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Sandra Marisa Rosmaninho Almeida

Body Image and Depressive Symptoms in 13-year-old Adolescents

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Esta investigação realizou-se no Serviço de Higiene e Epidemiologia da Faculdade de Medicina da Universidade do Porto, sob a orientação da Professora Doutora Elisabete Ramos.

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CONTENTS

1 RESUMO

Introdução: A imagem corporal (a imagem subjectiva do próprio corpo) é um fenómeno multidisciplinar que pode ter um papel fundamental na saúde do indivíduo. Embora as preocupações com a imagem corporal comecem durante a infância e se desenvolvam ao longo da vida, é o período da adolescência, devido às profundas alterações físicas, psicológicas, emocionais e sociais, que é considerado crítico para o aparecimento de insatisfação com a imagem corporal. A imagem corporal e consequentemente a insatisfação com a imagem corporal depende do contexto sociocultural, onde existem ideais de beleza padronizados para mulheres e homens.

A adolescência é também um período crítico para o desenvolvimento de sintomatologia depressiva, que geralmente envolve sentimentos negativos em relação à imagem corporal.

Embora as potenciais associações entre a insatisfação com a imagem corporal e a saúde mental já tenham sido estudadas, ainda existe uma lacuna na investigação relativamente aos sintomas iniciais de depressão, nomeadamente em populações de base populacional e principalmente no sexo masculino.

Objectivos: O objectivo deste estudo foi avaliar a associação entre a diferença da imagem corporal ideal e a percepcionada com os sintomas depressivos em adolescentes urbanos de 13 anos de idade, assim como analisar o possível efeito modificador do Índice de Massa Corporal nesta associação.

Métodos: A investigação foi realizada no âmbito da Coorte EPITeen (*Epidemiological Health Investigation of Teenagers in Porto*). No ano lectivo 2003/2004 foram avaliados os adolescentes nascidos em 1990, inscritos nas escolas públicas e privadas da cidade do Porto, com uma proporção de participação de 77,5%. Com base nesta coorte avaliamos 1688 adolescentes. A sintomatologia depressiva foi avaliada utilizando o Inventário de Depressão de Beck (BDI-II). Usando as figuras de Stunkard os participantes indicaram a imagem com que se identificavam e qual a que gostariam de ter. A insatisfação com a imagem corporal foi definida

pela discrepância entre a imagem percepcionada e a ideal. Para comparação de variáveis contínuas com duas amostras independentes usamos o teste de Mann-Whitney, para mais de duas amostras independentes utilizamos o teste de Kruskal-Wallis. Para comparar proporções utilizamos o teste de qui-quadrado. Foram utilizados coeficientes de regressão linear para quantificar a associação entre as pontuações do BDI e as diferenças das imagens de Stunkard. Os parâmetros de regressão linear e os respectivos intervalos de confiança a 95% foram obtidos por bootstrapping.

Resultados: Nesta amostra, 57,2% das raparigas e 67,6% dos rapazes tinham uma imagem corporal ideal diferente da percepcionada. Não se encontraram diferenças de sintomatologia depressiva por categoria de Índice de Massa Corporal medido. Após ajuste, verificamos que as diferenças entre a imagem percepcionada e a ideal estavam associadas a um aumento nos sintomas depressivos em ambos os sexos. A associação mais forte foi encontrada nos adolescentes que se percepcionavam com peso a mais (β=5,18 IC95% [3,67, 6,69] para raparigas normoponderais; β=3,14 IC95% [0,10, 6,18] para raparigas com excesso de peso e β=2,44 IC95% [0,65, 4,23] para rapazes normoponderais). Para os adolescentes que se percepcionavam com peso a menos encontramos uma associação significativa apenas para as raparigas normoponderais (β=1,61 IC95% [0,02, 3,20]).

Conclusões: A insatisfação com a imagem corporal é mais importante que o peso actual na predição da sintomatologia depressiva. A relação entre os sintomas depressivos e a imagem corporal é semelhante entre os adolescentes normoponderais e com excesso de peso, mas a força da associação é superior nos adolescentes normoponderais.

2 ABSTRACT

Introduction: Body image (the individual, subjective sense of the body) is a multidimensional phenomenon which plays a vital role influencing health. Although body image concerns emerge in younger ages and continue to develop lifelong, adolescence is a critical period to body image dissatisfaction because has pronounced physical, psychological, emotional, and social changes. Body image development clearly occurs in a cultural context that is purveying gender-specific standards for physical attractiveness, body weight, and body shape.

Adolescence is also a critical stage for the development of depressive symptoms that typically involve negative feelings toward body image.

Although the potential associations between body image dissatisfaction and mental health have been studied, there is still a lack of research concerning initial symptoms of depression, namely in non clinical populations, mainly in men.

Objectives: The aim of this study was to evaluate the association between the difference among perceived and ideal body image and depressive symptoms in urban adolescents of 13-year-old, and analyze the possible modifier effect of body mass index in this association.

Methods: This investigation was carried out under EPITeen cohort (Epidemiological Health Investigation of Teenagers in Porto). During the school term 2003/2004, participants born in 1990 and registered at every public and private school of Porto were evaluated with a proportion of participation of 77.5%. Using this cohort we evaluated 1688 adolescents. The Beck Disorder Inventory II (BDI-II) was used to measure depressive symptoms. Using the Figure Rating Scale, participants were required to choose what they perceived their current figure to be, and what they perceived their ideal figure to be. Body dissatisfaction was defined by the discrepancy between perceived current and ideal figures**.** For continuous variables, to compare two independent samples we used the Mann-Whitney test and for more than two the Kruskal-Wallis test was used. To compare proportions we used the chi-square test. Linear regression coefficients were used to quantify the association between BDI scores and the differences in

Stunkard figures. Linear regression parameters and the respective 95% confidence intervals were obtained by bootstrapping.

Results: We found that 57.2% of the females and 67.6% of the males presented a discrepancy between current and ideal figures. No differences were found between depressive symptoms and categories of measured Body Mass Index. After adjustment, we found that differences in the perceived and ideal figure were associated with an increase in depressive symptoms, in both genders. The strongest association was found in adolescents that perceived themselves as being too fat (β=5.18 IC95% [3.67, 6.69] for normal weight females; β=3.14 IC95% [0.10, 6.18] for overweight females and β=2.44 IC95% [0.65, 4.23] for normal weight males). For those who perceived themselves as being too thin we found a significant association only for the normal weight females (β=1.61 IC95% [0.02, 3.20]).

Conclusions: Body image dissatisfaction is more important than actual weight in predicting depressive symptoms. The relation between depressive symptoms and body image is similar in overweight and non-overweight adolescents, but the association is stronger in non-overweight adolescents.

3 INTRODUCTION

3.1 Definition of body image

Body image is a psychological concept that refers to an individual's mental representation of his or her own body. The definition of body image has change throughout time. The earliest point of view regarding the body image was related to a neurological construct (the brain's registration of the body sensory and motor activities). One important impetus for this perspective was an attempt to understand the "phantom limb phenomenon", whereby patients still felt pain or other sensations from the amputated limbs (1).

Later, body image became to be seen as the complex experience of one's physical being at varying levels of consciousness. This point of view regards the body as the boundary between the self and everything outside the self, and one's experience of the body is a projective representation of early emotional learning. Thus, body image has less to do with feelings about the body itself than about unconscious events and feelings about the self (1).

