Journal of Eating Disorders

RESEARCH

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The weight of words: investigating the role of weight stigma and body mass index in shaping children and youth's emotional experiences

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Abstract

Background The prevalence of overweight and obesity among children and adolescents has become a significant public health concern worldwide. These conditions not only affect physical health but also contribute to psychological challenges, particularly through weight stigma. Understanding the relationship between weight stigma, body mass index (BMI), and emotional distress is crucial for informing interventions, particularly in cultural contexts where weight-related perceptions vary.

Aim This study aimed to investigate the influence of weight stigma and BMI on the emotional experiences of children and youth in Egypt.

Methods A descriptive correlational design was employed in 16 preparatory schools, 49 secondary schools, and 20 faculties across various Egyptian governorates. A convenience sample of 2,731 participants aged 12–21 years was included. Data were collected using an online questionnaire that measured BMI, weight stigma, and emotional states (depression, anxiety, and stress) through validated tools. Statistical analyses included chi-square and linear regression tests.

Results The findings revealed that 22% of participants experienced high levels of weight stigma, which was significantly associated with higher levels of emotional distress ($p < 0.001$). Weight stigma explained 46.9% of the variance in emotional distress, whereas BMI showed no significant association with emotional states ($p = 0.983$). Notably, cultural factors, including conflicting societal norms regarding body weight and media influence, appeared to shape weight perceptions and stigma experiences among youth.

Conclusion Weight stigma is a stronger predictor of emotional distress than BMI, emphasizing the need for targeted interventions addressing weight-based discrimination. Given the cultural nuances influencing weight perception in Egypt, public health initiatives should incorporate culturally sensitive approaches to promote body positivity and mitigate the psychological impact of stigma. These findings contribute to global eating disorder research by highlighting the role of sociocultural factors in shaping weight-related experiences among youth.

Keywords Body mass index, Weight stigma, Emotional distress, Obesity, Children, Adolescents

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Plain English Summary

This study looked at how young people in Egypt feel about their bodies and how being treated differently because of their weight affects their emotions. The researchers wanted to understand whether being overweight or underweight (measured by Body Mass Index, or BMI) or being teased or judged for weight (called weight stigma) was more connected to feelings like stress, anxiety, or sadness. More than 2700 young people between the ages of 12 and 21 took part in the study. They answered questions about their height, weight, feelings, and whether they had experienced teasing or criticism about their bodies. The study found that nearly 1 in 5 participants experienced high levels of weight stigma. Those who felt more judged or teased about their weight were more likely to feel emotionally distressed. Surprisingly, actual weight (BMI) didn't have a meaningful link to emotional health; what mattered more was how others treated them because of their weight. Cultural attitudes in Egypt also played a big role. While some older adults see being heavier as a sign of health or wealth, younger people are more influenced by social media and Western beauty standards that promote thinness. This creates confusion and pressure for many young people. The findings highlight the importance of creating supportive environments in schools, families, and communities. Addressing teasing and promoting body acceptance could help protect young people's mental health, regardless of their body size.

Introduction

In recent decades, the prevalence of overweight and obesity among children and adolescents has emerged as a significant public health concern worldwide. Childhood and adolescence are critical developmental stages during which individuals form perceptions about themselves and their bodies that can have lasting effects on their emotional well-being and lower self-esteem [1, 2]. While efforts have been made to address the physical health consequences, the emotional and psychological impacts of weight-related issues in this vulnerable population have garnered increasing attention. In addition, one critical factor that may contribute to adverse harmful effect for social and emotional outcomes is weight stigma [3, 4].

Weight stigma arises from a misconstrued understanding of the complex etiology of obesity, which involves a multifaceted interplay among various factors encompassing environmental influences, behavioral patterns, metabolic processes, and genetic predisposition [1]. Since the 1960s, the stigma related to weight has intensified, coinciding with the rising prevalence of obesity [3]. Globally, more than 107 million children are affected by obesity, with a higher prevalence observed in high-income nations [5]. In Egypt, the "100 million healthy" initiative conducted a follow-up of approximately 50 million individuals in 2019. Startlingly, the findings revealed that around 40% of the participants suffered from obesity, defined as a BMI greater than 30 kg/m2 [6].

