

Behavioral and Psychosocial Factors in Childhood Obesity

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1. Introduction

Obesity has been recognized as a major public health problem and one of the most important causes of the burden of disease worldwide (Ezzati et al, 2002). Its prevalence has escalated over the last two decades, reaching pandemic levels in the developed countries and also increasing in the developing world (Wang & Lobstein, 2006). In fact, in the newsletter of the World Health Organization/Europe, called *The Bridge*, published in 2010, it's stated that "Paradoxically coexisting with under-nutrition, an escalating global epidemic of overweight and obesity – *globesity* – is spreading over many parts of the world" (p. 11). The pandemic of obesity originated in the United States of America and crossed to Europe and the world's poorest countries (Prentice, 2006).

The obesity phenomenon is observed not only in adults. Despite large differences among countries and regions, a global childhood obesity epidemic has also emerged worldwide. In many countries, including the United Kingdom, the United States, Australia, Brazil and China, child overweight is increasing at a faster rate than is adult obesity (Popkin et al, 2006). Of particular concern is the upward trend in countries that have traditionally experienced low rates of overweight (Lissau et al, 2004). In fact, obesity in children and adolescents is well recognized as a major public health concern (Institute of Medicine, 2005) because of alarming trends in the prevalence, severity, and occurrence of adverse health and psychosocial consequences over the life cycle. Compared with the past two decades, the rates of children who are obese has doubled, while the number of adolescents who are obese has tripled. So, in the United States, according to the National Health and Nutrition Examination Survey [NHANES] (Odgen et al, 2010), almost 32% of children and adolescents aged 2–19 years were overweight (Body Mass Index [BMI] at or above 85th percentile), while almost 17% were obese (BMI at or above 95th percentile). NHANES data indicated disparities among racial/ethnic groups, with Hispanic boys and non-Hispanic black girls disproportionately affected by obesity.

Childhood obesity also poses a serious problem in Europe. Studies conducted in Scotland (Craig et al, 2010) and England (Stamatakis et al, 2010) showed that in the United Kingdom there is a clear socioeconomic gradient with high prevalence of being overweight and obese in low socioeconomic strata. Mediterranean countries also present high levels of childhood

overweight in Europe. In Spain the nationwide enKid study reported prevalences of 12.4% for overweight and 13.9% for obesity among 2–24-year-olds, with the highest values observed between 6 and 13 years of age (Serra Majem et al, 2006). Spanish preadolescents (10–12 years) appear to be at particularly high risk, reaching prevalences of overweight and obesity of 29.9% and 8.9% respectively (Vázquez et al, 2010). Greece presents childhood obesity statistics as high as Spain (Lagiou & Parava, 2008). In Eastern Europe, rates are climbing substantially. Hungary has reported that 20% of children between the ages of 11 and 14 years are obese; in Poland rates have increased from 8% to 18% from 1994 to 2000 (World Health Organization, 2005).

Childhood obesity also extends to other areas of the world besides the United States and Europe. In the Middle East, the situation is critical: Eighteen percent of all children are overweight and 7% obese (Lobstein & Frelut, 2003). In Israel, the rate of 13.9% is on the rise (Keinan-Boker et al, 2005). In the Oceania region, Australia's current rates in children are among the highest in the developed world, with 20% of children overweight and 10% obese (Barnett, 2006). In New Zealand, 20% of children between the ages of 5 and 14 years are overweight, with another 10% obese. Approximately, 31% of Maori and Pacific Islander children are affected (Baur, 2006).

Estimates of the prevalence of overweight and obesity in school-aged youth from 34 countries (Janssen et al, 2005) showed a similar picture in prevalence rates to those noted above. The three countries with the highest prevalence of overweight youth were Malta (25.4%), the United States (25.1%), and Wales (21.2%). The countries with the highest prevalence of obesity were Malta (7.9%), the United States (6.8%), and England (5.1%). The three countries with the lowest prevalence of overweight and obese youth were Lithuania (5.1% and 0.4%), Russia (5.9% and 0.6%), and Latvia (5.9% and 0.5%).

Given the current prevalence of childhood obesity and the wide geographic distribution throughout the world, the term *pandemic* is appropriated to describe the picture of the new millennium (Kimm & Obarzanek, 2002). The Healthy People 2010 Program in the United States sets the goals of reducing obesity prevalence to 5% in children (U.S. Department of Health and Human Services, 2006), which is unlikely to be met.