The third point of view that follows considers body image as a perceptual representation of the body, particularly its size and shape. This narrower perspective was greatly influenced by clinical researchers trying to understand the distorted perceptions held by patients with eating disorders, such as anorexia and bulimia nervosa. Assessment of perceptual body image uses various body size estimation techniques to measure the accuracy or distortion of one's judgments (1).

The fourth perspective defines body image as a psychological attitude toward one's own physical characteristics, especially one's appearance, though it may incorporate physical competence and somatic health illness as well (1). So, researchers now distinguish at least two, relatively independent, components of body image: perceptual body image (i.e., estimation of one's body size, including perceptual distortion and discrepancy from idealized standards) and attitudinal body image (i.e., affect, cognitions, and behaviors concerning one's size/ appearance) (2). Body image, thus, is a biopsychosocial construction, partially determined by,

but not reducible to, the objective physical body. Researchers typically use self-reported questionnaires to measure specific components of body image attitudes, such as evaluations of physical attributes, and emotional feelings about the importance of one's appearance, and behaviors to manage one's appearance or one's own reactions to it (1).

When thinking about body image we can not dissociate it from the concept of body image dissatisfaction. Body image dissatisfaction is the subjective feelings of dissatisfaction with one's physical appearance. Based on this, several researchers have defined body image dissatisfaction as the discrepancy between ideal and perceived actual body sizes, and that discrepancy forms the basis for most common measures of body dissatisfaction. The largest the discrepancy between ideal and perceived body image the greater is the body dissatisfaction (3). The dissatisfaction can range from a mild preference for different characteristics to severe distress associated with extreme behaviors to change the body or avoid negative judgments (4). Body image dissatisfaction is pervasive and steadily increasing, with a majority of people reporting dissatisfaction with weight or body shape (5, 6).

Adolescents are particularly vulnerable to body image dissatisfaction (7), and adolescent body image has perceived increasing empirical and clinical attention within the few years due to the high prevalence of body image concerns in our society. In recent large community samples body dissatisfaction has been reported by 23.0%-61.8% of young women and 9.0-39.9% of young men (8-10).

3.2 Body image and body image dissatisfaction throughout the development

Body image is a very important aspect of psychological and interpersonal development namely in infants and adolescents (11, 12).

Body image in children

Since the time we are born body image continues to develop and evolve. Development occurs through a variety of inherent biological and sociocultural influences (11). A person sense of the self is rooted, in part, in the experience of embodiment. By the age of two years, most children can recognize their physical self in the mirror. Increasingly, this image becomes one representation of the personal identity (1). The process of socialization about the meaning and significance of physical appearance is influenced by the norms and expectations of one's culture, family, and peers. Cognitive and social learning entail the acquisition of emotion-laden attitudes about one's own body. Children not only acquire beliefs about what they look like, but they also internalize personal standards or ideals about what they should look like (1).

The first few years at school are concentrated on the development of literacy skills. This is important to the body image because the emergent readers use pictures, in order to make sense of the story, namely when the student's vocabulary is not sufficiently advanced to read the written text (13). Books written for children are created by adults who, consciously or not, work within their own ideological systems (13). So, children construct their identities and life trajectories as they relate to the cultural texts they encounter (14). Based on this, some studies support that six years of age is a pivotal time in girls' development of body image dissatisfaction (11, 15).

Another important instrument on the building of a body image in young ages is the set of toys that is available for children play (11). This is particularly relevant in girls because many toys that young girls play with may reinforce unrealistic expectations of women´s body shape. In

one study, researchers used anthropometric data to translate the shapes of the infamous Barbie and Ken dolls to those of adult women and men. They found that Barbie's body shape is so distorted that it has a probability of occurring in only 1 out of every 100 000 women, whereas the shape of the male doll, Ken is much more realistic and can be found in 1 out of 50 men (16). Nevertheless some unrealistic pattern became more frequent also for boys (11). In a study from the nineties it was showed that popular action figures marketed to boys had become unrealistically muscular over the past 30 years. When the degree of muscularity found on these toys was anthropometrically mapped onto the average male frame, the findings showed how the toys presented a degree of muscularity that even the most advanced bodybuilders could never attain (17).

The age at which body image concerns first appear is not completely clear (4), but research have shown that body image concerns emerge in younger ages, even before adolescence (7, 11, 15, 18-20), and that children as young as six-year-old have been found to express concern with their bodies (11, 15, 19). Some have already behaviors to change their body appearance as it was shown in a study were children as young as 8-9-year-old are engaging in dieting and strategies to increase muscle (21).

An understanding of body image must take into account that body and its appearance change over the life span (1), it is a continuum, and presumably adolescent body image is rooted in childhood body image (11).

Body image in adolescents

Adolescence is a period of live with pronounced physical, psychological, emotional, and social changes. However, adolescent body image develops as a complex function of various influences, including biological, psychological and social factors. The physical changes that

characterize this life stage have been implicated as a trigger for body image problems in both males and females (12).

Biological factors

The major landmark of physical development during adolescence is puberty, which last approximately three to four years (22). Puberty is the period which children reach biological maturity. The changes of puberty include physical growth, as well the biological growth of internal and external organs related to reproductive functioning. Large increase in sex hormones and changes in physical appearance characterize pubertal maturation (23). These physical changes of puberty growth typically initiate a redefinition of body image among adolescents (12).

The largest physical change in girls is characterized by an increased in body fat. These increase in fat tissue, and associated feature of puberty, causes girls' bodies to change from being naturally thin to more womanly, which conflicts with the cultural ideal of a slender body (12, 23, 24). For young men puberty often is a more positive experience in which the changes in body shape and weight are often desired because of the increase in muscle mass, which may be socially beneficial (12, 23-25).

Psychological factors

Adolescence is also a period of storm and stress for many young people, a period in which previous certainties are questioned and previous continuities no longer relied upon. So, the central problem of this period is the establishment of the sense of identity (26). Physiological changes and rapid physical growth provide the somatic base for the turmoil and indecision (26). Although all adolescents go through the same biological process, there are variations in the experience of puberty due individual psychological variables such as perceptions of the

experience (23). The translation of the physical body into the mental representation of the body and then into attitudes and behaviors is a complex and emotionally charged developmental process, that influence how the adolescents see themselves and consequently influence their perception of body image (12, 27).

Despite the norm for timing of maturation in human is large, adolescence may be divided into three developmental stages based on physical, psychological and social changes: Early adolescence, (from 10–13 years of age), middle adolescence (14–16), and late adolescence (17–19, but variable) (28).

Early adolescence is characterized by the developmental tasks of physical and cognitive maturation, emotional expressiveness, increased need for belonging and peer membership and experimentation with social relationships. This phase is also characterized by concrete thinking, namely an inability to see beyond the immediate or to deal with remote, future or hypothetical problems (29).

In middle adolescence, the developmental tasks and physical changes tend to become more settled with an emphasis on emotional control, intimacy, moral development, social justice and spirituality. The focus is also on improving the appearance and attractiveness, and socializing occurs in mixed-sex peer groupings, if culturally appropriate. It is during this phase of adolescence that more realistic career goals are considered and limitations recognized (29).

Late adolescence shows an increased involvement in acquiring the practical skills necessary for functioning independently from parents, making critical decisions related to adult life, as well as consolidating a moral code and socio-political ideology (29).

