

The relation between body mass index and emotional intelligence in children

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ABSTRACT

Pediatric obesity is going to be one of the major risk factors in our era. It might have adverse effects on all aspects of child's health. It could affect both physically and mentally and cause emotional suffering as well. It is shown that obesity could decrease cognition, but its relationship with emotional intelligence (EI) is unclear. In this cross-sectional study, the relationship between the child's weight and level of EI has been investigated. Seventy-one children with average age 9.2 ± 2.3 years old (32 girls and 39 boys) of volunteer parents who have come to counseling clinic were joined in this study. Anthropometrical information of children including BMI for age Z score was analyzed by using Anthro Plus software. Demographic information such as gender, year of birth, household income, and parental educational status were obtained by using common SES questionnaire. Emotional intelligence of children was obtained by using "Trait Emotional Intelligence Questionnaire – Child Short Form" (TEIQue-CSF). A significant negative correlation between BMI and EI score was seen in both genders ($r^2=0.33$, $p=0.001$). A similar pattern was also noticed for both boys and girls. Despite the similarity of this pattern in both genders, to some extent boys showed a stronger negative relationship between their BMI and EI score (Girls: $r^2=0.293$, $p=0.001$; Boys: $r^2=0.388$, $p=0.001$). Based on the present study, overweight and obesity are associated with a higher EI score in both genders, which shows the importance of weight effect on EI.

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1. Introduction

Obesity is a multifarious condition, one with severe social and psychological dimensions, that affects virtually all age and socioeconomic groups and threatens to crush both developed and developing countries (1). It is one of the major public health crises among children and adults. Childhood-related obesity is an increasing concern with respect to the health and well-being of the child (2). The number of overweight or obese infants and young children (aged 0 to 5 years) increased from 32 million globally in 1990 to 41 million in 2016 (3). Surprisingly, the vast majority of overweight or obese children live in developing countries, where the rate of increase has been more than 30% higher than that of developed countries (3). In the long term, childhood obesity also is associated with having obesity as an adult, which is associated with a wide range of serious health complications and an increased risk of premature onset of illnesses, including insulin resistance,

musculoskeletal disorders (especially osteoarthritis), cardiovascular disease, some cancers (endometrial, breast and colon), and disability (3–5). Obesity is also associated with higher healthcare requirements and costs among children. Overweight and obesity in childhood are associated with \$14.1 billion in additional prescription drug, emergency room and outpatient visit health care costs annually (6). An obese 10-year-old child who continues to gain weight throughout adulthood has lifetime medical costs that are \$19,000 higher compared to a healthy-weight 10-year-old who maintains a normal weight throughout life (7). Unfortunately, every aspect of the environment in which children are conceived, born and raised can contribute to their risk of becoming overweight or obese. During pregnancy, gestational diabetes (a form of diabetes occurring during pregnancy) may result in increased birth weight and risk of obesity later in life (3). Obesity not only affects human physically, but also it affects mentally as well. Obesity mental consequences show their effects much

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quicker than physical issues which needs a long-term effect on the human body. A great number of studies indicate that obese children have impaired psychological well-being (e.g., depression, self-esteem, and quality of life) compared to their non-overweight peers (5, 8). There has been an overwhelming amount of research conducted in this area over the past few decades, and as such, this paper provides a summarized overview of the vast trove of available information on the psychosocial aspects of childhood obesity (8). Many children with pediatric obesity are unhappy with their body shape and feel they are not good-looking. This often starts early in their life when they often face ridicule from parents and family members for their body size and shape (9). There is marked low self-esteem and self-worth noted in children with pediatric obesity (10). The child is often made fun of with respect to his body size and fatness. This is a phenomenon noted across both young children and adolescents (11). Apart from being the victim, the obese child may be the bully too. He may at times bully others due to his size and very often, the bullying is a result of wanting to feel superior and powerful over others while trying to overcome feelings of inferiority that lie within owing to his own obesity and body image discontent. Bullying in this manner often starts at kindergarten and continues thereafter (12).