Cultural attitudes in Egypt often associate higher body weight with prosperity and well-being, particularly among older generations, while younger populations are increasingly influenced by Western beauty standards that promote thinness. This cultural dichotomy creates a unique and often contradictory environment for youth, where weight stigma manifests differently across generations and social contexts. Family expectations play a significant role, with some parents encouraging weight gain in childhood as a sign of good health while simultaneously criticizing excess weight in adolescence due to shifting societal norms. Such mixed messaging can contribute to confusion, body dissatisfaction, and increased stigma among Egyptian youth [7, 8].

Furthermore, Egypt had an approximate 46.25 million social media users as of 2023, where weight-negative stereotypes are typically perpetuated, and the impact is increased by online anonymity. Social media algorithms tend to overexpose users to thin-ideal content, thereby allowing for easy internalization of weight stigma and subsequent unhealthy weight control behaviors. Studies have proven that constant exposure to Westernized beauty standards on social media platforms such as Instagram, TikTok, and Facebook is associated with body dissatisfaction, eating disorder symptoms, and greater weight-related stress in adolescents [9].

Weight stigma, also known as weight bias or weight discrimination, is a significant public health issue that involves negative thoughts, attitudes, and behaviors directed towards children who are subjected to criticism based on their weight. This can manifest as bullying or bullying-like behaviors. Weight stigma can take subtle forms, including the internal attribution of negative stereotypes (e.g., laziness, incompetence, and poor health) and subjecting individuals to intolerant behaviors such as teasing, bullying, and hostility [10]. Additionally, youths' body image, which encompasses their perception of their own body and the associated emotions and behaviors, is influenced directly and indirectly by factors such as social media, family dynamics, and the community environment [11]. When these factors interact, it can contribute

to the development of an unrealistic view of appearance and excessive comparison with peers [12].

Weight status seems to be one of the most crucial factors in bullying. Children of a youth's age pinpoint weight as the chief cause for harassment between their peers [13]. Previous studies consistently found that children with overweight (OW) were bullied more often and more intensively than their peers. Also, Youth who experience weight stigma may face long-term consequences, including lower self-esteem, academic challenges, and potential discrimination in social and professional environments later in life [14, 15].

Unfortunately, many youths, irrespective of their own weight status, tend to harbor weight-biased attitudes [16]. Eating disorders are an additional bad effect that may be produced by weight bias, in addition to mental stress, which can be caused by weight bias [10]. Furthermore, Gan et al.'s study indicated that children of both genders tolerate various effects of weight-based teasing and perceived pressure to be thin [17]. When an individual internalizes the negative effects of weight discrimination, their self-perceived weight status, as opposed to their objective weight status, which is measured by BMI, may have a greater influence on their mental health and behaviors [18]. Moreover, Lin et al. reported that impaired the perception of youth about their weight lead to eating disorders and stress [19].

Dim opinions toward abnormal weight conditions are usually held, particularly concerning the significant adverse effects that underweight and overweight can have on health, including social and mental status [20]. Patte et al., reported that the undesirable effects of weight stigma are psychosocial problems (such as anxiety, depression symptoms, low self-confidence and body image, unhealthy eating habits, lazy, and drug use) and physical impairments (such as an increased risk of heart disease) [4, 9].

Furthermore, the relationship between weight stigma, BMI, and emotional well-being may be influenced by various factors, such as age, gender, socioeconomic status, and coping strategies. Understanding these complexities is crucial for developing targeted interventions and support systems that promote positive emotional development and counter the harmful effects of weight bias [21].

While studies on weight stigma and its psychological impacts are abundant in Western cultures, studies on youth populations in Egypt and the broader Middle East region still remain scarce. The present study is unique in that it explores correlations between weight stigma, BMI, and emotional well-being in Egyptian youth, providing culturally targeted research on a large, understudied population. Given the increasing prevalence of eating disorders and weight-related psychological distress in the region, these findings have significant implications for public health policy, intervention efforts, and education programs aimed at lessening weight stigma and its impacts [22].

Aim: to investigate the influence of weight stigma and body mass index (BMI) on the emotional experiences of children and youth.

