acad Child Adolesc Psychiatry* 1999; 38: 453-9.
- [62] Albertini R, Phillips KA, Guevremont D. Body dysmorphic disorder. *J Am Acad Child Adolesc Psychiatry* 1996; 35: 1425-6.
- [63] Foster R, Veale D. Diagnosis and management of body dysmorphic disorder. *Directions in Psychiatry* 2007; 27: 173-80.
- [64] Agras WS, Bryson S, Hammer LD, Kraemer HC. Childhood risk factors for thin body preoccupation and social pressure to be thin. *J Am Acad Child Adolesc Psychiatry* 2007; 46: 171-8.
- [65] Ruffolo JS, Phillips KA, Menard W, Fay C, Weisberg RB. Comorbidity of body dysmorphic disorder and eating disorders: Severity of psychopathology and body image disturbance. *Int J Eat Disord* 2006; 39: 11-9.
- [66] Neziroglu F, Khemlani-Patel S, Veale D. Social learning theory and cognitive behavioral models of body dysmorphic disorder. *Body Image* 2008; 5: 28-38.
- [67] Corcos M, Flament MF, Giraud MJ, *et al*. Early psychopathological signs of bulimia nervosa. A retrospective comparison of the period of puberty in bulimic and control girls. *Eur Child Adolesc Psychiatry* 2000; 9: 115-21.
- [68] Steiner H, Kwan W, Shaffer TG, *et al*. Risk and protective factors for juvenile eating disorders. *Eur Child Adolesc Psychiatry* 2003; 12: 38-46.
- [69] Québec Institute of Statistic. Questionnaire sur les habitudes de vie et la santé 1998-[Health Habits Questionnaire]. Gouvernement of Quebec 1998.
- [70] Holt K, Ricciardelli LA. Social comparisons and negative affect as indicators of problem eating and muscle preoccupation among children. *J Appl Devel Psych* 2002 ; 23: 285-304.
- [71] Schmidt U, Humfress H, Treasure J. The role of general family environment and sexual and physical abuse in the origins of eating disorders. *Eur Eat Disord Rev* 1997; 5: 184-207.
- [72] Wonderlich SA, Crosby RD, Mitchell JE, *et al*. Relationship of childhood sexual abuse and eating disturbance in children. *J Am Acad Child Adolesc Psychiatry* 2000; 39: 1277-83.
- [73] Hargreaves DA, Tiggemann M. Idealized media images and adolescent body image: "Comparing" boys and girls. *Body Image* 2004; 1: 351-61.
- [74] Sands R, Tricker J, Sherman C, Armatas C, Maschette W. Disordered eating patterns, body image, self-esteem, and physical activity in preadolescent school children. *Int J Eat Disord* 1997; 21: 159-66.
- [75] Tiggemann M, Pennington B. The development of gender differences in body-size dissatisfaction. *Aust Psychol* 1990; 25: 306-313.
- [76] Lunde C, Frisén A, Hwang CP. Ten-year-old girls' and boys' body composition and peer victimization experiences: Prospective associations with body satisfaction. *Body Image* 2007; 4: 11-28.
- [77] McCabe MP, Ricciardelli LA. Body image and body change techniques among young adolescents boys. *Eur Eat Disord Rev* 2001; 9: 335-47.
- [78] Lynch WC, Heil DP, Wagner E, Havens MD. Ethnic differences in BMI, weight concerns, and eating behaviors: Comparison of Native American, White, and Hispanic adolescents. *Body Image* 2007; 4: 179-90.
- [79] Adams GR, Crane P. An assessment of parents' and teachers' expectations of preschool children's social preference for attractive or unattractive children and adults. *Child Dev* 1980; 51: 224-31.
- [80] Adams GR, Hicken M, Salehi M. Socialization of the physical attractiveness stereotype: parental expectations and verbal behaviors. *Int J Psychol* 1988; 23: 137-49.
- [81] Mills JS, Miller JL. Experimental effect of receiving negative weight-related feedback: A weight guessing study. *Body Image* 2007; 4: 309-16.