It must also be noted that obesity is related to health problems in children, adolescents and adults. High BMI in children and adolescents may have immediate consequences on health, with particular impact on high cholesterol and high blood pressure, which are risk factors for cardiovascular disease (CVD). In one study (Freedman et al, 2007), 70% of obese children had at least one CVD risk factor, and 39% had two or more. Also, children with obesity are more likely to have increased risk of impaired glucose tolerance, insulin resistance and type 2 diabetes (Whitlock et al, 2005). Psychological problems such as depression and worsening quality of life are also correlates of serious obesity (Daniels et al, 2005). In addition, obese children are more likely to become obese adults (Biro & Wien, 2010). In the analysis of three nationally representative cohorts of children (Van Cleve et al, 2010), it was reported that for all cohorts, 37% of children with obesity at the beginning of the study were so classified six years later. Both overweight and obesity also are major risk factors for a number of chronic diseases in adults, including diabetes, cardiovascular disease and certain cancers (National Institutes of Health, 1998).

The high prevalence of overweight and obesity, and the many adverse impacts associated with them, provide evidence of the need for a clear understanding of its causes to guide effective prevention and treatment. Obesity is believed to be of multifactorial etiology, but

the mechanisms involved in its development are not well understood. This chapter will review the relevant literature concerning both behavioral and psychosocial factors involved in childhood obesity, and the impact of childhood obesity on mental health.

2. The contribution of psychosocial and cultural factors to understanding childhood obesity

Although the mechanism of development of childhood obesity is not fully understood, it is clear that obesity occurs when energy intake exceeds energy expenditure. There are multiple factors for this imbalance; hence the rising prevalence of childhood obesity cannot be attributed to a single etiology. The causes of childhood obesity are complex and multifaceted because it is a condition with many genetic, biological, environmental and psychosocial influences. Genetic factors influence susceptibility to obesity (Franks & Ling, 2010; Lyon & Hirschhorn, 2005; Seal, 2011). However, behavioral and social factors seem to play significant roles in the rising prevalence of childhood obesity worldwide, rather than changes in biological or genetic factors (Dunton et al, 2009; Ferreira et al, 2006). These include, among others, dietary factors and eating habits, physical activity and social factors (Ben-Sefer et al, 2009).

2.1 Dietary and eating behavior patterns

Weight gain occurs as a result of energy imbalance, particularly when energy intake through food intake exceeds energy expenditure for body functions and physical activity. Recent research and reviews indicate that so-called *energy balance related behaviors* can contribute to the development of overweight and obesity, particularly a combination of increased fat intake, decreased physical activity and increased *screen time* (Ekelund et al, 2004). Screen time is the amount of time that a child spends watching television, playing on the computer and with videogames.

Factors that are named frequently as contributors to excess energy intake include restaurant food, sweetened beverages, large portion sizes, and the frequency of meals and snacks. Diverse eating patterns confound the understanding of the relationship between nutrient intake and chronic diseases, including obesity. These eating patterns seem to be related more consistently to increased total energy intake than to actual weight status (Krebs et al, 2007). Some studies showed that children (Bowman et al, 2004; Paeratakul et al, 2003) and adolescents (French et al, 2001) who consumed fast food more frequently had higher energy intakes and poorer diet quality, compared with those who did not. Overweight adolescents are less likely than their leaner counterparts to compensate for the increased energy in the food by adjusting energy intake throughout the day (Ebbeling et al, 2004). It has also been reported that energy intake has been related positively to consumption of sweetened beverages by children and adolescents (Nielsen & Popkin, 2004). Research studies have consistently found that when adults and children eat out instead of eating at home, they consume more fat and calories, more fried foods, more soft drinks, fewer fruits and vegetables, and less fiber (French et al, 2000; Zoumas-Morse et al, 2001).

The environment we live in has been described as *obesogenic*. The concept of an obesogenic environment has been defined as “the sum of influences that the surroundings, opportunities or conditions of life have on promoting obesity in individuals or populations” (Swinburn et al, 1999, p. 564). Many cultural and environmental factors are considered

obesogenic by having negatively influenced eating behaviors and the physical activity levels of children and adolescents. Time and economic pressures force many parents to minimize food costs and meal preparation time, resulting in an increase in availability and consumption of high-calorie and high-fat convenience foods and beverages, fewer family meals, more meals eaten away from home, and greater portion sizes (Johnson et al, 2008; Newby, 2007).

A school food policy to promote healthy eating behavior can also impact the food intake of children, reducing the intake of sugar and fat in food (Neumark-Sztainer et al, 2005). But other food policies and initiatives such as the presence of vending machines in schools (Belderson et al, 2003), the consumption of packed lunches at school (Whincup et al, 2005), or the use of breakfast clubs (New & Livingstone, 2003) can increase overweight/obesity.