Objectives:

1. To assess the impact of weight stigma on the emotional well-being of children and youth.
2. To investigate the relationship between body mass index (BMI) and emotional experiences among children and youth
3. Compare the perceptions of weight among children and youth, examining potential differences across age groups.
4. To explore the relationship between weight control behaviors, BMI, and weight perception among children and youth
5. To compare the perceptions of weight among children and youth, examining potential differences across age groups.

Materials and methods

Study design and sample equation

The study utilized a descriptive correlational design and was conducted in 16 preparatory schools, 49 secondary schools, and 20 faculties across different Egyptian governorates in both the government and private sectors. The convenience sample consisted of 2731 children, including 1922 females and 809 males, divided into three categories: faculty students (1681), secondary students (874), and preparatory students (176). The inclusion criteria were both gender (male and female) with age from 12 to 21 years, the exclusion criteria were subjects who have been diagnosed with mood or anxiety disorders and an eating disorder. Participants from a wide age range (12–21 years) were included to capture various developmental stages, from early adolescence (12–14 years) to early adulthood (18–21 years). This range allows for a broader understanding of how weight stigma affects emotional well-being across different developmental stages. To account for potential developmental variations, subgroup analyses were conducted to explore age-related differences in the effects of weight stigma on emotional distress.

To ensure diversity in the sample, we aimed to recruit participants from both urban and rural areas across Egypt, considering the socioeconomic context of the participants, as reflected by family income and the education level of the parents. Participants were drawn from

both government and private schools, representing a broad geographic range of Egyptian society. The schools were selected to reflect various educational levels across the nation.The equation was computed dependent on a study carried out by Pahl and Luedicke (2012) [20]. By the estimated effect size of 40% of teenagers reporting sad and depressed, low self-confidence, poor body image, annoyed, and afraid, the level of confidence (1-Alpha Error) was 99%, the margin of error was 3, the population proportion was 40, and the minimum final sample size was 1776. The online questionnaires were distributed to approximately 3200 students, and 2910 responses were received, resulting in an acceptance rate of 90.9%. After a thorough check of all responses, 179 were excluded due to missing data.

Tools of data collection

Part I: The characteristics of youth and children included age, gender, residence, education level of parents, and family history related to weight problems, weight, height, education level of children parents and family income.

BMI classification

For participants under 18 years of age, BMI was categorized using the World Health Organization (WHO) age- and sex-specific growth charts. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). The resulting BMI values were then plotted on the WHO growth charts to determine their percentile rankings. The following classifications were used: Underweight: BMI < 5th percentile, Normal weight: BMI between the 5th and 85th percentiles, Overweight: BMI between the 85th and 97th percentiles, Obesity: BMI > 97th percentile [18, 19].

This approach ensures that the BMI categorization accounts for the natural variations in growth and development among children and adolescents. For participants aged 18 and above, BMI was categorized using the standard adult cut-offs recommended by the WHO: underweight (<18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2), and obesity (≥30 kg/m^2) [18, 19].

Part II: The children's weight perception was measured through questions, "How do you think about your body image?" answer alternatives were "Very Thin," "Not Very Thin," "Normal," "Not Very Fat," and "Very Fat." The "Very Thin," "Not Very Thin" reflected a perception of being underweight, and Not Very Fat, " and "Very Fat" reflected a perception of being overweight; it was adapted from Lee et al. [21]. Also, weight control behaviors were measured through this item: "Have you tried to control your weight in the last 30 days?" The answer alternatives were "Not tried, " "Tried to lose weight, " "Tried to gain weight, " and "Tried to maintain weight." It was adapted from Lee et al. [21].

Part III: Weight stigma was measured with four points of perception of teasing scale (POTS) (e.g., "Do people laugh at you because you are heavy?", Do people make jokes about your weight? Do people make fun of you when you work out? (and do people ever laugh at you when you walk into a place alone?) On a 3-point scale (1 = never, 2 = sometimes, 3 = always) for each item. High scores mean high stigma. The total score was categorized as high stigma if it scored 60% or more and low stigma if it scored below 60%; this was adapted from Thompson et al. [23].