The increasing autonomy of adolescents and the beginning of the separation from parents makes them more susceptible to peers and social influences (28).

3.3 Risk factors in the development of body image problems

Body image development clearly occurs in a cultural context that is purveying gender-specific standards for physical attractiveness, body weight, and body shape (1). Mass media are means of communication that generate messages to the population, but it has been harshly criticized for playing a powerful role in communicating the standard ideal body image, since it present in most Western societies (24).

Idealized images of males and females are presented in the media every day. The Western culture's emphasis on beauty permeates all levels of media. The widespread dissemination of these cultural expectations fuels the drive for the ideal shape (30). In general, the media has created an image of the ideal female body type of thinness, and thinness at a level that is impossible for most women to achieve by healthy means (12, 31). It has been argued that this media presentation of thin images as the ideal body image is a major contributor to current high levels of body dissatisfaction in women (12, 24, 31, 32), and this negative influence could be caused because models in the media are seen as realistic representations of actual people rather than carefully manipulated, artificially developed images (33). Images portrayed in magazines, television advertisements and billboards, television shows and movies, and music videos have a strong impact on how adolescents relate to their physical and psychosocial environments (24, 31). The media's portrayal of the ideal standard may have a negative effect on body acceptance and research has demonstrated associations between exposure to media images and women and girls' body dissatisfaction (4, 24, 32). Such connections have been also supported by a possible dose-effect relation, such that frequent exposure to television and magazines is associated with greater body dissatisfaction (34, 35).

The processes of influence of media include social comparison, internalization of a thin ideal, and investment in appearance for self-evaluation. When women compare their body with an image presented in the media, they may find themselves wanting. Repeated exposure to

such images may lead women to internalize the thin ideal in a way that it becomes accepted by them as the reference point against which they judge themselves. Furthermore, thin ideals are not offered in a void but rather as part of complex cultural scripts that link thinness and attractiveness to happiness, desirability, and status. This schema is likely to exert particular salience in adolescence, when the major developmental task is the establishment of identity and when puberty moves girls away from, rather than toward, the thin ideal (12).

These processes may have perceptual, affective, cognitive, and behavioral consequences for body images. There may be perceptual distortion whereby women view themselves as fat when they are not. In the affective field, the failure to meet unrealistic size and weight goals leads to body dissatisfaction and negative mood. In the cognitive domain, investment in appearance as the central criterion of self-evaluation results in selective attention to appearance messages. In terms of behavior, women typically pursue the thin ideal through dieting or other weight loss measures (12, 36).

Media also have impact on male body image, however in a different way (31, 37). Men and boys are subjected to ideal media images of broad shoulders, well-developed upper body, flat-stomach, and narrow hips (31, 38-40). These male ideals often convey muscularity at a level impossible for most men to achieve by healthy means (39, 41) and exposure to magazines and television images of the male body ideal has led to muscle dissatisfaction (41, 42). Given the increasing large discrepancy between current beauty ideals as portrayed in the media and the body size and shape of real men, it is not surprising that boys and men are joining their female counterparts in experiencing increasing body dissatisfaction (7, 43).

The messages in the media encourage adolescent to adopt these extreme beauty standards as their own (33, 38). The continual exposure to these ideal images engenders social-comparison processes, where individuals who frequently compare their appearance to that of other persons, especially targets who are “more attractive“, (i.e., an upward comparison)

are at a greater risk of body dissatisfaction (30, 33, 44). These images are a constant reminder to body dissatisfied that they are a failure in relation to the standard (31).

Nevertheless, media may have an important role we have other sociocultural influences. Parents are important agents of socialization who influence their children´s body image. Parental role modeling conveys the extent to which physical appearance is valued within a family (12, 27), and studies have shown that parents exert their influence by directly encouraging body change strategies including weight loss and increase in muscle tone in both young men and women (45-47). Often the main predictor of body dissatisfaction and weight loss strategies was perceived pressure to lose weight from the mother (32, 46, 47). On the other hand, feedback from both mothers and fathers influenced adolescents' overall satisfaction with their bodies (47, 48).

Friends and peer influences can also have a profound impact on body image (4, 12, 49). Friendship groups share body attitudes and the importance that peers place on weight and eating is strongly related to weight concerns in adolescent girls (4, 12, 49). Research has observed that having a friend who is dieting prospectively predicted the development of body concerns in early adolescent girls (4, 50). A growing body of research suggests that through appearance-related conversation (e.g., about clothes, weight and diet), girls provide a "peer appearance culture". These conversations often take the form of discussions known as "fat talk" in which girls develop a norm of concern about weight and shape and compare themselves to each other (4). There is a also a relationship between negative verbal commentary about weight and shape and body dissatisfaction among boys and girls (12, 33).

Physical activity is another important aspect related to body image. Adolescents that practice sports have a more positive body image, a higher percentage of them is satisfied with their physical appearance and did not wish to change their weight (51, 52). Adolescents who considered themselves "fat" tend to have elevated levels of physical inactivity (53).

3.4 Differences in body image dissatisfaction between males and females

It is evident that the nature, risk factors, outcomes, and developmental course of body dissatisfaction differ by gender. Until recently, most research on body image in adolescents has focused on young women's concerns with body fat. For young women the presence of elevated body fat is viewed as a deviation from the thin ideal body type and so they are more likely to judge themselves as fat despite they may be normal weight or even underweight, reporting body image dissatisfaction (8, 12, 36, 54-58).

A study in adolescent girls identified perceived pressure to be thin as the most potent predictor of body dissatisfaction onset, and that, it was a more powerful predictor of body dissatisfaction onset than was actual body mass (9). This implies that social pressure to be thin might play a larger role in fostering body dissatisfaction than physical deviation from the culturally defined thin ideal (9). This findings support the proposal that thin ideal may indeed be normative for females.

Whereas young women struggle with pressure to be exceedingly thin, young men are exposed to increasing pressure to be muscular (43, 59) with an ideal body type that has broad shoulders and large biceps, young men are as likely to desire weight gain as weight loss however also characterized by lower fat (43). In boys who are dissatisfied with their size, some want to be thinner and other to be more larger and muscular (4). Recent studies suggest that about a third of adolescent boys desire a larger and more muscular body build, whereas another third desire a thinner body size. Findings that boys want to be thinner may reflect a desire for less body fat rather than a small frame (41). For young men with a high BMI there is more perceived social pressure to alter weight, including weight loss strategies, on the other hand young men with low BMI also perceive sociocultural pressure to gain weight and increase

muscle tone (41, 46). Even adolescent boys with average BMI may perceived themselves as too small and may use strategies to increase their body mass, body frame or muscles (41).

Adolescent girls appeared to evidence high levels of body dissatisfaction regardless of their weight. Females with normal body mass index are more likely to view themselves as overweight (54-58). In contrast, normal or overweight girls report greater levels of dissatisfaction than boys, with dissatisfaction being greatest for overweight girls (7, 57). In fact young women are most satisfied with their bodies when they are underweight (7, 8). Likewise, girls engaged in body change strategies irrespective of their weight, which would suggest that other factors (e.g. pressure from peers or parents) are contributing to body change strategies.