All of the factors described above are contributing to create a “toxic environment” that promotes in the population the consumption of unhealthy foods because they are better tasting, are highly accessible and are less expensive, as compared with healthy foods (Schwartz & Brownell, 2007). So, the increasing prevalence of obesity, particularly in the developed world, is partially explained by societal changes that promote both consumption of energy-dense foods and unhealthy eating patterns (Centers for Disease Control and Prevention, 2011).

2.2 Physical activity and sedentary behavior

Physical activity is an important factor of health and well-being for people of all ages. There is evidence supporting the link between physical inactivity and obesity in children (Tremblay & Willms, 2003) and adolescents (Janssen et al, 2006). Children who are physically active may gain immediate and long-term positive effects (Hartmann et al, 2010). However, low levels of fitness (Tomkinson et al, 2003) and recent declines in active transportation, such as walking and cycling to school (Carlin et al, 1997), have been reported among children in many developed countries.

Physical activity patterns established during childhood may continue into adulthood (Friedman et al, 2008), but longitudinal studies show a decline in physical activity with increasing age (Telama et al, 2005), with physical activity tracking at low to moderate levels across the life span (Malina, 2001). Studies reveal a decrease in physical activity participation during adolescence (Kimm et al, 2002; Van Mechelen et al, 2000) and differences in patterns of physical activity participation for males and females (Sallis et al, 2000). Moreover, perceived sports competency (females), and cardio-respiratory fitness, playing sports outside school and having active fathers (males) in childhood and adolescence were positively associated with being persistently active during the transition from adolescence to adulthood (Jose et al, 2011).

There is evidence that decreased opportunities and participation in physical activity contributes to overweight. Opportunities for children's physical activity include participation in structured activities, such as physical education at school and in organized sports teams, as well as less structured activities such as walking and cycling to school and active free-play (Pangrazi, 2000). School physical education programs have decreased because of the pressure to increase test scores, so children's opportunities to participate in recess and physical education activities during school time are decreasing. And it seems that children are not compensating for the lost physical activity time by increasing their physical activity level after school or on holiday (Andersen & van Mechelen, 2005). In fact,

contemporary children may also engage in sedentary activities after school, and spend less time walking to school and playing outside. Moreover, sedentary behaviors, such as watching television, playing on the computer and with videogames have increased (American Academy of Pediatrics, 2006; Barlow & the Expert Committee, 2007). It has been reported that preschool children spend around 80% of their time in activities classified as sedentary (Reilly et al, 2004). However, the relationship between sedentary behavior and obesity is not explained solely by reduced physical activity. In a population of adolescent females, correlation between percentage of body fat and Internet viewing time persisted even after controlling for physical activity (Schneider et al, 2007).

The Centers for Disease Control and Prevention (2003) recommended that children be active daily at least 60 minutes. In addition, the American Academy of Pediatrics (2003) recommended that children accumulate no more than two hours per day of screen time. Despite these recommendations, it seems that the real situation is quite different. In the U.S., in a nationally representative cross-sectional study of 2,964 children aged 4 to 11 years (Anderson et al, 2008), it was found that 37.3% had low levels of activity play, 65% had high screen time, and 26.3% had both those behaviors.

Children spend more time with media than in any other activity except for sleeping—an average of more than seven hours/day (Rideout, 2010). Children and teenagers who use a lot of media may tend to be more sedentary in general (Jordan, 2007; Vandewater et al, 2004). Children and teenagers who watch more TV tend to consume more calories or eat higher-fat diets, and to have poor eating behaviors (Barr-Anderson et al, 2009; Pearson et al, 2011; Zimmerman & Bell, 2010). In a prospective study of 3-year-old children, TV viewing and physical activity measures at age 3 were better predictors of BMI at age 6 than eating habits (Jago et al, 2005). Moreover, TV viewing has been identified as the strongest connection between a specific behavior and childhood obesity (Whitaker, 2003).

Undoubtedly media play an important role in the current epidemic of childhood and adolescent obesity. Screen time may displace more active pursuits, advertising of junk food and fast food increases children's requests for those particular foods and products, snacking increases while watching TV or movies (Council on Communications and Media, 2011). Late-night screen time is known to displace or disturb children's and teens' sleep patterns, and there is evidence that later bedtimes and less sleep may be associated with a greater risk of obesity (Bell & Zimmerman, 2010; Taheri, 2006).

Recently, a new generation of video games that requires interactive physical activity, known as *exergaming*, has become popular. These new video games have the potential to attract children to become more physically active and could have particular value for extremely sedentary individuals or those who may shun traditional forms of exercise. For example, a study of preteens playing *Dance Revolution* and *Nintendo's Wii Sports* found that energy expenditure was equivalent to moderate-intensity walking (Graf et al, 2009).