Part IV: Negative emotion was measured through Depression, Anxiety, and Stress Scale (DASS 21) [24, 25], which distributed on 3 domains: the depression domain included 7 items; the anxiety domain included 7 items, and the stress domain included 7 items. Each Likert scale item rated always "3, " sometimes "2," and never "1," and a high score indicates severe negative emotions. The children's responses were categorized into 4 categories: normal if the score was 21, mild from 22 to < 35, moderate from 35 to < 49, and severe from 49 to 63.

Pilot study: A pilot study was conducted with 275 participants to evaluate the clarity, reliability, and practicality of the data collection tools (POTS and DASS-21). The findings confirmed the high internal consistency of the tools (Cronbach's $\alpha = 0.825–0.879$), and no modifications to the questionnaire were necessary. Feedback from participants during the pilot also indicated that the survey format and questions were clear and easy to understand.

Data collection

To ensure the relevance and appropriateness of these scales for the Egyptian context, both scales were subjected to a cultural adaptation process. Specifically, the scales were first translated into Arabic by bilingual experts, followed by a back-translation to ensure the accuracy of the translated versions. A pilot study was then conducted with a sample of Egyptian youth to assess the clarity and cultural appropriateness of the translated items. The feedback from this pilot study indicated that the scales were well-understood by participants, and no significant issues related to cultural differences in interpretation were observed. These adaptations ensured that the tools were appropriate for measuring the constructs in the Egyptian context.

Data were collected using an online questionnaire developed via Microsoft Forms (https://forms.office.com/r/LMEbeV7QKL). The questionnaire was distributed to participants via email and social media platforms such as WhatsApp and Telegram, with a limited time of approximately two weeks for completion. Data collection

Table 1 Characteristics of subjects (n = 2731)

Items		n	%
Age:			
12–<14		49	1.8
14–<16		307	11.2
16–<18		694	25.4
18–21		1681	61.6
Mean ± SD	18.24±3.17		
Gender:			
Female		1922	70.4
Male		809	29.6
Residence:			
Rural		1192	43.6
Urban		1539	56.4
Family member suffered from weight problem:			
Obesity		718	26.3
Underweight		260	9.5
No		1753	64.2
Weight:	Mean (SD)	65.31(15.86)	
Height:	Mean (SD)	162.82(16.05)	
BMI:			
Underweight		229	8.4
Normal		1603	58.7
Overweight		526	19.3
Obesity		373	13.6
Education level of children' parents:			
Not read and write		113	4.1
Primary education		479	17.6
Secondary education		982	35.9
University education		1157	42.4
Monthly income of family:			
Insufficient		1627	59.6
Sufficient		1104	40.4

took a total of four months, from February 1 to May 30, 2022.

Statistical analysis

The collected data were coded and entered into the (SPSS) version 26. The data was reported as a number and percent, or as the mean (standard deviation), as appropriate. To assess the relationship and correlation between BMI and weight stigma and their effect on negative emotions among children, chi-square and simple linear regression tests were employed. The formula for BMI is weight in kilograms divided by height in meters squared. Statistical significance was considered at $P \leq 0.05$*. Effect sizes were computed using Cramér's V for chi-square tests and Cohen's f^2 for regression analysis, ensuring the robustness of statistical interpretations. Confidence intervals (95% CI) were also reported for key findings. Cronbach's alpha coefficient test was used by a statistician in the SPSS program version 26 to assess the reliability of the adapted tools. The predesigned questionnaire verified good internal consistency and reliability, as revealed by a Cronbach's α coefficient of Depression, Anxiety, and Stress Scale (DASS 21) 0.879, children's weight perception 0.843 and Weight stigma 0.825.

Table 2 Distribution of youth and children according Weight stigma and DASS (n = 2731)

Items	n	%
Weight stigma among children		
Low	2141	78.4
High	590	21.6
Depression, Anxiety, and Stress Scale		
Normal	30	1.1%
Mild	1319	48.3%
Moderate	1220	44.7%
Severe	161	5.9%

Results

According to the characteristics of the studied youth and children (see Table 1), the mean age was 18.24 (SD = 3.17) years, the mean weight was 65.31 (SD = 15.86) kg, and the mean height was 162.82 (SD = 16.05) cm. Among the children, 19.3% were overweight, 13.6% were obese, and 8.4% were underweight. The majority of participants were females (70.4%) and lived in urban areas (56.4%). Regarding the education level of the participants' parents, 42.4% of the parents had completed university education. Additionally, 59.6% of the participants' families reported having insufficient income, indicating a lower socioeconomic status.