The gender-BMI interaction indicates that adiposity functions are different for boys and girls. A quadratic (U-shaped) model was supported for boys and indicates that they are dissatisfied with their bodies when they are either below or above average weight and most satisfied when they are of average weight. In contrast, girls show a positive linear relation, such that their dissatisfaction increases with body weight (8). So, body image dissatisfaction is not only significantly dependent on body mass distribution, but that the direction of this dissatisfaction is also important. That´s why, body dissatisfaction scores for people classified as underweight are significantly different from those persons classified as being normal and/or overweight (7). Research has been initially more centered in the females with the application of the linear model, but the application of this model particularly in boys doesn´t permit to identify the true relations between BMI and body dissatisfaction (7).

Although the relation between body image dissatisfaction differs by gender it isn't entirely clear. The available information shows that positive body image plays a vital role in fostering healthy psychological and physical development, conversely, poor body image has a wide range of negative consequences because persons who are discontent with their physical appearance are at risk of a variety of psychological problems namely depression (1, 4).

3.5 Body image and depression

Adolescence is a critical stage for the development of positive or negative body image, and it is also a critical stage for the development of depressive symptoms (60). Research focusing on adolescent depression demonstrated that adolescents are more likely to be depressed than children (61), and that, while rates of depression are similar for boys and girls during childhood, in adolescence, the proportion of depressed female adolescents increases to twice compared with male adolescents (62, 63). Epidemiological studies reveal that the prevalence rates of adolescent depression vary between 2.9% to 8.3% (63-65). According to data from the European population, 4% of 12 to 17-year-olds and 9% of 18-year-olds have depression, making it one of the most prevalent disorders and one with wide-ranging consequences, among which suicide is the most visible face (in particular in some countries) (66). Depression has also been linked with high rates of co-existing anxiety and behavioral problems, substance abuse disorders, and depression in adulthood (61, 67-69) .

Depressive symptoms typically involve feelings about the self that are likely to include negative feelings toward body image (50) because depression may increase vulnerability to real or perceived vulnerability criticism and pressures to achieve the ideal body (50). There is an association between depressed symptoms and body dissatisfaction in young women, and men (70, 71). In girls, this association could be explained by the pressure to attain impossible standards of attractiveness in a society that values physical appearance (12, 36). As a consequence**,** research has shown that depressed mood predicts body change strategies in young women, including decreasing weight and increasing muscles (72). In boys, depressed mood can predict body change strategies, including increasing muscles or decrease weight (72). However, it seems that the psychological effects of body image are more pronounced in young women than in young men (54, 70).One possible explanation is that the ideal body for

men and boys is not as clearly presented in Occidental society as it is for women and girls. Therefore men and boys may not receive as much pressure from the media to conform to the societal ideal (46, 73).

The relation between obesity/overweight status and depression has been studied, but the exact underlying mechanisms for the relation between them are not clear. Until now three hypotheses have been suggested to establish the pattern in which depression and obesity are related: a positive association (higher depression is associated with more obesity) (74-78), a negative association (higher depression is associated with lower obesity), and no association (79). These inconclusive results may be explained by a possible U-shapped association, were people with underweight and overweight reported more depressive symptoms, compared to people of normal weight (80). On the other hand it is known that body weight perceptions are not in agreement with actual BMI and the one's perception of body characteristics appear to be more important than actual appearance (57, 81, 82).

Previous research has examined the hypothesis that adolescent females with more negative weight-related body images would report higher levels of depressive symptoms (83). Also it has found that it is body image dissatisfaction (a dimension of personality) rather than objective physical aspect of the body that is important to increase depressive symptomatology. So, it is the psychological variable of body image, not the biological variable of body fat, which is significantly predictive of levels of depressive symptomatology (54, 70, 83-85).

Although the potential associations between body image dissatisfaction and mental health have been studied, there is still a lack of research concerning initial symptoms of depression, namely in populational-based samples, particularly in males. And it is very important to study young adolescents without the diagnosis of disease, and before the appearance of it, in order to identify the adolescents at risk. Understanding this relationship between perceived body image and depressive symptoms could address an important point

considering the increasing pressure about body image in western societies and the increasing prevalence of depression. It is of particular interest to study different populations since the cultural questions are fundamental for the occurrence of depression, for the definition and relation with body image, and consequently for the relation between body image and depression.

4 AIMS

The aim of this study was to evaluate the association between the difference among perceived and ideal body image and depressive symptoms in urban adolescents of 13-year-old, and analyze the possible modifier effect of body mass index in this association.

5 PARTICIPANTS AND METHODS

Participants

Participants were evaluated in 2003/2004 during the assembling of a cohort of urban adolescents born in 1990 and enrolled at Porto schools, known by the acronym EPITeen (Epidemiological Investigation of Teenagers Health in Porto) (86). The study addresses four primary areas of research: (1) growth and physical development; (2) behavioural and biological risk factors; (3) prevalence of selected diseases with large public health impact; and (4) psycho-social measures. It also aims to provide information for a comprehensive understanding of the tracking of risk factors and their effects on adulthood health.

"Direcção Regional de Educação do Norte (DREN)", the official entity that provides general orientation and regional policies for all schools of Porto, approved the study and gave permission to contact the schools. Each school board had the final decision about allowing students contact so that individual participation could be sought. As school education is compulsory in Portugal until 15 years old the adolescents born in 1990 were expected to be enrolled at any of the 51 schools of Porto that provide teaching from the 5^{th} to the 9^{th} grade. All public schools and 19 (79%) private schools allowed us to contact eligible students. Approximately 200 eligible students were present in non-participating schools and no effort was made to contact them using alternative approaches. In participant schools we identified 2787 eligible adolescents. Forty-four adolescents (1.6%) could not been reached (missing classes during the study period), 583 (20.9%) were considered refusals since no signed informed consent form was returned, and 2160 (1561 public and 509 private school students) agreed to participate and provided information at least for part of the planned assessment. This resulted in a 77.5% overall participation proportion, similar in public (77.7%) and private schools (77.0%, p=0.709).

In Portugal, education is compulsory by law for 13-year-old adolescents, making schools an ideal sampling frame.

The Ethical Committee of the University Hospital of São João, Porto, approved the study. Policies and procedures were developed to guarantee data confidentiality and protection. Parents and adolescents received written and oral information explaining the purpose and the design of the study. Written informed consent was obtained both from parents and adolescents.

The evaluation comprised two self-administered questionnaires (one completed at home, another at school), and a physical examination performed at school (including measurement of height and weight).

The home questionnaire inquired about demographic, social, behavioral and clinical characteristics of the adolescent and family. At school, during the research team visit adolescents answered an additional questionnaire comprising further information on physical activity, smoking and alcoholic beverages intake. Body image and depressive symptoms were also evaluated as part of the school questionnaire.

Family Characteristics

Parents' educational level was recorded as an index of social and economic class. Each adolescent was finally classified according the highest completed degree regardless of maternal or paternal. The same procedure was followed considering parents profession, which were obtained for both parents using open question.

Parents were asked about previous diagnosis of depression. Assessment of parental history of depression was based on self-reported previously diagnosis of depression, separately for father and mother. We consider with parent's depression if at least one of the parents reported a diagnosis.

Physical Activity

We recorded for physical activity evaluation the extracurricular activities. To quantify usual practice of sports adolescents were asked to indicate the name of organized and unorganized sports, and the total time spent per week on each sport.

