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Original Article

Self-efficacy in Weight Management and Anthropometric Indices in Tehrani Male Adolescents

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ABSTRACT

Background and Objectives: Although a growing interest on the role of self-efficacy in weight management is reported worldwide, less research has been carried out on this association in adolescents. The aim of the present study was to investigate association of weight linked self-efficacy with anthropometric measurements in Tehrani male adolescents.

Materials and Methods: The study was carried out on 535 male students aged 12–16 years old from two secondary high schools of District 5, Tehran, Iran. Weight, body mass index (BMI), body fat percentage and body muscle percentage were measured using bio impedance analyzer (BIA) scale. A validated weight efficacy lifestyle questionnaire (WEL) was used to assess weight linked self-efficacy.

Results: The higher weight linked self-efficacy was significantly associated with further body muscle percentage ($P<0.05$). However, no significant association was seen between the self-efficacy and weight, height, BMI and body fat percentage of the male adolescents.

Conclusions: Results of the current study suggest that self-efficacy for weight management may be unlinked to specific measures of obesity, while male adolescents with a higher self-efficacy in weight management may have a higher muscle mass. Further research is necessary to verify effects of self-efficacy on anthropometric indices in male adolescents.

Keywords: Male adolescent, Self-efficacy, Obesity, Anthropometric indices, Tehran

Introduction

Childhood obesity is one of the most important risk factors for comorbidities in adulthood (1). Obesity is continuously rising in children and adolescents in most high-income and low-income countries; therefore, this phenomenon is still a challenging and costly issue in health (2). The overall prevalence of obesity in 11–19 years old female and male adolescents includes 8.7 and 11.83%, respectively (3). Results of a national survey on Iranian students (6–18 years old) has shown that more than one fifth of all students (22.2% females and 22.9% males) are obese or over-weighted (4). Nearly 80% of obese adolescents are reported to be obese in adulthood (5). Recent studies have demonstrated that behavioral problems in schools such as lower self-esteem are associated to weight status in children (6–9). Recently, childhood obesity specialists have focused on multidisciplinary treatment approaches that supports long-term healthy lifestyle changes (10). Systematic reviews of child obesity treatments have revealed that multidisciplinary approaches, including nutritional intervention, physical activity program and cognitive behavioral therapy, can result in more significant decreases in bodyweight (11). Self-efficacy refers to individual conviction of being able to initiate a behavioral change required to achieve personal goals such as weight loss (12, 13). Weight control self-efficacy can be defined as personnal capability to make healthy eating choices for the effective weight management even when faced to

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risky environments (14). Despite the assumption that targeting increases in weight-linked self-efficacy results in enhanced weight loss, the existing studies include inconsistent and even opposite findings on roles of self-efficacy in weight management (15–23). A recent study on self-efficacy as a predictor of weight changes in 106 overweight or obese African-American women has found that higher baseline self-efficacy includes a surprisingly reverse association with the rate of weight loss, suggesting that high initial self-efficacy may actually represent overconfidence or having less experience with weight loss attempts (21). Based on another study, higher self-efficacy included no associations with weight management in adolescents (22). Overall, results of studies on association of self-efficacy with weight management in various age groups, including male adolescents, have shown controverting and conflicting results. Furthermore, previous studies have used BMI and other anthropometric indices as primary outcomes, which may demonstrate a distorted image of healthy body weight (23). Recent studies have reported a low-level of self-efficacy in male adolescents (17–18). Therefore, the aim of the current study was to compare the weight-linked self-efficacy in male adolescents with normal weight and its association with obesity and overweight in high school students in Tehran, Iran.

Materials and Methods

Participants and setting

The present cross-sectional study was carried out in two high schools, 2015–2016, randomly selected from City District 5 of Tehran, Iran. A total number of 535 students of 12–16 years old were participated through a two-stage stratified cluster sampling design by considering inclusion criteria. The inclusion criteria consisted of lack of suffering from any weight-linked underlying diseases, no use of prescribed medications that affecting weight and lack of weight-linked diets or history of training programs in nutrition and physical activity.

Ethical considerations

The study was approved by the Ethics Committee of the National Nutrition and Food Technology Research Institute, Tehran, Iran (reference number: Ir.sbmu.nnftri.rec.1394.22). Written consents were signed by the participants and their parents before the study commencement. Benefits of participating in the study (including awareness of physical fitness and health status, free attendance to healthy lifestyle programs and receiving healthy snacks at schools) were described for the students and their parents to enhance the involvement rate of participants.