Some data show that children with obesity miss more days of school compared to students with normal weights (13). Missed days of school, might be due to illness or to avoid weight-based bullying (14), as some studies have shown that children with obesity are bullied and teased more than their normal-weight peers (15), and are more likely to suffer from social isolation, depression, and lower self-esteem (16), which can make it hard to keep up academically. Many experts believe schools are a key setting for efforts to prevent childhood obesity (17, 18). Among adults, it is shown that obesity might affect and decrease the "Emotional Intelligence" (EI) (19–21).

EI is a relatively new concept that tries to connect the emotion and cognition concepts since 28 years ago (22). EI is the capability of individuals to recognize their own, and other people's emotions, to discern between different feelings and label them appropriately, to use emotional information to guide thinking and behavior, and to manage and/or adjust emotions to adapt environments or achieve one's goal(s) (23). It is generally said to include three skills: (1) Emotional awareness, including the ability to identify your own emotions and those of others; (2) The ability to harness emotions and apply them to tasks like thinking and problems solving; (3) The ability to manage emotions, including the ability to regulate your own emotions, and the ability to cheer up or calm down another person (24). Some of the studies on adults have shown the negative effects of obesity on EI (25, 26). Moreover, it seems that a fail cycle could be observed between emotions and eating patterns and as a consequence overweight and obesity would be the result. Emotional characteristics have been related to both body weight and health behaviors.

Multiple studies also suggest that negative emotions (e.g. negative mood) may negatively affect eating patterns (27–29). The present study has tried to find out the possible effects of obesity and overweight on pediatrics' EI.

2. Materials and methods

Seventy-one children with average age 9.2 ± 2.3 years old (32 girls and 39 boys) of volunteer parents who have come to counseling clinic were chosen. The parents were well informed about the study and consent form were signed by them. The weight was measured using the Tanita HD-318 digital weighing scale to the nearest 0.1 kg. The height was measured using the Seca Bodymeter 206 to the nearest 0.1 cm. Anthropometrical information of children including BMI for age Z score was analyzed by using Anthro Plus V.1.04 software of World Health Organization. Demographic information such as gender, year of birth, household income, and parent's educational status were obtained by using a common SES questionnaire. Emotional intelligence of children was obtained by using "Trait Emotional Intelligence Questionnaire – Child Short Form" (TEIQue-CSF) (30). The "Trait Emotional Intelligence Questionnaire" (TEIQue) developed by K. V. Petrides, which is an integral part of a scientific research program that is currently based in the London Psychometric Laboratory in University College London (UCL) (31) and is a well-known tool for such a task (32, 33). TEIQue-CSF questionnaire is developed for children aged between 8 and 12 years old and includes in the short version 36 items, responded to on a five-point Likert scale (1=strongly disagree to 5=totally agree). The questionnaire assesses the Global Score of Emotional Intelligence of children. Data were expressed as Mean \pm SEM by using IBM SPSS Statistics Software (v.25, Chicago, IL). Statistical differences between normal and obese/overweight groups were determined by using T student test. In order to understand whether there is an association between BMI and EI, Pearson's correlation was used. Differences between groups were considered significantly different when the p-value was less than 0.05.

3. Results

Based on the results most of the families showed average or above average household income in both normal and overweight/obese children's groups (36 and 33% less than average and 64 and 67% above average among overweight/obese and normal group, respectively). As Fig. 1 shows about 47% of children were in the normal BMI for age Z score (BAZ) and 53% were either overweight or obese. Furthermore, boys showed higher BAZ than girls.

As Fig. 2 shows, a significant negative correlation between BMI and EI score was seen in both genders ($r^2=0.33$, $f=33.99$, $p=0.001$). A similar pattern was also noticed for both boys and girls.