As shown in Table 2, regarding the studied youth and children and negative emotions, we detected that 48.30% of them reported mild symptoms of negative emotions, 44.70% reported a moderate level, and 5.90% reported severe levels, while only 1.10% reported being normal. Also, related weight stigma 2, 78% of the studied children had a low-weight stigma, while 22% of them had a high-weight stigma.

Table 3 Linear regression associated of perceived DASS scores with BMI, weight Stigma score, age, and weight (n = 2731)

Model	Unstandardized B		St. Error	Beta	*t*	*p*
(Constant)	20.646		0.650		31.780	0.000
BMI	2.363		0.000	0.000	0.021	0.983
Weight Stigma	2.843		0.118	0.474	24.123	0.000
Age	−0.106		0.221	−0.152	−0.479	0.641
Weight	−1.175		1.349	−2.543	−0.871	0.402
R	R^2	Cohen's f2	Adjusted R square	*F*	*p*	
0.685	0.469	0.88	0.228	63.552	0.000	

Table 4 Relation between BMI of youth and children and their total weight stigma (n = 2731)

	weight Stigma				Chi-square *P*. value	Cramér's V
	High		Low			
	n	%	n	%		
Underweight	93	40.6	136	59.4	< 0.001**	0.393
Normal	136	8.5	1467	91.5		
Overweight	179	34	347	66		
Obesity	182	48.8	191	51.2		

**highly significant if $p < 0.01$

Table 5 Relation between youth and children's BMI, Weight control behaviors and weight perception (n = 2731)

	Perception						Chi-square *P*. value	Cramér's V
	Perceived normal (N = 2073)		Over-weight (N = 554)		Under-weight (N = 104)			
	n	%	n	%	n	%		
Weight control behaviors								
Try to lose (N = 590)	158	26.8	432	73.2	0	0	< 0.001**	0.749
Try to maintain (N = 310)	269	86.8	36	11.6	5	1.6		
Try to gain (N = 87)	7	8.1	3	3.4	77	88.5		
Not try to change (N = 1744)	1639	93.9	83	4.8	22	1.3		
BMI								
Underweight (N = 229)	158	69	4	1.7	67	29.3	< 0.001**	0.407
Normal (N = 1603)	1402	87.5	165	10.3	36	2.2		
Overweight (N = 526)	345	65.6	180	34.2	1	0.2		
Obesity (N = 373)	168	45.1	205	54.9	0	0		
Age								
12—< 14 (N = 49)	12	24.5	18	36.7	19	38.8	< 0.001**	0.203
14—< 16 (N = 307)	204	66.4	87	28.3	16	5.2		
16—< 18 (N = 694)	529	76.2	126	18.2	39	5.6		
18 – 21 (N = 1681)	1328	79	323	19.2	30	1.8		

**highly significant if $p < 0.01$

The linear regression model indicated a highly significant overall model, with F = 63.552 and a *p* value .000. Also, this model detects that the predictor variables had 46.9% effect on DASS, as detected at $R^2.469$. Additionally, the analysis showed no significant association between BMI and the DASS score ($p = 0.983$), while weight stigma

had a positive predictor effect on the DASS score with a highly significant effect at p value .000. Meanwhile, age and weight were not significant predictors of emotional distress ($p > 0.05$), unlike BMI and weight stigma. This may indicate that these variables exert their influence indirectly through other mediating factors. Also, the effect size, measured using Cohen's f^2, is 0.88, which indicates a large effect size. This suggests that the predictor variables (BMI, weight stigma, age, and weight) have a strong impact on the variance in perceived DASS scores.

According to the relation between the BMI of youth and children and their total weight stigma, Tables 3 and 4 revealed that 48.8% of obese children experienced high weight stigma, while 40.6% of underweight children reported high weight stigma. Conversely, 91.5% of children with normal weight reported low weight stigma. Moreover, the table indicated a highly significant association between BMI and weight stigma at P value <0.001**. The effect size, measured using Cramér's V, is 0.393, which suggests a moderate-to-strong association between BMI categories and weight stigma levels.