Anthropometric measurements

The anthropometric indices were measured by trained nutritionists using standard methods. Weight of students was measured using Bioimpedance Analyzer (Omron-BF511, Japan) in light clothing with no shoes. Height was measured using tape measure while standing without shoes beside wall. The body mass index (BMI) (kg/m^2) was computed as weight divided by the square of height. The Z-scores of BMI were analyzed using WHO Standard BMI Chart (24). In addition to measurement of adiposity, percentages of body fat and muscle were measured using Bioimpedance Analyzer (Omron-BF511, Japan). Based on the standards, students with BMI Z-scores for age of < -2 and < -2–1 SD (standard deviation) were classified as thin, BMI Z-scores for age of ≥1 but < 2 as overweight and BMI Z-scores of ≥ 2^{nd} percentile for age as obese. Specifically, if the Z-score of height for age was smaller than -2 SD, the person was short-height (24). For the categorization of body composition indices, if the Z-score of body fat percentage was smaller than the 2^{nd} mean, the individual had low levels of body fat while when the Z-score was larger than the 91^{th} percentile, the individual had high levels of body fat. Individuals with low and high body muscle percentages had below 2^{nd} and above 98^{th} percentiles of body fat, respectively (19).

Weight control self-efficacy

A validated twenty-item questionnaire of self-efficacy (WEL) (25) was used to assess the self-efficacy associated to eating behaviors. This questionnaire had been used and verified to assess accurately the self-efficacy in Iranian male adolescents (20). The participants were asked to estimate their confidence in ability to avoid eating when faced with various situations such as availability of foods (e.g. ‘I can control my eating on the weekends’), negative emotions (e.g. ‘I can resist eating when I am anxious’), physical discomforts (e.g. ‘I can resist eating when I feel physically run down’), social pressures (‘I can resist eating even when I feel it’s impolite to refuse others' request) and positive

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activities ('I can resist eating when I am watching TV'). Responses were measured on a scale from 0 (not confident) to 9 (very confident). Based on a previous study, total WEL scores of 20 items (0–180) for each participant were achieved from combining the numerical scores from each item and classified to above 70% as high and under 70% as low self-efficacies (26).

Other measurements

Demographics, socioeconomic status, calorie intake and physical activity were assessed to adjust their effects on associations between the major variables. The food frequency questionnaire (FFQ) was used to estimate the total energy intake and the international physical activity questionnaire (IPAQ) to estimate energy expenditure.

Data analysis

Data were analyzed using SPSS Software (PASW Statistics 23.0; SPSS Inc., Chicago, IL, USA). Subjects were categorized into three groups based on the BMI status, including under-weight, normal weight and overweight/obese groups. To test a hypothesis that self-efficacy was inversely linked to the level of obesity, multiple linear regressions were used for each dependent variable (BMI, height, weight, body fat percentage and body muscle percentage) after adjusting for age, energy intake and physical activity.

Results

Characteristics of the participants are summarized in Table 1. The average age of the adolescents was slightly more than 14 years. The mean weight of the students was 61.45 ±16.37 and the mean of height was 169.33 ±9.84. A majority of the student mothers had a BMI in overweight ranges and most of them were housekeepers without university educations. Nearly 55.7% of the participants (n = 298) were categorized into normal BMI group and 41.4% (n = 221) in overweight and obese groups (Table 2). Table 3 shows profiles of weight control self-efficacy within the participants. Only 19.3% of the participants were reported with high scores of the weight efficacy lifestyle questionnaire (WEL).

Table 1. Socio-demographic characteristics of the participants (n = 535)

Demographic index		Mean (SD)	N (%)
Students' age (yr)		14.1 (1.27)	
Students' Height (cm)		169.33 (9.84)	
Students' weight (kg)		61.45 (16.37)	
Students' calorie intake (kcal)		2436 (635)	
Students' physical activity (met)		979 (138)	
Mothers' height (cm)		165.11 (4.83)	
Mothers' weight (kg)		79.09 (32.25)	
BMI of mothers (kg/m^2)		29.02 (12.54)	
Number of children in the family	2≤		113 (21.1)
	2>		422 (78.9)
Mother's employment	housekeeper		470 (87.9)
	Employed		67 (12.1)
Mother's education	Under diploma		32 (6)
	Diploma		456 (85.2)
	Higher		47 (8.8)

Table 2. Descriptive statistics for the anthropometric measurements (n = 535)