Depressive symptoms

The Beck Depression Inventory II (BDI-II) was developed to the assessment of symptoms corresponding to criteria for measuring the severity of depression in individuals aged 13 and over (87, 88). The BDI has become one of the most widely accepted instruments for assessing the severity of depression in diagnosed patients and for detecting possible depression in normal populations (87). The second edition of the Beck Depression Inventory consists of 21 items, each of which has four self-evaluative statements scored from 0 to 3 (87, 88). Scores range from 0 to 63, with higher scores reflecting increased depressive severity. For instance, scores ranging between o and 13 are indicative of “minimal depression”, scores that fall between 14-19 are considered to reflect a “mild” level of depression, scores of 20 to 28 are considered “moderate” and a score ranging from 29 to 63 is labeled “severe” (87, 88). The BDI-II has been found to be effective in assessing the presence and extent of depression in adolescents, although a cutoff of 21 or higher has been recommended (89).

Although the BDI-II´s items are congruent with the criteria outlined in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders(DSM-IV, American Psychiatric Association, 1994), the BDI-II is intended to identify the severity of symptoms and not to provide a differential diagnosis (88, 90).

There has been an extensive review of the literature regarding the assessment of the internal consistency of the BDI. Results of reliability and validity studies suggest that the BDI is a useful measure for assessing depression. In some studies depending upon time intervals, the

Pearson For non-psychiatric patients, the test-retest coefficients ranged from 0.60 to 0.90. The Pearson Product –Moment correlation yielded a reliability coefficient of 0.86 and with a Spearman-Brown corrected correlation this number increased to 0.93 (90).

The content validity of the BDI-II appears to be excellent. The BDI-II covers the major content domains of depression including sadness, pessimism, beliefs of being failure, loss of pleasure, feelings of guilt, punishment feelings, self-dislike, self-criticalness, suicidal thoughts or wishes, experiences of crying, agitation, anhedonia, indecisiveness, feelings of worthlessness, lack of energy, altered sleep patterns, irritability, increases or decreases in appetite, concentration difficulties, fatigue, and loss of interest in sex (88). The convergent and divergent validity of the BDI-II also appears to be well supported. The BDI-II correlates significantly with other indices of depression and depression-related constructs including the BDI-IA (r=0.93), the Hamilton Rating Scale for Depression (r=0.71) and for the BHS (Beck Hopeless Scale) (r=0.68) (88).

The BDI-II appears to differentiate well between depressed and non-depressed persons (88).

In this study, participants were asked to report their experiences of each item experienced during the most recent two weeks, including that day. Responses are summed, yielding a range of scores from 0 to 63, with higher scores indicating greater depressive symptomatology (87). The BDI-II was previously validated in Portuguese adolescents (91, 92).

Figure Rating Scale

Figural rating scales have been commonly used for assessing body image. They have been created to assess overall size satisfaction and consists of a range of images (usually schematic line drawing or silhouettes) of varying sizes, from thin (underweight) to heavy (overweight). Individuals are asked to choose the image most representative of their current and

ideal selves. The discrepancy between the two ratings is used as an index of dissatisfaction (24, 93-95).

Body image perception and ideal image was determined using body shape representation from a Figure Rating Scale – The Stunkard figures (96). The Figure Rating Scale consists of a series of nine figure drawings. Each of the nine figures was scored from 1 to 9, with “1” representing the most slender figure and “9” representing the heaviest figure. For this study, participants are provided with a set of two scales depicting either the male or female form. Participants are required to choose how they perceived their current figure and how they perceived their ideal figure. The Figure Rating Scale has a good test-retest reliability and adequate validity for the investigation of body image disturbance (97). Body dissatisfaction was defined by the discrepancy between perceived current and ideal figures (current figure rating minus ideal figure rating). Thus, a positive rating indicates that the participants report an ideal figure thinner than the current whereas a negative rating indicates that the participants report and ideal figure larger than the current.

Some limitations of the use of the Figure Rating Scale is that they do not distinguish between fat deposition and increased muscle mass as the cause of an increase in body size. If a person is dissatisfied and would like to be more muscular, it may be apparent that the larger figures look ”fatter” as opposed to muscular, whereas the slimmer silhouettes may actually be perceived as being more toned, derived to the inability of these silhouette’s to make a muscle/fat distinction (43, 58). Other potential problem is that the sizes and dimensions reflected by the figures may not match of individual clients, leading individuals to say “none of these shapes look like me” (24).

Anthropometry

Adolescents` height and weight were measured in light clothing and without shoes. The weight was measured on Tanita® (scale and bioimpedance instrument) to the nearest 0.1 Kg, and height was measured to the nearest 0.1cm using a standard portable height bar.

To measure weight, the participants stand over the platform with body weight evenly distributed between both feet (98).

In regard to height, the participants stand over the portable height bar with heels together and back as straight as possible, and with head touching the vertical surface of the measuring device. The weight of the subjects was distributed evenly on both feet and the head was positioned in the Frankfort horizontal plane. The arms hang freely by the sides with the palms facing the thighs. The movable block was brought down until it touched the head, making sure to put sufficient pressure to compress the hair (98).

Body mass index (BMI) was calculated as weight (Kg) divided by the square height (m^2). Adolescents were classified according to the age- and sex- specific body mass index (BMI) percentile, elaborated by the Centers for Disease Control and Prevention (99). Adolescents with BMI values above the 95^{th} percentile were classified as obese, and those with BMI values between the 85^{th} and 95^{th} percentiles were categorized as overweight (99). .

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7 MANUSCRIPT

Body image and depressive symptoms in 13-year-old adolescents

Sandra Almeida[1,2], Milton Severo[1,2], Joana Araujo[1,2], Carla Lopes[1,2], Elisabete Ramos[1,2]

[1]Department of Hygiene and Epidemiology and Cardiovascular Research & Development Unit, University of Porto Medical School, Portugal

[2]Institute of Public Health, University of Porto, Portugal

Correspondence:

Elisabete Pereira Ramos (eliramos@med.up.pt)

Department of Hygiene and Epidemiology, Medical School, University of Porto

Alameda Prof. Hernâni Monteiro

4200-319 Porto – Portugal

Phone: + 351 225 513 652

Fax: + 351 225 513 653

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Abstract

Objective: This study aims to evaluate the association between the discrepancy between perceived and ideal body image and depressive symptoms in 13-year-old urban adolescents and analyze the possible modifying effect of body mass index on this association.

Design: A population-based cross-sectional study

Setting: A urban community in Porto, Portugal

Participants: We evaluated 1688 adolescents.

Main Outcome Measures: The Beck Disorder Inventory II (BDI) was used to measure depressive symptoms. Using the Figure Rating Scale, participants were required to choose what they perceived their current figure to be, and what they perceived their ideal figure to be. For continuous variables, to compare two independent samples we used the Mann-Whitney test and for more than two the Kruskal-Wallis test was used. To compare proportions we used the chi-square test. Linear regression coefficients were used to quantify the association between BDI scores and the differences in Stunkard figures. Linear regression parameters and the respective 95% confidence intervals were obtained by bootstrapping.

Results We found that 57.2% of the females and 67.6% of the males presented a discrepancy between current and ideal figures.. After adjustment, we found that differences in the perceived and ideal figure were associated with an increase in depressive symptoms, in both genders. The strongest association was found in adolescents that perceived themselves as being too fat (β=5.18 IC95% [3.67, 6.69] for normal weight females; β=3.14 IC95% [0.10, 6.18] for overweight females and β=2.44 IC95% [0.65, 4.23] for normal weight males).