However, despite protective effects of physical activity on adiposity of childhood obesity (particularly in adolescents), significant methodological limitations related to the validity of the measurements of both physical activity and body fatness must be considered (Reichert et al, 2009).

2.3 Socioeconomic and cultural factors

One consistent epidemiological finding is the fact that, in highly developed countries at least, the prevalence of obesity is inversely associated with both socioeconomic status and

educational status (Mustillo et al, 2003; Prentice, 2006). Economic poverty and/or lack of education impair a person's ability to resist the current obesogenic environment, so in highly developed societies, obesity may be a cause of economic disadvantage rather than simply a consequence (O'Rahilly & Farooqi, 2008). Data have suggested that in industrialized countries, excess weight gain in children was more prevalent among lower-income families (Veugelers & Fitzgerald, 2005; Wang et al, 2002). Low-income families face numerous barriers including food insecurity, lack of safe places for physical activity, and lack of consistent access to healthful food choices, especially fruits and vegetables (American Academy of Pediatrics, 2003).

There are large disparities in obesity between socio-demographic groups. Findings from nationally representative surveys conducted by the Centers for Disease Control and Prevention, the National Health and Nutrition Examination Survey, and the Youth Risk Behavior Surveillance System in the United States (Wang, 2011) indicated that some population groups are affected more seriously than others. For example, Native American, Black and Mexican-American children have the highest prevalence of obesity, whereas Asians have the lowest rate among all ethnic groups; preschool age children have a lower obesity prevalence than older children; young people in some states and cities are twice as likely to be overweight or obese than those living in other regions; low socioeconomic status is associated with obesity only among some population groups.

Beliefs about what foods are desirable or appropriate, what is an attractive or healthy weight, how families should share meals, and the authority parents have over children at different ages, as well as many other attitudes that affect lifestyle habits are influenced by cultural values and beliefs. For example, some studies have examined differences between identified racial, ethnic, or cultural groups; it has been pointed out that black girls are more satisfied with heavier bodies than are white girls (Kimm et al, 1997). A study of low-income minority parents of preschool-aged children showed that Hispanic parents had indulgent feeding styles more often than did low-income black parents (Hughes et al, 2005).

Sociocultural factors in the household are the most investigated environmental factors for all *energy balance related behaviors*. It must be noted first that a systematic review of environmental factors of obesity-related eating behaviors in children and adolescents (Van der Horst et al, 2007) showed consistent evidence for relationships between parental and children's fat, fruit and vegetable intake; for parental and siblings' intakes with adolescents' energy and fat intake; and for parental educational level with adolescents' fruit and vegetable intake. In addition, a systematic review of studies on factors influencing physical activity level (Ferreira et al, 2006) identified fathers' physical activity habits, school physical activity-related policies and time spent outdoors as potential determinants of physical activity in children. As we noted previously, the emergence of the technology revolution with handheld videogames and cell phones may also promote sedentary lifestyles and reduced children's physical activity levels (McMurray et al, 2000).

3. Behavioral and emotional problems associated with childhood obesity

Overweight and obesity have received a great deal of attention in psychological and psychiatric research. It was postulated that obese people suffer from their weight situation given the fact that obesity is a highly visible condition meaning that everybody can evaluate the weight status of others and make commentaries about it (Warschburge, 2005). Consequently there are a wide range of behavioral and emotional outcomes that have been

studied in association with obesity in children and adolescents, particularly those related to stigma, psychological well-being, and mental health problems.

3.1 Stigma

It is generally agreed that being obese or even being overweight is one of the most stigmatizing and least socially acceptable conditions in childhood (Schwimmer et al, 2003). Modern societal prejudice against obesity and overweight is widespread, even toward children and adolescents.

A stigma is defined as a mark or attributes that link a person to undesirable characteristics or negative stereotypes (Goffman, 1963). Stigma is part of a cultural system of shared meanings or schemas that allow people to control behavior, interpret the world, respond to differences, express disapproval or explain danger or inferiority (Jones et al, 1984; Page, 1984). It can be seen as a relationship between an attribute and a stereotype (Jones et al, 1984). There are three related concepts which comprise a set of issues to be considered in any stigmatized situation: Associative stigma, internalized stigma, and stigma management. *Associative stigma*, which Goffman (1963) called *courtesy stigma*, is ascribed to people who are voluntarily attached as caregivers or acquaintances to people who are stigmatized, such as dying or mentally ill patients. *Internalized stigma*, or accepting the discrediting of one's worth conveyed by society, can occur without the experience of overt mistreatment and can lower a person's sense of self-esteem and prestige because he or she is aware of the threat of censure and rejection (Jones et al, 1984). *Stigma management* is central to coping with carrying a stigma; that is, being aware of the real or potential negative reactions of others and attempting to minimize their effects (Jones et al, 1984; Page, 1984). The stigmatized person who strives to manage the stigma must consider the problems of concealment, disclosure, and "passing" as normal, secrecy, information management, and social visibility (Goffman, 1963; Page, 1984).