The data presented in this Table 5. provide significant insights into the relationships between weight control behaviors, BMI, age, and weight perception among youth. The findings reveal a strong association between weight control behaviors and weight perception (Cramér's V = 0.749, $p < 0.001$). The moderate association between BMI and weight perception (Cramér's V = 0.407, $p < 0.001$) suggests that BMI influences self-perception but is not the sole determinant. Meanwhile, the weaker association between age and weight perception (Cramér's V = 0.203, $p < 0.001$) suggests that weight perception stabilizes as individuals age but remains subject to external influences. Additionally, the study found highly significant relationships between weight control behaviors, age, and BMI with weight perception ($p < 0.001$)

Discussion

Relation between BMI, DASS and weight stigma

The present study fills a critical gap in the literature by investigating weight stigma and its psychological consequences within the Egyptian context, an area where limited research exists. The findings offer a cultural understanding of how societal and familial attitudes toward weight influence emotional well-being in children and adolescents, contributing to the global discourse on weight stigma. The analysis of the relationship between BMI and weight stigma experiences revealed a significant association. Furthermore, the observed positive predictive effect of weight stigma on emotional distress, coupled with the significant association between BMI and weight stigma experiences, underscores the need for comprehensive interventions and support systems. Efforts should be directed towards reducing weight-based biases and discrimination in various settings, such as schools, healthcare facilities, and communities.

Overall, this study highlights the significant emotional toll that weight stigma can take on children and youth, regardless of their BMI status. Weight-based discrimination, stereotyping, and social exclusion can contribute to heightened levels of depression, anxiety, and stress, particularly among vulnerable populations such as children and adolescents.

This finding aligns with previous research by Gmeiner and Warschburger, conducted a study in various areas of the Germany and Federal State of Brandenburg, and their findings support the results of the current study that there is a correlation between weight stigma and body weight, regardless of gender and weight groups [25]. Also, the adolescents with both gender who overestimated their body weight suffered from psychological issues as reported at different studies [21, 26, 27]. Similarly, psychological stress and physical symptoms were more common in overweight or obese Austrian teenagers [28]. Furthermore, Patte and others found that students who experienced bullying and had underweight perceptions had higher levels of anxiety and depressive symptoms [13]. Researchers also reported symptoms of depressive disorder among adolescents who were dissatisfied due to their thinness [29].

Besides, Althumiri and others conducted a cross-sectional study in Saudi Arabia and reported that there was a significant relation between obesity and weight stigma [30]. The negative impact of obesity on body perception can trigger anxiety, increase exposure to social pressure, and lead to unethical attitudes.

Given the strong association between weight stigma and emotional distress observed in this study, targeted interventions should be developed to address both direct and indirect contributors to weight-based discrimination. Public health initiatives must focus on integrating culturally sensitive educational programs that challenge harmful beauty norms while promoting positive body image. Schools and community programs should provide support mechanisms to help youth navigate conflicting societal expectations, reduce internalized weight stigma, and develop healthy coping strategies. By contextualizing weight stigma within the unique sociocultural environment of Egypt and addressing the paucity of research in Middle Eastern countries, this study contributes valuable insights that can inform global efforts to reduce weight-based discrimination and promote holistic well-being among youth. Future research should further explore the interplay between cultural norms, media exposure, and family influences in shaping youth experiences of weight stigma in the Middle East. Longitudinal and qualitative

studies are particularly needed to provide deeper insights into the lived experiences of those affected by weight stigma and to inform more effective intervention strategies.

Relationship between youth and children's weight control behaviors, body mass index (BMI), and weight perception

This study explores the relationships between BMI, weight control behaviors, and weight perception among youth and children. Findings indicate a strong association between weight perception and weight control behaviors (Cramér's $V = 0.749$, $p < 0.001$), suggesting that self-perception significantly influences weight management efforts. Notably, those who attempted to lose weight primarily identified as overweight, while individuals trying to gain weight predominantly perceived themselves as underweight.