Conclusions Body image dissatisfaction is more important than actual weight in predicting depressive symptoms. The relation between depressive symptoms and body image is similar in overweight and non-overweight adolescents, but the association is stronger in non-overweight adolescents.

Introduction

Body image is defined as the individual, subjective sense of the body. This is a biopsychosocial construction that reflects actual body structure and function, body-related experience, social response to body appearance, and sociocultural body values and ideals (1). It includes at least two components: perceptual body image (i.e. estimation of one's body size) and attitudinal body image (i.e. affective, cognitive, and behavioral concern) with one's body size (2).

Body image concerns emerge at younger ages, even before adolescence (3-5). Nevertheless, adolescence is a period in which pronounced physical, psychological, emotional and social changes take place that make adolescents especially susceptible to social pressures to conform to ideal stereotypes. Not surprisingly, therefore, this stage of life has been implicated as a trigger for body image problems, both in males and females (4, 6, 7).

Adolescence is also a critical stage for the development of depressive symptoms (8). According to data from the European population, 4% of 12 to 17-year-olds and 9% of 18-year-olds have depression, making it one of the most prevalent disorders and one with wide-ranging consequences, among which suicide is the most visible face (in particular in some countries) (9). Obesity has been studied has a potential risk factor for depression but results of studies concerning the association between obesity and depression are conflicting, some find a positive association (10-12) or no association at all (13). These inconclusive results may be explained by a possible U-shaped association (14). On the other hand, it is known that body weight perception is not in accordance with actual BMI (15-18).

Although the potential associations between body image dissatisfaction and mental health have been studied, there is still a lack of research concerning initial symptoms of depression, namely in non clinical populations, mainly in men. Understanding this relationship between perceived body image and depressive symptoms could be of crucial importance, considering the increasing pressure

regarding body image in western societies and the increasing prevalence of depression (9, 15).

The aim of this study was to evaluate the association between the difference between perceived and ideal body image and depressive symptoms in 13-year-old urban adolescents, and to analyze the possible modifying effect of body mass index on this association.

Methods

Subjects

Participants were evaluated in 2003/2004 during the assembling of a cohort of urban adolescents born in 1990 and enrolled at Porto schools, known by the acronym EPITeen (Epidemiological Investigation of Teenagers' Health in Porto) (19). All public schools and 19 (79%) private schools allowed us to contact eligible students. Approximately 200 eligible students were present in non-participating schools and no effort was made to contact them using alternative approaches. In compliant schools we identified 2787 eligible adolescents. Forty-four adolescents (1.6%) could not been reached (absent from classes during the study period), 583 (20.9%) were considered refusals since no signed informed consent form was returned, and 2160 (1561 public and 509 private school students) agreed to participate and provided information at least for part of the planned assessment. This resulted in a 77.5% overall participation proportion, similar in public (77.7%) and private schools (77.0%, p=0.709). In Portugal, education is compulsory by law for 13-year-old adolescents, making schools an ideal sampling frame.

The Ethical Committee of the University Hospital of São João, Porto, approved the study. Policies and procedures were developed to guarantee data confidentiality and protection. Parents and adolescents received written and oral information explaining the purpose and the design of the study. Written informed consent was obtained both from parents and adolescents.

Data collection

The evaluation comprised two self-administered questionnaires (one completed at home, another at school), and a physical examination performed at school (including measurement of height and weight).

The home questionnaire inquired into demographic, social, behavioral and clinical characteristics of the adolescent and family. At school, during the research team's visit, adolescents responded to an additional questionnaire comprising further information on physical activity, smoking and alcoholic beverage intake. Body image and depressive symptoms were also evaluated as part of the school questionnaire.

Body image perception and ideal image were determined using body shape representation from a Figure Rating Scale – The Stunkard figures (20). The figure Rating Scale consists of a series of nine figure drawings. Each of the nine figures was scored from 1 to 9, with "1" representing the most slender figure and "9" representing the heaviest figure. For this study, participants were provided with a set of two scales depicting either the male or female form. Participants were required to choose how they perceived their current figure and how they perceived their ideal figure. The Figure Rating Scale has good test-retest reliability and adequate validity for the investigation of body image disturbance (21). Body dissatisfaction was defined by the discrepancy between perceived current and ideal figures (current figure rating minus ideal figure rating). Thus, a positive rating indicates that the participants report an ideal figure thinner than the current, whereas a negative rating indicates that the participants report an ideal figure larger than the current.

The Beck Depression Inventory, which is a 21-item self-report scale, was used to measure depressive symptoms. Total scores can range from 0 to 63, with higher scores corresponding to a more depressed mood (22). We used the previously validated Portuguese version of the BDI-II (23).

The parents' years of education was used as an indicator of social class. We classified the adolescents according to the parent with the highest completed grade of education. Assessment of parental history of depression was based on self-reported previous diagnosis of depression, separately for father and mother. We considered parent's depression if at least one of the parents reported a diagnosis.

For the adolescent, we considered as practice of sports any planned, regular exercise which was not part of obligatory curricular activities, regardless of intensity.

Adolescents` height and weight were measured in light clothing and without shoes. The weight was measured on Tanita® (scale and bioimpedance instrument) to the nearest 0.1 Kg, and height was measured to the nearest 0.1cm using a standard portable height bar. Adolescents were classified according to the age- and sex- specific body mass index (BMI) percentile, elaborated by the Centers for Disease Control and Prevention (24). Adolescents with BMI values above the 95th percentile were classified as obese, and those with BMI values between the 85th and 95th percentiles were categorized as overweight (24).

Of the 2160 adolescents who participated in at least in one component of the study, we had information about perceived current figure and ideal figure for 1868 and, of these, 1688 (90.4%) completed the BDI-II. Thus, the sample analyzed in the current study was made up of 1688 adolescents (798 males and 890 females). No significant differences were found between the participants included in this study and the full cohort for gender, type of school, history of depression in the parents, or distribution by categories of BMI. However, those with complete information presented a higher level of parents' education.

Statistical analysis

Statistical analysis was performed separately for each gender. For continuous variables, to compare two independent samples we used the Mann-Whitney test and for more than two the Kruskal-Wallis test. To compare proportions we used the chi-

square test. Linear regression coefficients were used to quantify the association between BDI scores and the differences in Stunkard figures. The final analysis was stratified by gender and categories of BMI and adjusted for parents' depression, sports practice, parents' education and type of school. As the BDI score has a skewed distribution, regression parameters and the respective 95% confidence intervals where obtained by bootstrapping (25).

Results

The prevalence of overweight was 17.2% in males and 15.8% in females; for obese the prevalence was 11.0% and 9.2% respectively. Regular practice of sport was reported by 39.9% of females and 61.1% of males. The prevalence of at least one parent with a previous diagnosis of depression was 35.3% in females and in 30.0% in males.

We found that 42.8% of the females and 32.4% of the males showed no discrepancy between their current and ideal body image. In females, 12.3% presented two or more figures of discrepancy between current and ideal figure [1.3% had an ideal figure larger than current, and 10.9% reported an ideal figure thinner than current]. In males this occurred for 19.3% (8.3% and 11.0% respectively).