There are weight-related beliefs and attitudes that are expressed as stereotypes, prejudice and rejection toward children and adolescents because they are overweight or obese. In a society where slimness is valued and self-determination is emphasized, obese people are often viewed as undesirable, lazy and responsible for their condition. As a result, obese children are often subject to negative stereotyping, discrimination and social rejection. Often they encounter physical bullying by peers (such as pushing, hitting, or kicking), verbal teasing (name calling, being made fun of), and social exclusion (such as being excluded from peer activities, being avoided or ignored). Research on Canadian children aged 11–16 years reported that overweight and obese boys and girls were more likely to be the victims of physical, verbal and relational bullying than their normal weight peers (Janssen et al, 2004). A study in the United States, found that, compared with average weight children, obese children reported being teased at least three times more often (Neumark-Sztainer et al, 2002). It was found that between a quarter and a third of those teenagers report being teased by peers for reasons of weight, with obese girls and thin boys showing the highest levels of teasing (Eisenberg et al, 2003). A review of gender differences found that overweight girls were stigmatized significantly more often than boys and they typically faced more teasing, bullying and social marginalization in both friendships and romantic relationships (Tang-Peronard & Heitmann, 2008).

In addition, it appears that obese children and adolescents have difficulties with peer relationships. As many as one-third of obese children have no reciprocated friendships

(Zeller et al, 2008). Peers rank obese children among the least desirable playmates (Zametkin et al, 2004). Obese youngsters themselves report being less socially accepted (McCullough et al, 2009).

Obese and overweight children are also susceptible to negative attitudes from teachers, parents, and even health professionals. The term *civilized oppression* was used to describe the pervasive pattern of ongoing, daily denigration and condemnation that constitutes living as an obese person (Rogge et al, 2004). Adults have been found to stigmatize obese children citing that they are untidy and lack self-control (Zametkin et al, 2004). Children as well as adults stereotype the obese as "lazy," "ugly" and "stupid" (Latner & Stunkard, 2003). There are also current prejudicial beliefs well documented among health professionals that obese people are "gluttonous," "lazy," "bad," "weak," "stupid," "worthless" and "lacking in self control" (Schwartz et al, 2003). Even obesity prevention initiatives for children often inappropriately label large numbers of children as "overweight" or "fat" (Szwarc, 2004-2005).

3.2 Psychological well-being

Psychological well-being is a relatively complex notion with a variety of components that may contribute to it. The elements of psychological well-being believed to be most seriously compromised in obesity are self-esteem, body image and emotional well-being (focused primarily on quality of life and social functioning).

Studies on self-esteem in obese children and adolescents report inconsistent results. Martyn-Nemeth et al (2009) found that low self-esteem is clearly associated with overeating and weight gain in adolescents. Many other studies indicate that overweight and obese children and adolescents have moderately lower self-esteem than non-obese peers (French et al, 1996; Friedlander et al, 2003; Hesketh et al, 2004). Other studies reveal no differences in self-esteem between population-based groups of obese children and adolescents and non-obese controls (Renman et al, 1999; Strauss, 2000). Furthermore, studies report that self-esteem is not significantly lower in obese populations once body image is controlled for (French et al, 1995; Pesa et al, 2000).

Clinical samples of obese children also report higher levels of psychosocial maladjustment and lower self-esteem than population-based samples of either obese or normal-weight children (Hill, 2005; Sjoberg, 2005). Obesity in children seeking clinical treatment is often more severe than in children in the general population (Flodmark, 2005). This may reflect the different characteristics of those who are seeking treatment because they are more negatively affected psychologically by their obesity or they feel unable to control it (Wardle & Cook, 2005).

Self-esteem in obese children varies with gender, age and ethnicity (Walker & Hill, 2009; Wardl & Cooke, 2005). Obese females seem to be at greater risk for self-esteem problems because body image is an important component of their self-esteem; adolescents appear more at risk than younger children, and whites are more susceptible than Hispanics or African-Americans. But in a recent systematic review the differences between children and adolescents were not so clear (Griffiths et al, 2010).