The relationship between BMI and weight perception was moderate (Cramér's $V = 0.407$, $p < 0.001$), demonstrating that although BMI plays a role in shaping weight perception, additional sociocultural and psychological factors contribute to misperceptions. Many overweight individuals misclassified themselves as having a normal weight, potentially due to cultural norms and media influences. This highlights the need for public health interventions to improve awareness of healthy weight classifications and address body image concerns.

The association between age and weight perception was weaker (Cramér's $V = 0.203$, $p < 0.001$), suggesting that while weight perception stabilizes with age, younger adolescents (12–14 years) are more likely to have inaccurate weight perceptions than older adolescents (18–21 years). This underscores the importance of early interventions in school settings, including age-appropriate health education and body image awareness programs, to correct misperceptions and encourage healthier attitudes toward body weight.

Overall, these results emphasize the importance of integrating psychological and behavioral components into weight-related health interventions. Public health campaigns should focus on addressing the role of perception in shaping weight control behaviors, providing accurate self-assessment resources, and countering stigma related to weight classifications. Given the strong link between weight perception and weight control behaviors, future research should explore the psychological and social drivers of these relationships to inform more effective, culturally sensitive intervention strategies for youth.

These results cohort with the studies by Moehlecke and others conducted a study on Brazilian adolescents and reported that most of the adolescents had correct perceptions of their body image related to BMI, and those who had body image misperceptions and were dissatisfied with their weight were more likely to have mental disorders [14]. In addition to these findings, Boutelle and others discovered that overweight youths were more likely to engage in unhealthy weight control behaviors [31]. Similarly, Bhurtun and Jeewon reported that 11.7% of students were overweight based on BMI, with 43.3% of respondents attempting to lose weight [32]. Also, the weight status and perceptions were strongly linked to weight loss attempts [33]. Puhl and others investigated the impact of weight bias and discrimination on children and adolescents with overweight or obesity, who are more susceptible to these negative experiences than their peers [34]. To the contrary, some studies have mentioned that weight stigma could actually contribute to weight gains and poor health outcomes [35, 36]. Implications from standing work indicate that weight control behavior is independent of weight perception. So further studies are needed to explore other factors. Moreover, increasing efforts must consider strategies to control the weight as part of broader initiatives to inhibit and treat negative emotions as a result of weight stigma. Furthermore, Poor correlation between body size perception and BMI in children and adolescents has been reported by various scholars [37–39].

Relationship between youth and children's age and weight perception

Our study demonstrates that weight perception varies across different age groups. The younger age group (12—<14 years) had a higher proportion of participants perceiving themselves as underweight or overweight, compared to the older age groups. This suggests that younger children may have more distorted perceptions of their weight status, potentially due to factors like body image concerns or developmental changes. Overall, the data highlights the influential role age plays in shaping weight perception during childhood and adolescence.

This improvement in weight perception with age may be attributed to factors such as increased body awareness, cognitive development, and exposure to societal norms and expectations regarding body image [40].

These results supported with the study by Wang et al [41]. stated that there was significant correlation between children age and their perception about their body weight at p 0.022. Younger children aged <10 years was more likely to perceive themselves as underweight [42]. Misperception of weight status is reported in both adults [43] and children [44] particularly among those overweight. It has been reported that children and adolescents tend to underestimate their weight [45]. The perception was influenced by age, obtaining significant differences with PF, χ^2 (4, $N = 388$) = 13.39, $p = 0.01$, as children tended to

underestimate their body size more as they became older [46].

The findings highlight the critical need for targeted interventions within educational and healthcare settings to mitigate weight stigma and its psychological impacts on children and adolescents. Schools could implement training programs for educators to recognize and address weight-based bullying effectively. These programs should focus on promoting body positivity, fostering inclusive environments, and teaching empathy to reduce stigma among peers. Additionally, integrating counseling services within schools could provide affected children with timely emotional support, helping them develop coping strategies to manage the psychological distress associated with weight stigma. In healthcare settings, training for providers on weight-inclusive care practices is essential to minimize bias and improve the quality of care for children and adolescents of all body sizes. Public health campaigns could also play a role in reshaping societal attitudes toward weight and reducing the prevalence of stigma in broader community contexts.