Anthropometric index	Underweight N (%)	normal weight N (%)	Overweight N (%)
Height[1]	19 (3.6)	490 (91.6)	26 (4.9)
BMI[2]	16 (3)	298 (55.7)	221 (41.4)
Body fat percentage[3]	115 (21.5)	298 (55.7)	112 (22.8)
Body muscle percentage[4]	5 (0.9)	242 (45.2)	288 (53.9)

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Table 3. Self-efficacy in weight control of the participants (n = 535)

	categories	N (%)
Self-efficacy in weight control	(Less than 70% of the score)low	432 (80.7)
	(higher than 70% of the score) desirable	103 (19.3)

Table 4. Regression analysis for the prediction of clinical indicators

Anthropometric indices	Weight		Height		BMI		Body fat percentage		Body muscle percentage	
	Beta factor	P value	Beta factor	P value	Beta factor	P value	Beta factor	P value	Beta factor	P value
Self-efficacy	0.02	0.69	-0.01	0.89	0.01	0.79	-0.04	0.37	0.14	0.04

Weight-related self-efficacy and anthropometric indices

Results from the regression analysis showed no significant correlations between changes in BMI and changes in total score of weight-linked self-efficacy (P=0.79). No associations were seen between the self-efficacy and weight (P=0.69), height (P=0.89) and body fat percentage (P=0.37). However, changes in body muscle percentage were significantly associated with changes in WEL scores of the participants (P=0.04). Participants who were more confident in their ability to avoid eating in high-risk situations had higher levels of body muscle percentage.

Discussion

Results of the current study suggest that self-efficacy for weight management may be unlinked to specific measures of obesity, while male adolescents with a higher self-efficacy in weight management may have a higher muscle mass. Obese adolescents are often expected to have lower levels of weight control self-efficacy (20) and associated problems to weight management (27). The aim of the present study was to compare weight control self-efficacy schemes in normal-weight, over-weight and obese youths. Most of similar studies have focused on roles of self-efficacy in weight loss in interventional weight-loss programs (28–30). Results of the current study did not support the hypothesis of inverse relationships between the self-linked beliefs and weight, BMI and body fat percentage in school students. The fact that higher levels of self-efficacy include no meaningful links with weight, BMI and body fat percentage was unexpected because previous researches have verified self-efficacy as a significant predictor of weight loss and low-level adiposity (31–35). For example, Steele and Michael investigated roles of self-efficacy in association with various measures of adiposity in early adolescent-age groups and reported that higher levels of self-efficacy was associated to lower levels of waist circumference (WC), triceps skinfold thickness (TSF) and BMI (33). Desirable eating-linked self-efficacy has been reported as a negative predictor of overweight in upper-grade elementary school students in an observational study (34). Although the existing differences may be attributed to inclusion of both males and females in these studies, the present study was carried out only on males. Moreover, the weight control self-efficacy acts in different manners in different cultural backgrounds. Cultural differences may affect correlations between the psychological factors such as self-efficacy and the anthropometric indices. Obesity may not be considered as a health problem in societies such as Iran. Furthermore, this discrepancy may occur due to the larger sample size in the present study, which has allowed for further reliable estimations.

The current results show a robust association between the weight control self-efficacy and body muscle percentage that makes this study unique for considering body composition in addition to weight and BMI for the prediction of obesity status in adolescents. It is reported that weight and BMI are not good indicators of nutritional status in adolescents (36). In other words, adolescents with higher muscle masses may mistakenly be considered as overweight or obese. Findings from the current study support this hypothesis that male adolescents with higher muscle masses have further self-efficacies in their eating habits. However, limitations in this study must be considered when extrapolating results to actual uses. The current samples included only male adolescents

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and thus results cannot be generalized to samples of female adolescents, younger children and older adults. The major strength of this study is considering body composition (as well as weight and BMI) in participants that contributes to appropriate assessment of obesity. It is not possible to verify causal associations between variables in this study due to its cross-sectional design. Another limitation includes the self-reported self-efficacy questionnaire and the possibility of inaccurate reports. Moreover, other aspects of the psychological status were not measured in this study. Despite these limitations, the current study is novel and worthy in demonstrating importance of weight management self-efficacy for the control of weight and body composition in male adolescents.

Conclusion

This study provides evidence that enhancing adolescents' confidence in their ability to resist overeating, even in face of social pressures, may improve the body muscle percentage. However, no meaningful correlations were found between the self-efficacy and weight, BMI and body fat percentage. It will be advantageous to further develop this study with a larger group of individuals, including individuals of other age and sex to achieve further reliable conclusions. Studies are also necessary to assess effects of weight linked self-efficacy on body composition in interventional weight-loss programs in various age ranges of men and women.

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