As for body image, the most consistently replicated finding is that obese children and adolescents have a more negative body image than their peers and often believe that they have been responsible for their obesity (Ben-Sefer et al, 2009). Overweight children as young as age 5 can also develop a negative body image (Pallan et al, 2011). A relationship between

increasing weight status and body dissatisfaction in older children has been observed in many different cultural communities (Crow et al, 2006; Duncan et al, 2006; Fonseca et al, 2009; Mirza et al, 2005). However, it does not appear to be inevitable, and many obese children are not aware that they are overweight (Wardle & Cooke, 2005). Moreover, researchers of both American and Australian adolescents suggested that the perception of being obese appears to be more predictive of mental disorders than actual obesity status (Ali et al, 2010; Allen et al, 2006).

Obesity in children also may correlate with poorer quality of life (Flodmark, 2005). A cross-sectional study of children and adolescents between ages 5 and 18 years demonstrated that severely obese children and adolescents have lower health-related quality of life than children and adolescents who are healthy, and similar quality of life as those diagnosed as having cancer (Schwimmer et al, 2003). In addition, given the importance placed on body shape and size in occidental culture, overweight children may experience elevated peer problems and peer rejection compared to non-overweight children. The psychosocial burden of excess weight appears to be significant even in young children. A cross-sectional survey conducted in 100 primary schools of a large French region, with 2,341 children aged 6–11 randomly selected (Pitrou et al, 2010) found that overweight was strongly associated with poor social functioning and with higher rates of peer difficulties.

Other studies, however, have different findings to those already mentioned in relation to childhood obesity and psychological well-being. In an extensive review of the empirical evidence on the relationship between childhood obesity and psychological well-being (Wardle & Cooke, 2005), the authors concluded that obese children seem to have psychological resilience to the adverse consequences of obesity. In fact, after examining the most relevant studies in this area, they find that while levels of body dissatisfaction are higher in community samples of overweight and obese children and adolescents than in their normal-weight counterparts, few are significantly depressed or have low self-esteem. A number of potential moderators and mediators of the association between obesity and psychological well-being have been proposed. Emerging most strongly are gender, age and ethnicity, but future research has some way to go before the risk and protective factors are fully established.

3.3 Mental health problems

Bruch and Touraine (1940) were the first authors to show a particular interest in the emotional functioning of obese children and adolescents. Since earliest publication, the psychopathological features of children with overweight and obesity have been studied extensively. The understanding of the relationship between obesity and common mental health disorders in children and adolescents is less advanced, and results are inconsistent (Gatineau & Dent, 2011). In addition, it must be noted that research in this area is subjected to many limitations (Costello et al, 2005; Pitrou et al, 2010, Vila et al, 2004; Wardle et al, 2005) such as the use of clinical samples that may not reflect the general population, the infrequent inclusion of structured clinical interviews based on diagnostic criteria, the lack of use of control groups in the study design, etc.

Despite these limitations, there are a number of interesting findings about childhood obesity in relation to mental health problems. Several studies have found mental health problems in young people with obesity. Higher rates of depression, anxiety, eating disorders, social withdrawal and behavioral problems have been found among obese children and youth

(Bosch et al, 2004; Zametkin et al, 2004). For example, a study carried out in 155 French children and adolescents referred and followed for obesity (Vila et al, 2004) reported that when administered diagnostic interviews with the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS-R), 58% of obese children had at least one DSM-IV psychiatric diagnosis, and between 50% and 64% scored positive on questionnaire screening techniques. The most frequent disorder was anxiety disorder (32%), followed distantly by disruptive behavior disorder (16%), and affective disorder (12%). Psychopathology was particularly prominent in those children whose parents scored high on the General Health Questionnaire (GHQ-28; a screening questionnaire of psychiatric and non-psychotic morbidity). Compared with diabetic children, they displayed significantly higher internalized and externalized questionnaire scores and poorer social skills. Another study reported that a substantial number of referred obese youngsters suffered from mental disorders (Van Vlierberghe et al, 2009). In this research there were also differences in the prevalence of psychiatric disorders, and in the psychological symptoms between referred and non-referred overweight youngsters: Referred youth displayed significantly more eating disorders and binge-eating disorders than non-referred youngsters and exhibited a significantly greater severity of internalized symptoms.

Related to eating disturbances, Stice et al (2002) found that emotional eating was positively associated with binge-eating disorder (BED), and BED was predictive of obesity (but negative affect alone was not related to BMI). However, BED has been rarely found in samples of obese children seeking inpatient or outpatient treatment (Decaluwé & Braet, 2003). In fact, eating disturbances such as binge eating, episodic overeating and the use of inappropriate compensatory behaviors are more common in adolescents and young adults (Britz et al, 2000; Decaluwé et al, 2003).

