

Association between body mass index and perceived weight status with self-rated health and life satisfaction in Iranian children and adolescents: the CASPIAN-III study

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Abstract

Purpose Adolescent obesity is a well-known worldwide issue with growing prevalence and complications. The concept of body image and complications of its misperception has been noted more recently. Life satisfaction (LS) and self-rated health (SRH) have also been known as independent morbidity and mortality factors. The objective of this study was to evaluate the associations of perceived weight status (body image) and actual body mass index (BMI), with LS and SRH in a nationally representative sample of a pediatric population in Iran, as a country located in the Middle East and North Africa region.

Methods This nationwide population-based survey was conducted among 5,570 (2,784 female and 2,786 male) Iranian students, aged 10–18 years, living in urban and rural areas of 27 provinces, which were selected via multistage sampling method. Agreement between BMI and perceived weight status (underweight, about right and overweight/obesity) was assessed. Adjusted association between BMI and perceived weight status with LS and SRH was assessed using multiple logistic regressions after adjustment for potential confounders.

Results Nearly 40 % of the participants misperceived their body image. Misperception as overweight or underweight was found to be associated with lower odds for both LS and SRH [overweight SRH OR 0.796 (95 % CI 0.647–980),

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underweight SRH OR 0.701 (95 % CI 0.588–0.835), overweight LS OR 0.884 (95 % CI 0.718–998), underweight LS OR = 0.676 (95 % CI 0.577–0.793)], whereas the association between actual BMI with LS and SRH was not statistically significant (P value > 0.05).

Conclusion A mismatch between BMI and body weight perception was found in this study. Moreover, LS and SRH were not related with BMI, but had negative association with body weight perception.

Keywords Adolescents · Self-rated health · Life satisfaction · Body mass index · Perceived weight status

Introduction

Obesity has been known as a universal issue, which is increasing in all countries, especially the developing nations [1–3]. Child and adolescent obesity is one of the most challenging health problems at a global level, since it can result in an increasing risk of non-communicable illnesses such as diabetes, asthma and cardiovascular diseases, alongside psychosocial situations such as negative self-esteem, depression and anxiety [4].

While the evidence represents that prevalence of obesity is growing, it appears to be the case that body dissatisfaction is not following the same trend, as many studies have suggested a fall in weight discontent [1]. This inclination can be resulted from misperception of weight, which is particularly observed in overweight and obese adolescents. Recent studies support this idea that prevalence of perceiving oneself as overweight or obese has experienced a drop since less than 10 years ago [5].

In a study conducted as part of CASPIAN-III study, similar results were obtained. This study also showed that there is a noticeable disparity between true body weight and body image satisfaction, as it was found that a great percent of overweight or obese adolescents are not concerned with their weight [1].

Moreover, it was indicated that extra weight is perceived more frequently in overweight individuals than it does in obese persons [1, 5].

Life satisfaction (LS) is defined as “Overall judgment that one’s life is a good one” [6] or “a cognitive global judgment of one’s life as a whole” [7]. As suggested in many studies, this concept is associated with numbers of factors such as personal indicators, familial and peer relationship factors. Data suggest that in comparison with healthy weight adolescents, life satisfaction is lower in overweight and obese youths, and it is believed that this is associated with how they perceive of their own weight [8, 9]. Self-rated health (SRH) is defined as “an individual’s or group’s perceived physical and mental health over time”

[10]. This concept is created out of many factors subjectively that include health behaviors, general physical functioning and specific health situations. It has been described as an independent predictor of morbidity and mortality, which is even more powerful than many biomedical health factors [9, 11]. SRH operates through contemporary health status and physical factors that are totally self-concepted [9, 12]. Similar to LS, SRH is also associated with physical, mental and social health and is a predictor factor for health morbidity and mortality [13, 14]. The relationship between obesity and lower LS has been demonstrated in previous studies [15, 16]. The same association has been reported between obesity and poorer SRH [17, 18]. It has been suggested that although underweight and severe obesity are strongly associated with poorer SRH, obesity in moderate levels shows a relationship with the concept that is variable due to age and sex [19].

The influence of body image on LS and SRH was investigated recently. In a recent study by Herman et al. [9] on Canadian adults (2013), it was demonstrated that weight status perceptions in adults are associated with LS and SRH even more significantly than actual weight status.