Strength points

- The study addressed the significant problem of weight stigma and its impact on youths and children's emotional well-being, shedding light on the prevalence of weight stigma and its association with increasing BMI values.
- By categorizing the participants into categories of age, the study captured a range of BMI values, enabling a more nuanced understanding of the relationship between BMI levels and negative emotions at different ages.

Limitation points

- While the cross-sectional design provided valuable insights into the associations between BMI, weight stigma, and emotional distress, it precludes the ability to infer causality.
- The reliance on self-reported data may introduce bias due to social desirability or subjective interpretation.
- The study did not include a control group, making it challenging to compare the emotional experiences of children with and without weight stigma or varying BMI values.
- However, we recognize that the use of convenience sampling may limit the generalizability of our findings to the broader population of Egypt. Future studies should consider stratified sampling techniques to ensure a more representative sample of Egypt's diverse population.

Conclusion

This study highlights the significant emotional toll that weight stigma imposes on children and youth. Weight stigma was found to be a strong predictor of negative emotional states, such as depression, anxiety, and stress, regardless of participants' BMI. While no significant association was observed between BMI and emotional states, weight stigma explained a considerable portion of the variance in emotional distress, emphasizing its critical role in shaping mental health outcomes. Given the influence of cultural expectations and media on weight-related perceptions in Egypt, addressing weight stigma requires a multidimensional approach that integrates public health policies, media literacy education, and family-based interventions.

The findings underscore the importance of addressing weight stigma through targeted interventions in schools, healthcare settings, and public health campaigns. Promoting body positivity, implementing anti-bullying programs, and fostering supportive environments can help mitigate the psychological impact of weight stigma, particularly in culturally nuanced contexts. Healthcare providers should be trained to recognize and reduce weight bias, while public health messaging should move away from weight-centric approaches to focus on holistic health and well-being. Furthermore, integrating eating disorder prevention into these initiatives is crucial, as stigma can drive unhealthy behaviors and disordered eating patterns.

Future research should focus on exploring the long-term consequences of weight stigma and identifying protective factors that enhance resilience among youth. Longitudinal and qualitative studies are particularly needed to provide deeper insights into the lived experiences of those affected by weight stigma and to inform more effective intervention strategies.

Acknowledgements

The authors extend their appreciation to Princess Nourah bint Abdulrahman University Researchers Supporting Project number (PNURSP2025R444), Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia.

Author contributions

Conceptualization, Hendy A. Zaher A. Salman S.; methodology, Zaher A and Hendy A. Rasha I.; software, Tantawi H; validation, Hendy A and Hendy A.; formal analysis, Sayed S.; investigation, Soliman S.;data curation, Al-Mugheed K.; writing—original draft preparation, Hendy A, Sayed S. and Alabdullah A., Zaher A, Tantawi H; writing—review and editing, Sally M., Rasha I and Salman S.; visualization, Tantawi H, Rasha I and Salman S.; supervision, Al-Mugheed K.; project administration Hendy A.; funding acquisition, Alabdullah A. All authors have read and agreed to the published version of the manuscript.

Funding
Princess Nourah bint Abdulrahman University Researchers Supporting Project number (PNURSP2025R444), Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia.

Availability of data and materials
The data supporting this study's findings are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
The ethics committee of the Faculty of Nursing at Ain Shams University reviewed and approved the study (study ID: 23.09.125). Prior to completing the questionnaire, written informed consent was obtained from all participants or their legal guardians. Participants were informed of the study's purpose and procedures, and were assured that all information gathered would be kept confidential. They were also informed of their right to withdraw from the study at any time without any consequences. The online survey was anonymous, ensuring that there was no risk to the participants. Additionally, written informed consent was obtained from the participants or their legal guardians for the publication of the study's findings. To address potential emotional distress, participants were provided with contact information for a licensed psychologist who was available to offer support. Participants were also reminded that they could discontinue their participation at any time, with no repercussions. Additionally, all survey responses were kept confidential and anonymous, with no personally identifiable information collected. Only aggregate data were used for analysis and publication, further safeguarding participants' privacy.

Consent for publication
Not applicable.

Competing interests
No competing interest.

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Received: 24 May 2024 Accepted: 24 March 2025
Published online: 01 May 2025

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