We found significant differences in the distribution of categories of body image discrepancy according to categories of actual body mass index (Table 1). In both genders the proportion of adolescents with an ideal figure thinner than current increased with BMI. For those with BMI lower than the 85th percentile, 52.5% of females and 39.0% of males reported the same current and ideal body image. In females with BMI<85th percentile, 21.1% reported a larger ideal image than the current body image and 26.4% the opposite. For males these values were 46.9% and 14.1%, respectively (Table 1). We found also significant differences in body image discrepancy according to parents' education, in females and according to practice of sports, in males.

After adjustment, we found an increase in BDI scores with the increase in the discrepancies between ideal and current image, but decreasing scores with the increase in BMI categories. In females, significant differences were also found with parents' history of depression and with socio-economic indicators (Table 2).

To analyze the possible role of BMI as an effect modifier in the association between body image and BDI we stratified data according to two categories of BMI: BMI<85th percentile and BMI≥85th percentile. Only four overweight males had an ideal figure larger than current, so to guarantee homogeneity we decided to exclude them from this analysis. The stronger association was found in females, namely in those with a BMI lower than the 85th percentile and who reported an ideal figure thinner than current (β=5.18 IC95% [3.67, 6.69]). Those who reported an ideal figure larger than the current also presented a significant positive association but with a lower magnitude (β=1.61 IC95% [0.02, 3.20]). Females with BMI≥85th percentile that reported an ideal figure thinner than the current also presented a significant increase in BDI scores (β=3.14 IC95% [0.10, 6.18]) (table 3). In males, the association was significant only in those with BMI<85th percentile who reported an ideal figure thinner than current (β=2.44 IC95% [0.65, 4.23]) (Table 3).

Discussion

As expected a high proportion of overweight or obese adolescents reported an ideal figure thinner than the current (7). However, 26.4% of girls and 14.1% of boys of normal weight reported an ideal image thinner than current. These results are consistent with other studies, supporting the fact that the Western culture's preoccupation with thinness as a marker for beauty has a real impact (6, 26, 27).

Apart from the actual body mass index, we found significant differences in the discrepancy between ideal and current body image according to parents' education, type of school and practice of sports.

The proportion of adolescents with same ideal and current figure was lower in the females studying in public schools and with less educated parents. This might indicate that the effect of social pressure for thinness is not limited to the higher social classes.

In accordance with previous studies that reported a better satisfaction with body image we found a lower proportion of adolescents with discrepancy between ideal and current figure in those that practice sport (28-30). In girls the results did not reach statistical significance, which is probably explained by the lower proportion of girls that practice sports compared with boys.

In the adolescents with normal BMI we found that approximately 1/4 of the girls reported an ideal figure larger than current. This could be partially explained by the fact that our category defined as BMI lower than 85th percentile included some that in fact have low weight which wish to be larger but not necessarily fatter. In males the large proportion that reported an ideal figure larger than current was more expected than in girls and the most probable explanation is that they chose a large ideal figure not because of the desire to be fatter but to be stronger (31-34). This problem arises due to the inability of these silhouettes to make a muscle/fat distinction (31, 35).

For both genders we found that adolescents who considered themselves to have their ideal figure were less depressed than the others. In our study the association between depressive symptoms and the discrepancy between current and ideal figure is stronger in those who reported an ideal figure thinner than the current than in those who reported and ideal figure larger than the current, which may reflect a possible effect of social pressure to be thinner even in 13-year-old adolescents (6). However, it is important to note that a large proportion of those classified as discrepant report only a minor difference between ideal and current image. Thus, our results showed that even small differences between the ideal and the current figure were associated with an increase in depressive symptoms. Additionally we found a stronger relation between the desire to be thinner and BDI in those with normal BMI,

significantly in both genders, which could reflect the increase of social pressure even on boys. The weak association in males could be partially explained by the possible misclassification by many males when selecting the figure.

Consistently with other studies we found that self-perceived body image has been associated with depressive symptoms more than actual body mass index (4, 26, 36, 37). As our adolescents are population–based and with low levels of depressive symptoms, our results may indicate that body image could be more important than actual body mass index especially in non clinical populations.

Depression has multifactorial determinants with parents' history of depression playing an important role (38-41). One limitation of our study is that family history of depression was based solely on self-reported data. However, the significant association found with adolescents' BDI scores is in agreement with other studies, which allows us to expect that the self-reported information could be a good indicator of the family environmental risk.

The strength of our study lies in the fact that it is population-based and was conducted on a large sample representative of 13-year-old adolescents. We assume that because school education is compulsory at this age, and we had a higher proportion of participation. Nevertheless, we excluded in this analysis adolescents who did not report the specific information. This limitation resulted in an under-representation of adolescents with parents with a lower level of formal education, a group which presents the highest proportion of adolescents with different current and ideal figure and also a higher BDI score, which could attenuate the association found in our study. Furthermore, no significant differences were found regarding other potential determinants, namely categories of BMI or parental history of depression.

Therefore our findings suggested a relatively more important role of body image concern than actual weight in the prediction of depressive psychological morbidity. We also found that the relation between depressive symptoms and body image is similar in

overweight and non-overweight adolescents, but the association is stronger in non-overweight adolescents.

Our results support the increasing recognition of the importance of body dissatisfaction as a target for health actions. Health professionals must develop a greater awareness of body image issues as part of an approach based on prevention and early intervention, which will benefit the physical and mental health of the community.

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All authors had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis

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Table 1: Discrepancy between the current and ideal body image, by the characteristics of the sample and by gender.

		Females, n (%)						Males, n (%)					
		≤ -2	**-1**	**0**	**1**	**≥ 2**	**p**	**≤ -2**	**-1**	**0**	**1**	**≥ 2**	**p**
Body Mass Index (Kg/m^2)*	**< 85th**	13 (1.8)	142 (19.3)	385 (52.5)	164 (22.3)	30 (4.1)		74 (11.6)	225 (35.3)	249 (39.0)	73 (11.4)	17 (2.7)	
	≥ 85th & < 95th	0 (0)	0 (0)	33 (21.3)	92 (59.4)	30 (19.3)	< 0.001	0 (0)	4 (2.6)	36 (23.5)	81 (53.0)	32 (20.9)	< 0.001
	≥ 95th	0 (0)	0 (0)	1 (1.1)	42 (46.7)	47 (52.2)		0 (0)	0 (0)	3 (3.1)	46 (46.9)	49 (50.0)	
Practice of sports	**No**	8 (1.4)	81 (14.1)	235 (40.9)	191 (33.2)	60 (10.4)	0.221	36 (10.6)	87 (25.7)	86 (25.5)	86 (25.5)	43 (12.7)	0.003
	Yes	5 (1.3)	54 (14.2)	177 (46.5)	100 (26.2)	45 (11.8)		37 (7.0)	137 (25.8)	196 (37.0)	106 (20.0)	54 (10.2)	
Parents' depression	**None**	8 (1.7)	69 (14.4)	199 (41.6)	150 (31.4)	52 (10.9)	0.767	38 (8.8)	102 (23.7)	143 (33.3)	96 (22.3)	51 (11.9)	0.102
	At least one	3 (1.0)	45 (15.0)	130 (43.2)	85 (28.2)	38 (12.6)		17 (7.8)	62 (28.6)	53 (24.4)	62 (28.6)	23 (10.6)	
Parents' education (years)	**0-6**	5 (2.0)	53 (21.6)	78 (31.7)	83 (33.7)	27 (11.0)	0.021	16 (9.5)	46 (27.2)	56 (33.1)	33 (19.5)	18 (10.7)	0.178
	7-9	2 (1.1)	28 (15.6)	82 (45.8)	47 (26.3)	20 (11.2)		12 (8.3)	44 (30.3)	41 (28.3)	33 (22.8)	15 (10.3)	
	10-12	2 (0.9)	23 (10.0)	111 (48.0)	69 (29.9)	26 (11.2)		15 (7.0)	54 (25.2)	61 (28.5)	50 (23.4)	34 (15.9)	
	≥ 13	3 (1.5)	25 (12.6)	87 (44.0)	60 (30.3)	23 (11.6)		18 (9.1)	45 (22.7)	72 (36.4)	51 (25.7)	12 (6.1)	
Type of school	**Public**	12 (1.6)	117 (15.9)	301 (40.9)	221 (30.0)	85 (11.6)	0.045	63 (9.0)	182 (26.1)	231 (33.2)	145 (20.8)	76 (10.9)	0.144
	Private	1(0.4)	25 (10.3)	118 (48.6)	77 (31.7)	22 (9.0)		11 (5.7)	47 (24.5)	57 (29.7)	55 (28.6)	22 (11.5)	