The research to date has been focused on relationship between LS/SRH and obesity, which means not so many strong evidences exist based upon association of two mentioned concepts and body image. Furthermore, much of the research up to now has been conducted in western communities, In addition to the fact that these surveys have been mostly done on adults, and hence, our information about this relationship in adolescents is inadequate.

The objective of this study was to evaluate the associations of perceived weight status (body image) and actual body mass index (BMI), with LS and SRH in a nationally representative sample of a pediatric population in Iran, as a country located in the Middle East and North Africa (MENA) region.

Methods

Participants and study design

The data used in this survey were collected as a part of the “national survey of school student high risk behaviors”(2009–2010) as the third survey of the school-based surveillance system entitled “Childhood and Adolescence Surveillance and Prevention of Adult Non-communicable Disease” (CASPIAN) study. Descriptions of the method and operation of the survey have been described [20].The study was approved by the ethical committee and other relevant national regulatory organizations.

The present study was performed among 5,625 students aged 10–18 years who were selected via multistage random cluster sampling method from urban and rural areas of 27 provinces in Iran. Eligible schools in our study were stratified according to the information bank of the Ministry of Health and Medical Education, and then, they were selected randomly. In selected schools, the students were also selected randomly. Sampling and examinations were begun after complete explanation of the study's objectives and protocols for students and their parents, obtaining the written informed consent from parents and also the oral assent from the students. A team of trained healthcare professionals recorded information in a checklist and carried out the examinations under the standard protocol by using calibrated instruments. Height was measured to the nearest 0.1 cm with the participant barefoot, standing with heels together and head positioned so that the line of vision was perpendicular to the body. Weight was measured without shoes and with light clothing to the nearest 100 g in barefoot. Body mass index [BMI = weight (kg)/height (m²)] was calculated.

Two sets of questionnaires were completed for students and their parents. The questionnaires have been obtained from Global School Health Survey (GSHS) in Persian. The validity and reliability of questionnaires has been assessed previously [21]. Demographic information was completed by obtaining data for all officially enrolled students in the sampled classes from the school record. Family-based characteristics including parental level of education, possessing a family private car and type of home were assessed by an interview carried out by parents or child by a trained researcher.

Definition of terms

The BMI cutoffs provided by the Centers of Disease Control and Prevention (CDC) [22] standards as underweight (BMI < 5th), healthy weight (BMI: 5th–85th), overweight (BMI: 85th–95th) or obesity (BMI > 95th). The questions regarding the student perception of his/her weight status [underweight, appropriate weight (about right) and overweight] were used to assess the students' perceived weight status. The different combinations of BMI and perceived weight status of students (healthy weight–underweight, healthy weight–about right, healthy weight–overweight, underweight–underweight, underweight–about right, underweight–overweight, overweight–underweight, overweight–about right and overweight–overweight) were considered in present study. Also, a dichotomous variable were defined for agreement (concordance) or disagreement (discordance) between BMI and perceived weight status. This variable also was subdivided into four categories: healthy–about right, underweight–

Table 1 General characteristics of subjects by sex in Iranian adolescents: the CASPIAN-III Study

	Male <i>n</i> (%)		Female <i>n</i> (%)		<i>P</i> value
Age (year) ^a	14.68 (2.44)		14.76 (2.36)		0.23
Mother's education					
Illiterate	615	22.0	652	23.8	0.26
Diploma or less	2,045	73.0	1,962	71.5	
University educations	141	5.0	130	4.7	
Father's education					
Illiterate	392	14.2	421	15.5	0.39
Diploma or less	2,112	76.2	2,042	75.0	
University educations	266	9.6	260	9.5	
Owning personal car	1,383	49.8	1,349	49.5	0.82
Type of house					
Personal	2,207	80.4	2,135	80.0	0.70
Rental	537	19.6	533	20.0	
Physical activity					
<1 h/week	1,746	69.1	1,196	61.5	<0.001
1–2 h/week	488	19.3	714	25.1	
>2 h/week	294	11.6	344	13.3	
Screen time					
≤ 2 h/day	568	21.6	479	19.0	0.02
>2 h/day	2,064	78.4	2,040	81.0	
BMI (kg/m ²) (mean)					
Underweight	498	17.6	486	17.5	<0.001
About right	1,775	62.9	1,914	65.6	
Overweight	265	9.4	186	8.0	
Obese	286	10.1	215	8.9	
Perceived weight status					
Underweight	888	31.3	869	30.8	<0.001
About right	1,294	45.6	1,424	50.5	
Overweight	654	23.1	525	18.6	
BMI-perceived weight status					
Healthy weight–underweight	159	12.4	195	13.8	<0.001
Healthy weight–about right	988	76.9	1,117	78.9	
Healthy weight–overweight	138	10.7	103	7.3	
Underweight–underweight	312	35.5	273	31.9	
Underweight–about right	494	56.1	541	63.1	
Underweight–overweight	74	8.4	43	5.0	
Overweight–underweight	25	3.9	15	2.9	
Overweight–about right	285	43.9	252	48.6	
Overweight–overweight	339	52.2	251	48.5	
Self-rated health					
Poor	806	32.1	666	27.2	<0.001
Good	1,703	67.9	1,787	72.8	
Life satisfaction					
Dissatisfied	1,150	41.2	1,249	45.1	0.003
Satisfied	1,644	58.8	1,518	54.9	