In contrast, some population-based studies did not report significant associations between overweight and psychopathology (Drukker et al, 2009; Erermis et al, 2004; Lamertz et al, 2002; Wardle et al, 2006). This contrasts with those studies using clinical samples that generally show a clear positive association between overweight and levels of depressive symptoms and anxiety disorders (Pine et al, 2001; Van Vlierberghe et al, 2009; Vila et al, 2004), and oppositional defiant disorders (Mustillo et al, 2003). One possible explanation is that people who suffer mentally from their elevated weight status, significantly more often seek professional help than those who do not, and thereby bias the clinical samples toward higher levels of psychopathology (Pitrou et al, 2010).

Prospective studies in the literature also found an association between obesity and psychopathology. For example, in a community-based cohort of 820 youths, studied longitudinally at four occasions spanning childhood and early adulthood (Anderson et al, 2006), it was found that DSM disorders of anxiety and depression were associated with higher BMIs in females but not in males.

Moreover, childhood obesity has been associated with emotional and behavioral problems from a very young age, but findings are inconsistent. Results from the UK's Millennium Cohort Study (Griffiths et al, 2011) indicated that at age 5, obese boys are at particular risk of hyperactivity and inattention problems, conduct problems, and peer relationship problems when the Strengths and Difficulties Questionnaire (SDQ) is used to screen psychopathology outcomes. But in a cross-sectional study of a national representative sample of 4- to 5-year-old Australian children (Sawyer et al, 2006) it was found that differences in rates of SDQ mental health problems experienced by young children of different weight status appear

relatively small. It seems that higher rates of mental health problems experienced by many obese boys may reflect differences in their socio-demographic characteristics rather than their weight status per se.

Related to hyperactivity and inattention problems, it has been suggested that the impulsivity and poor behavioral regulation often found in youth with Attention-Deficit/Hyperactivity Disorder (ADHD) may lead to the development of eating patterns that put youth at increased risk for obesity. Research conducted in clinical samples (Holtkamp et al, 2004; Hubel et al, 2006; Lam & Yang, 2007) linked overweight and ADHD in children. And even a large cross-sectional study of children and adolescents aged 5 to 17 years (Waring & Lapane, 2008) reported that unmedicated children with ADHD are more likely to be overweight.

It was also reported that disordered sleep may be one of the many contributors to excessive weight during childhood (Beebe et al, 2007). Longitudinal studies have documented that shorter sleep times predict the later emergence of overweight (Agras et al, 2004). A cross-sectional study of 383 youths ages 11–16 years (Gupta, 2002) indicated that overweight youths experienced less total sleep time than non-obese youths, although there were no significant differences between the groups in measures of sleep disturbance. Some studies also suggest that children and adolescents with major depression disorders and a high BMI have more fragmented sleep than healthy controls (Wojnar et al, 2010).

The relationship of obesity and common mental health disorders is complex and multifactorial, especially with depression. Depression itself is often associated with abnormal patterns of eating and physical activity that could result in future obesity; however, obesity may also result in psychosocial problems that can produce depression. Evidence supports both hypotheses. Pine et al (2001) found that youths with depression are at greater risk to develop an increased BMI. Anderson et al (2006) found that depression in childhood predicted higher weight over time among female youths but not male youths. Results from longitudinal studies also suggest that depression precedes obesity in adolescents—girls, but not boys—and that obesity precedes depression in adults. In one study (Richardson et al, 2003) 1,037 New Zealanders were assessed to determine the presence of obesity and major depression in early adolescence (ages 11, 13, and 15), late adolescence (ages 18 and 21), and adulthood (age 26). After controlling for sex, socioeconomic status, maternal obesity and depression, and baseline obesity, it was reported that depression in early adolescence was associated with a slightly lower risk of adulthood obesity in both boys and girls; but the relationship between late-adolescent depression and adulthood obesity differed across the sexes: Boys who were depressed at age 18 or 21 were less likely to be obese at age 26 than were boys without depression in late adolescence; girls with late-adolescent depression, however, were twice as likely to be obese at age 26 than were girls who were not depressed at 18 or 21. Furthermore, the prevalence of obesity among girls increased linearly with the number of assessment periods at which they were depressed.

Results from the longitudinal Northern Finland 1966 Birth Cohort Study (Herva et al, 2006) indicated that obesity in adolescence may be associated with later depression in young adulthood, and being overweight/obese both in adolescence and adulthood may be a risk factor for depression among female subjects. Examining longitudinally by meta-analysis whether overweight and obesity increase the risk of developing depression, and whether depression increases the risk of developing overweight and obesity, bidirectional associations were found between depression and obesity, particularly in adults (Luppino et

al, 2010): Obese persons had a 55% increased risk of developing depression over time, whereas depressed persons had a 58% increased risk of becoming obese. In this study, the association between depression and obesity was stronger than the association between depression and overweight, which reflects a dose-response gradient.