- [82] Puhl RM, Latner JD. Stigma, obesity, and the health of the nation's children. *Psychol Bull* 2007; 133: 557-80.
- [83] Davison KK, Markey CN, Birch LL. Etiology of body dissatisfaction and weight concerns among 5-year-old girls. *Appetite* 2000; 35: 143-51.
- [84] Carnell S, Edwards C, Croker H, Boniface D, Wardle J. Parental perceptions of overweight in 3-5 y olds. *Int J Obes* 2005; 29: 353-55.
- [85] Costanzo PR, Woody EZ. Domain-specific parenting styles and their impact on the child's development of particular deviance: The example of obesity proneness. *J Soc Clin Psychol* 1985; 3: 425-45.
- [86] Birch LL, Fisher JO, Grimm-Thomas K, Markey CN, Sawyer R, Johnson SL. Confirmatory factor analysis of the child feeding questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite* 2001; 36: 201-10.
- [87] Fisher JO, Birch LL. Restricting access to palatable food affect children's behavioral response, food selection, and intake. *Am J Clin Nutr* 1999; 69: 1264-72.
- [88] Heatherton TF, Polivy J, Herman CP. Restraint and internal responsiveness: Effects of placebo manipulations of hunger state on eating. *J Abnorm Psychol* 1989; 98: 89-92.
- [89] Wardle J, Guthrie CA, Sanderson S, Rapoport L. Development of the children's eating behaviour questionnaire. *J Child Psychol Psychiatry* 2001; 42: 963-70.
- [90] Groesz LM, Levine MP, Murnen SK. The effect or experimental presentation of thin media images on body satisfaction: A meta-analytic review. *Int J Eat Disord* 2001; 31: 1-16.
- [91] Greenberg BS, Eastin M, Hofschire L, Lachlan K, Brownell KD. Portrayals of overweight and obese individuals on commercial television. *Am J Public Health* 2003; 93: 1342-48.
- [92] Cusumano DL, Thompson JK. Media influence and body image in 8-11 year-old boys and girls: A preliminary report on the multidimensional media influence scale. *Int J Eat Disord* 2001; 29: 37-44.
- [93] Sands ER, Wardle J. Internalization of ideal body shapes in 9-12-year-old girls. *Int J Eat Disord* 2003; 33: 193-204.
- [94] Latner JD, Rosewall JK, Simmonds MB. Childhood obesity stigma: Association with television, videogame, and magazine exposure. *Body Image* 2007; 4: 147-55.
- [95] Harrison K. Television viewing, fat stereotyping, body shape standards, and eating disorder symptomatology in grade school children. *Commun Res* 2000; 27: 617-40.
- [96] Harrison K, Bond BJ. Gaming magazines and the drive for muscularity in preadolescent boys: A longitudinal examination. *Body Image* 2007; 4: 269-77.

- [97] Bell BT, Lawton R, Dittmar H. The impact of thin models in music videos on adolescent girls' body dissatisfaction. *Body Image* 2007; 4: 137-45.
- [98] Knauss C, Paxton SJ, Alsaker FD. Relationships amongst body dissatisfaction, internalization of the media body ideal and perceived pressure from media in adolescent girls and boys. *Body Image* 2007; 4: 353-60.
- [99] Holt K, Ricciardelli L.A. Social comparisons and negative affect as indicators of problem eating and muscle preoccupation among children. *J Appl Dev Psychol* 2002; 23: 285-304.
- [100] Quebec Institute of Statistics. Enquête social et de santé auprès des enfants et des adolescents québécois 1999 [Quebec Child and Adolescent Social and Health Survey]. Health and Well-Being Series. Government of Quebec 1999.
- [101] Devault C, Jeannin A, Narring F, Ferron C, Michaud PA. Eating disorders among female adolescents in Switzerland: Prevalence and association with mental and behavioral disorders. *Int J Eat Disord* 1998; 24: 207-16.
- [102] Story M, French SA, Neumark-Sztainer D, Downest B, Resnick MD, Blum BW. Psychosocial and behavioral correlates of dieting and purging in Native American adolescents. *Pediatrics* 1997; 99 : e8.