BMI Body Mass Index

^a Age presented as mean (SD)

underweight, overweight–overweight and discordant. For SRH, students were asked “in general, would you say your health is: excellent, very good, good, fair or poor?” SRH was considered as binary variable in analysis based on Herman et al. [9] study; excellent, very good and good as “good” and fair and poor as “poor”. LS was assessed by 10-points Likert scale. Students were asked to specify their level of LS in general (very dissatisfied (score no 1–2), dissatisfied (score no 3–4), neither satisfied nor dissatisfied (score no 5–6), satisfied (score no 7–8) or very satisfied (score no 9–10). LS was considered as dichotomous variable [dissatisfied (score no 1–6) and satisfied (score no 7–10)] in analysis to estimate the probability that students would report being satisfied with their life [9].

Statistical analysis

Quantitative variables are expressed as means and standard deviation (SD), and categorical variables are expressed as number and percentages. Student *t* test was used to compare age mean between sexes. Association between qualitative variables was assessed by using Pearson chi-square test. Multiple logistic regressions (MLR) model was used to assess the association between BMI and perceived weight status with SRH and LS after adjusting for potential confounder including age, sex, socioeconomic status, parent’s education, screen time activity, physical activity. The results of MLR are shown as odds ratios (OR) and 95 % confidence interval (CI). Forest plots were used to illustrate adjusted OR (95 % CI) of different combinations of BMI and perceived weight status with LS and SRH by sex. Design of sampling method was considered in all analysis. *P* values <0.05 were considered as statistically significant. Statistical analyses were performed in SPSS version 16 and STATA 12 software.

Results

In this study, 2,784 female and 2,786 male participated. The mean age of participants (SD) was 14.68 (2.44) years among male and 14.76 (2.37) among female (*P* value = 0.23).

Table 1 demonstrates the baseline characteristics of the participants. As can be seen in this table, there are significant differences in physical activity, BMI, perceived weight status, self-rated health and life satisfaction between two genders. As it is apparent, physical activity and higher screen time are more prevalent in female compared with male, while overweight and obese conditions as well as perceiving one as overweight are more frequent in male rather than female. Reporting one’s health as good was more seen in female (72.8 vs 67.9 % in male), while believing in having satisfaction in life was more prevalent in male (58.8 vs 54.9 % in female).

Figures 1 and 2 demonstrates the relationship between BMI and body image in female and male. As it can be seen from these figures in underweight, normal and overweight/obese subcategories of BMI, 56.5, 58.5 and 63.2 % (respectively) of female predict their weight status correctly, and respectively, 62.9, 55.9 and 61.5 % of male in underweight, normal and overweight/obese subcategories of BMI predict their weight status correctly. It is apparent from this figure that compared to male; the percentage of correct prediction of one’s weight status is similar in female, as 58.8 % of female and 58.2 % of male predict their body image correctly.

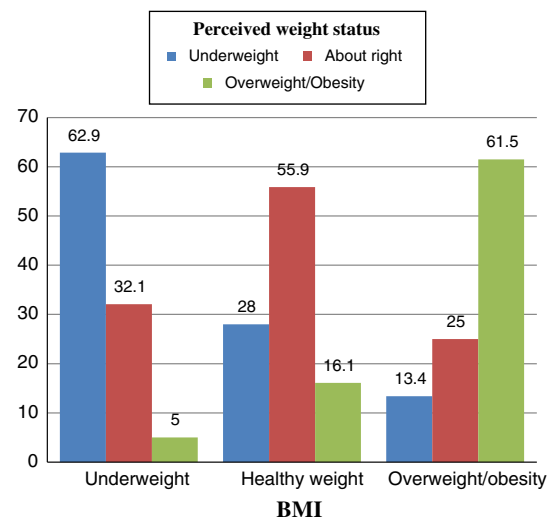


Fig. 1 Association between BMI and perceived weight status in adolescents aged 10–18 years, in boys: the CASPIAN-III Study