Several mediating and moderating factors must be considered in understanding the direction and strength of the relationship between obesity and psychopathology (Markowitz et al, 2008; Napolitano & Foster, 2008). The mediating factors are those that help to explain the relationship of the two conditions, while the moderating variables might influence the strength of such relationship. The main mediating factors for obesity causing mental disorders in children and adolescents include low self-esteem, body dissatisfaction, lack of physical activity, weight-based teasing and eating disorders (Gatineau & Dent, 2011). As for moderating factors, gender and age could affect the direction and/or strength of the relationship between obesity and common psychiatric disorders in children and adolescents. Girls may be particularly vulnerable to the emotional costs of obesity (Cornette, 2008; Israel & Ivanova, 2002; Stradmeijer et al, 2000). A review of gender differences found that overweight girls were stigmatized significantly more often than boys and they typically faced more teasing, bullying and social marginalization in both friendships and romantic relationships (Tang-Peronard & Heitmann, 2008). The negative impact of obesity on mental health in children appears to increase as they get older, although research results in this area are contradictory. Some findings suggest that obese adolescents had a particular risk of emotional and psychosocial problems, while in younger children the emotional impact of overweight would be limited (Hill, 2005; Walker & Hill, 2009). However, recent findings of The Millennium Cohort Study (Griffiths et al, 2011) indicate that childhood obesity may be associated with emotional and behavioral problems from a very young age, with obese boys at particularly high risk.

4. Conclusions

This chapter reviewed the relevant literature concerning both behavioral and psychosocial factors involved in childhood obesity, and the impact of childhood obesity on mental health. The main conclusions of this review and some recommendations are summarized below:

1. Epidemiologic trends in the prevalence and worldwide distribution of overweight and obesity in children and adolescents suggest the existence of a real new pandemic in the new millennium.
2. Childhood obesity represents a dynamic process rather than a stable condition, in which genetic, psychosocial and environmental factors mutually interact as children grow and develop in different contexts.
3. Weight gain occurs from an imbalance between energy consumed and energy expended. The impact of energy balance related behaviors, particularly the combination of increased fat intake, decreased physical activity and increased screen time, on the development of childhood overweight and obesity is mediated and moderated by socioeconomic and cultural factors.
4. The disparities in obesity between different socio-demographic groups of children and adolescents indicate that obesogenic environmental changes may affect some groups more than others, which is also why different groups may have responded differently to the environmental conditions.

5. Obesity is well recognized as a major public health concern that can create tremendous social and emotional adversity both in children and in their families.
6. Stigma related to overweight and obesity is pervasive, even in children. Although environmental approaches to prevent obesity are promising because they move away from the individual as the source of the problem, they are not without stigmatized risks.
7. The relationship between obesity and psychological well-being (self-esteem, body image and emotional well-being) show inconsistent results.
8. The most frequently implicated mental health conditions in obese children are internalized problems (depression and anxiety), behavioral problems, uncontrolled eating behavior, and attention-deficit/hyperactivity disorder.
9. The relationship between obesity and mental health problems is complex and seems to be bi-directional in that clinically meaningful psychological distress might foster weight gain, and obesity may lead to emotional problems.
10. Girls may be particularly vulnerable to the emotional costs of overweight and obesity.
11. Despite the extensive current literature about the implications of childhood globesity, further research is needed, particularly long-term follow-up studies, for a better understanding of the developmental trajectories that may improve prevention and treatment efforts.
12. The holistic treatment of childhood obesity should encompass psychosocial and emotional consequences as well as physical effects.

5. References

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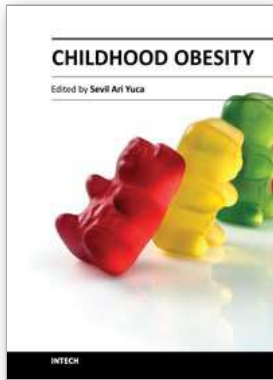
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This book aims to provide readers with a general as well as an advanced overview of the key trends in childhood obesity. Obesity is an illness that occurs due to a combination of genetic, environmental, psychosocial, metabolic and hormonal factors. The prevalence of obesity has shown a great rise both in adults and children in the last 30 years. It is known that one third of children who are obese in childhood and 80% of adolescents who are obese in their adolescent years continue to be obese later in life. Obesity is an important risk factor in serious illnesses such as heart disease, hyperlipidemia, hyperinsulinemia, hypertension and early atherosclerosis.

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