- [103] Brausch AM, Muehlenkamp JJ. Body image and suicidal ideation in adolescents. *Body Image* 2007; 4: 207-12.
- [104] American Psychological Association. Topic; Obesity. Retrieved June 2008. <http://www.apa.org/topics/topicobesity.html>.
- [105] Rosen JC. Cognitive-behavioral body image therapy. In Garner DM, Garfinkel PE. Eds, *Handbook of treatment for eating disorders* (2nd ed.) New York: The Guilford Press 1997.
- [106] Cash TF. *What do you see when you look in the mirror? Helping yourself to a positive body image*. New York: Bantam Books 1995.
- [107] Dworkin SH, Kerr BA. Comparison of interventions for women experiencing body image problems. *J Coun Psych* 1987; 34: 136-40.
- [108] Fisher E, Thompson JK. A comparative evaluation of cognitive-behavioral therapy (CBT) versus exercise therapy (ET) for the treatment of body image disturbance: Preliminary findings. *Behav Modif* 1994; 18: 171-85.
- [109] Fairburn CG, Jones R, Peveler RC, *et al.* Three psychological treatments for bulimia nervosa: A comparative trial. *Arch Gen Psychiatry* 1991; 48: 463-69.
- [110] Rosen JC. Body image assessment and treatment in controlled studies of eating disorders. *Int J Eat Disord* 1996; 20: 331-43.
- [111] Veale D, Ennis M, Lambrou C. Possible association of body dysmorphic disorder with an occupation or education in art and design. *Am J Psychiatry* 2002; 159: 1788-90.
- [112] Ramirez EM, Rosen JC. A comparison of weight control and weight control plus body image therapy for obese men and women. *J Consult Clin Psychol* 2001; 69: 440-6.
- [113] Farrell C, Shafra R, Lee M. Empirically evaluated treatments for body image disturbance: A review. *Eur Eat Disorders Rev* 2006; 14: 289-300.
- [114] Epstein L, Paluch RA, Kilanowski CK, Raynor HA. The effect of reinforcement or stimulus control to reduce sedentary behavior in the treatment of pediatric obesity. *Health Psychol* 2004; 23: 371-80.
- [115] Golan M, Fainaru M, Weizman A. Role of behavior modification in the treatment of childhood obesity with the parents as the exclusive agents of change. *Int J Obes Relat Metab Disord* 1998; 22: 1-8.
- [116] Golan M, Vaitzman A, Fainaru M. Impact of treatment for childhood obesity on parental risk factors for cardiovascular disease. *Prev Med* 1999; 29: 519-26.
- [117] Golan M, Weizman A, Apter A, Fainaru M. Parents as the exclusive agents of change in the treatment of childhood obesity. *Am J Clin Nutr* 1998; 67: 1130-38.
- [118] Kitzmann KM, Beech BM. Family-based interventions for pediatric obesity: Methodological and conceptual challenges from family psychology. *J Fam Psychol* 2006; 20: 175-89.
- [119] Kitzmann KM, Dalton III W, Buscemi J. Beyond parenting practices: Family context and the treatment of pediatric obesity. *Family Rel* 2008; 57: 13-23.
- [120] Davison KK, Birch LL. Childhood overweight: A contextual model and recommendations for future research. *Obesity Rev* 2001; 2: 159-71.
- [121] Dennison BA, Erb TA, Jenkins P L. Television viewing and television in bedroom associated with overweight risk among low-income preschool children. *Pediatrics* 2002; 109: 1028-35.
- [122] Arredondo EM, Elder JP, Ayala GX, Campbell N, Baquero B, Duerksen S. Is parenting style related to children's healthy eating and physical activity in Latino families? *Health Educ Res* 2006; 21: 862-71.
- [123] Stark LJ, Collins FL, Osnens PG, E. Using reinforcement and cueing to increase healthy snack food choices in preschoolers. *J Appl Behav Anal* 1986; 19: 367-79.
- [124] Birch L, Fisher J. Mother's child-feeding practices influence daughters eating and weight. *Am J Clin Nutr* 2000; 71: 1054-61.