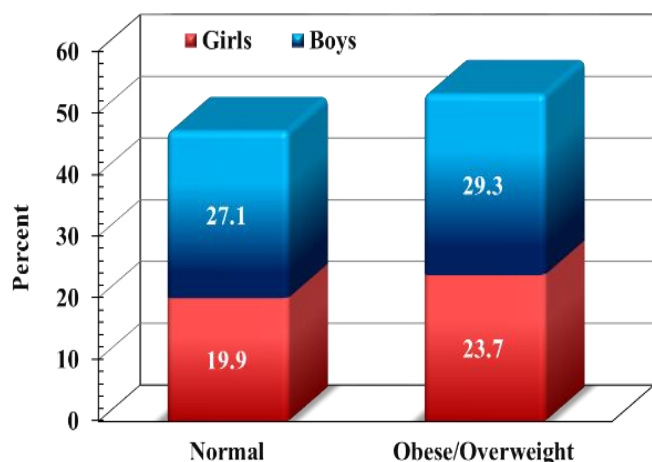


Fig. 1. Gender-based comparison of the BAZ of studied children.

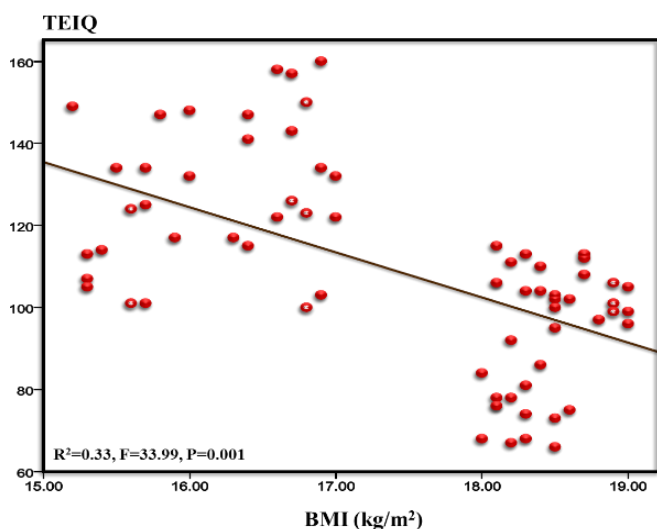


Fig. 2. Relationship between BMI and EI score among both genders.

Despite the similarity of this pattern in both genders, to some extent boys showed a stronger negative relationship between their BMI and EI score which could be seen in Fig. 3 and Fig. 4 (Girls: $r^2=0.293$, $f=13.27$, $p=0.001$; Boys: $r^2=0.388$, $f=22.15$, $p=0.001$). Total EI scores of normal weight children showed significantly higher than overweight/obese ones ($p<0.001$, $T=8.52$, $df=69$; Fig. 5).

4. Discussion

In relation to obesity, much is known about healthy lifestyle (i.e., nutrition and physical activity), but little is known about the well-being (34). In fact, many of the recommendations for the treatment of child and adolescent overweight and obesity focus on physical outcomes like BMI and body composition with disregard for their impact on psychological or social well-being. Some of the important psychological or social well-being issues are EI and intelligence quotient (IQ). Traditional IQ is the ability to learn, understand and reason. It is well

documented that obesity has a negative effect on cognition. Cross-sectional studies have found that obesity is associated with low intellectual ability and neuroimaging abnormalities in adolescence and adulthood. Obese children and adults have lower IQ than do lean controls (35, 36). Most of the follow-up cohort studies found that adults who were obese in midlife were more likely to suffer cognitive decline and develop dementia than were their lean peers (37–39). Systematic review and meta-analysis have shown an inverse association between obesity and IQ.

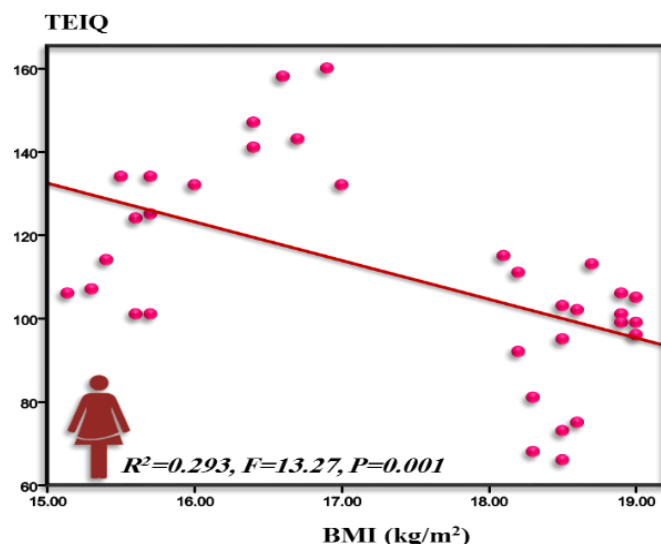


Fig. 3. Relationship between BMI and EI score among girls.