* According to the CDC percentile (24).
≤-2 = ideal larger than current from 2 or more figures; -1=ideal larger than current from1 figure; 0= ideal equal to current; 1= ideal thinner than current from 1 figure; ≥2= ideal thinner than current from 2 or more figures.

Table 2: Association of Beck Depression Inventory scores and body image discrepancy, body mass index, physical activity and parents' characteristics, according to gender.

		Females				Males			
		Mean (SD)	**p**	**Crude β (CI95%)**	**Adjusted β (CI95%)***	**Mean (SD)**	**p**	**Crude β (CI95%)**	**Adjusted β (CI95%)***
Body image discrepancy (Perceived figure - Ideal figure)	**≤ -2**	8.62 (8.11)		2.5 (-1.0;9.0)	1.4 (-1.7;6.9)	5.38 (5.16)		1.0 (-0.3;2.6)	**1.8 (0.1;3.9)**
	-1	8.44 (9.30)		**2.3 (0.8;4.2)**	**1.5 (0.0;3.2)**	4.42 (5.56)		0.0 (-1.0;1.2)	0.0 (-1.1;1.2)
	0	6.15 (6.27)	< 0.001	Ref	Ref	4.40 (6.17)	0.001	Ref	Ref
	1	8.96 (7.59)		**2.8 (1.7-3.9)**	**4.5 (3.0;6.1)**	5.13 (5.34)		0.7 (-0.3;1.8)	**1.9 (0.7;3.4)**
	≥ 2	10.51 (10.04)		**4.3 (2.5-6.7)**	**6.6 (4.2;9.6)**	6.26 (6.78)		**1.8 (0.3;3.6)**	**3.2 (1.4;6.5)**
Body Mass Index (Kg/m^2) †	**< 85th**	7.79 (7.98)		Ref	Ref	4.82 (6.05)		Ref	Ref
	≥ 85th & < 95th	7.89 (7.11)	0.468	0.1 (-1.1;1.6)	**-2.3 (-3.8;-0.7)**	4.85 (5.69)	0.313	**0.0 (-0.9;1.1)**	**-1.9 (-3.5;-0.7)**
	≥ 95th	8.15 (7.76)		0.4 (-1.3;2.3)	**-3.3 (-5.7;-0.4)**	5.14 (4.69)		**0.3 (-0.8;1.5)**	**-2.2 (-4.7;-0.5)**
Practice of sports	**No**	8.13 (7.70)	0.059	Ref	Ref	4.76 (5.53)	0.782	Ref	Ref
	Yes	7.34 (7.74)		-0.8 (-1.8;0.2)	-1.0 (-2.0;0.2)	4.90 (6.01)		0.1 (-0.7;1.0)	0.1 (-0.8;1.0)
Parents' depression	**None**	7.04 (7.37)	< 0.001	Ref	Ref	4.33 (5.18)	0.055	Ref	Ref
	At least one	8.81 (7.59)		**1.8 (0.7;3.0)**	**1.8 (0.7;2.8)**	5.11 (5.67)		0.8 (-0.1;1.8)	0.8 (-0.0;1.8)
Parents' education (years)	**0-6**	8.97 (8.47)	0.049	Ref	Ref	4.80 (6.51)	0.428	Ref	Ref
	7-9	7.07 (7.45)		**-1.9 (-3.3;-0.2)**	-1.0 (-2.8;0.6)	4.09 (4.70)		-0.7 (-1.9;0.6)	-0.6 (-1.9;0.9)
	10-12	7.37 (7.45)		**-1.6 (-3.2;-0.2)**	**-1.4 (-3.1;0.0)**	4.51 (5.40)		-0.3 (-1.6;0.9)	-0.3 (-1.7;1.2)
	>12	7.16 (5.91)		**-1.8 (-3.3;-0.4)**	**-1.8 (-3.4;-0.3)**	4.83 (5.14)		0.0 (-1.3;1.3)	-0.2 (-1.6;1.3)
Type of school	**Public**	7.72 (7.92)	0.129	Ref	Ref	4.83 (6.17)	0.026	Ref	Ref
	Private	8.18 (7.54)		0.4 (-0.6;1.7)	**1.6 (0.5;2.9)**	4.94 (4.54)		0.1 (-0.7;1.0)	0.4 (-0.7;1.4)

* Adjusted for all variables in the table. † According to the CDC percentile (24)

Table 3: Depressive symptoms and body image *

		Females				Males			
		BMI < 85th percentile†		BMI ≥ 85th percentile†		BMI < 85th percentile†		BMI ≥ 85th percentile†	
		β	IC 95%	β	IC 95%	β	IC 95%	β	IC 95%
Differences between figures ≤ -1 (a)		1.61	[0.02, 3.20]	--	--	0.49	[-0.77, 1.75]	--	--
Differences between figures ≥1 (b)		5.18	[3.67, 6.69]	3.14	[0.10, 6.18]	2.44	[0.65, 4.23]	1.82	[-0.19, 3.82]
Practice of sports		-0.75	[-2.06, 0.56]	-1.15	[-3.32, 1.02]	0.258	[-0.98, 1.49]	-0.29	[-1.67, 1.10]
Parents' depression		2.19	[0.92, 3.47]	0.52	[-1.59, 2.64]	0.70	[-0.51, 1.90]	0.79	[-0.59, 2.17]
Parents' education (years)	**7-9**	-1.28	[-3.15, 0.59]	-0.72	[-3.68, 2.25]	-1.14	[-2.93, 0.66]	0.63	[-1.48, 2.74]
	10-12	-0.90	[-2.66, 0.87]	-2.80	[-5.75, 0.16]	-0.49	[-2.18, 1.18]	0.13	[-1.80, 2.05]
	>**12**	-1.50	[-3.40, 0.41]	-1.81	[-4.84, 1.22]	-0.63	[-2.37, 1.11]	0.86	[-1.25, 2.97]
Type of school	**Private**	0.84	[-0.61, 2.29]	3.53	[1.10, 5.96]	0.29	[-1.12, 1.69]	0.34	[-1.19, 1.87]

* Adjusted for all variables in the table. † According to the CDC percentile (24)
(a) ≤-1 = ideal larger than current; (b) ≥1= ideal thinner than current.