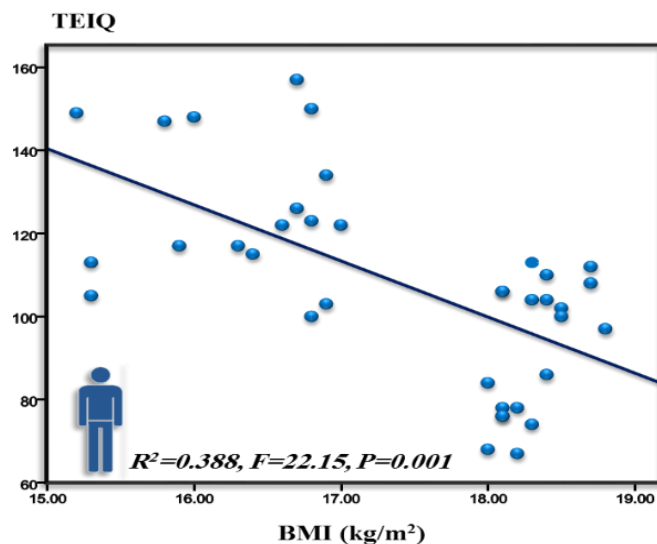


Fig. 4. Relationship between BMI and EI score among boys.

There could be a connection between EI and IQ as well. As Goleman suggested, EI forms a better way to use IQ through self-control, perseverance, and self-motivation (40). IQ could contribute only 20% to one's success, whereas emotional quotient (EQ), which is the ability to understand oneself and interact with people, contributes 80% (41). Unlike IQ and

obesity relationship, there are few studies on such a connection between obesity and EI. A study shows that IQ and conscientiousness significantly predict emotional intelligence, and identifies shared brain areas that underlie this interdependence (42).

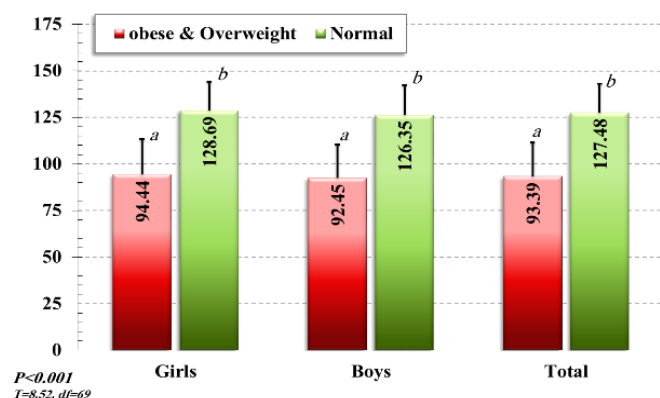


Fig. 5. Gender-based comparison of EI score of studied children.
^{ab} Values with the different superscripts are significantly different at $p < 0.001$ based on one t-student test.

Given that the psychosocial health of obese and overweight children and youth has been studied from a largely psychopathological perspective, measures often report on specific issues (i.e., depression and behavioral concerns). However, this approach fails to recognize or capture the limitations of well-being that may not meet specific diagnostic criteria. Overweight children have reported lower quality of life (QOL) than non-overweight peers (43). Studies suggest that the lower QOL for overweight children is related to physical functioning and psychosocial domains (44, 45), still obese children when compared to healthy-weight children are up to five times more likely to report lower global health-related QOL scores and in one study could not be distinguished in terms of scores from children with cancer receiving chemotherapy (46).

5. Conclusion

Based on the present study, overweight and obesity is associated with higher EI score in both genders, which it shows the importance of weight effect on EI. Despite strong p -value in Pearson correlation between BMI and EI score, which was found in this study, due to calculated R square, it is hard to say that there is a strong relationship between these two items.

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