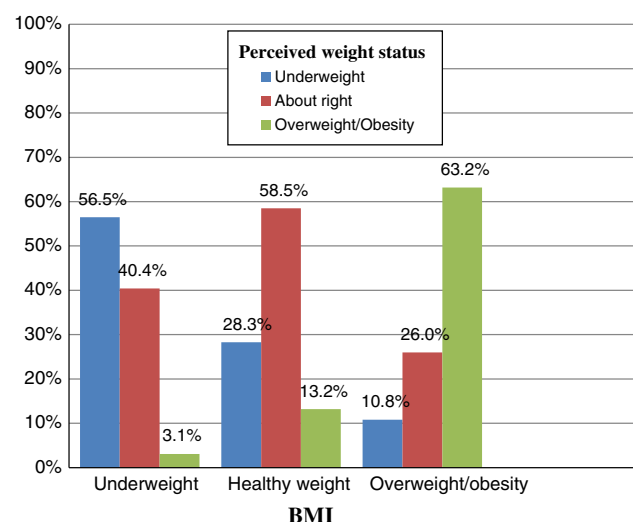


Fig. 2 Association between BMI and perceived weight status in adolescents aged 10–18 years, in girls: the CASPIAN-III Study

Table 2 Comparison of perceived weight status and BMI with self-rated health and life satisfaction by sex in Iranian adolescents: the CASPIAN-III Study

	Male <i>n</i> (%)			Female <i>n</i> (%)		
	Good	Poor	<i>P</i> value	Good	Poor	<i>P</i> value
<i>Self-rated health</i>						
BMI^a						
Underweight	297 (68.3)	138 (31.7)	0.98	289 (69.6)	126 (30.4)	0.03
Healthy weight	1,070 (68.0)	504 (32.0)		1,214 (73.0)	449 (27.0)	
Overweight	155 (66.8)	77 (33.2)		132 (81.5)	30 (18.5)	
Obese	170 (68.0)	80 (32.0)		133 (71.1)	54 (28.9)	
Perceived weight status						
Underweight	485 (64.1)	272 (35.9)	<0.001	469 (65.4)	248 (34.6)	<0.001
About right	833 (72.0)	324 (28.0)		973 (77.2)	287 (22.8)	
Overweight	381 (64.7)	208 (35.3)		341 (72.7)	128 (27.3)	
	Dissatisfy	Satisfy	<i>P</i> value	Dissatisfy	Satisfy	<i>P</i> value
<i>Life satisfaction</i>						
BMI						
Underweight	198 (40.4)	292 (59.6)	0.18	221 (46.4)	255 (53.6)	0.03
Healthy weight	727 (41.7)	1,016 (58.3)		866 (46.3)	1,004 (53.7)	
Overweight	115 (44.2)	145 (55.8)		68 (37.4)	114 (62.6)	
Obese	100 (35.7)	180 (64.3)		84 (39.6)	128 (60.4)	
Perceived weight status						
Underweight	398 (46.1)	466 (53.9)	<0.001	448 (52.8)	400 (47.2)	<0.001
About right	478 (37.5)	798 (62.5)		587 (41.9)	813 (58.1)	
Overweight	267 (41.4)	378 (58.6)		210 (41.1)	301 (58.9)	

^a Underweight: BMI < 5th;
Normal weight: BMI: 5th–85th;
Overweight: BMI: 85th–95th;
obesity: BMI > 95th

As Table 2 shows, there is a significant association between perceived weight status and both SRH and LS in both genders. In comparison with perceived weight status, BMI was seen to be associated with SRH in female, but not in male. The same relationship was found between BMI and LS. Interestingly, underweight category of perceived weight status seemed to have poorer LS in both genders.

Table 3 illustrates the association between BMI and perceived weight status with LS and SRH in different logistic regression models. The results showed that while BMI had no significant association with either of SRH or LS, perceived weight status was associated with both outcomes in all of the models. It is also apparent from the table that both perceived underweight and perceived overweight subjects experienced poorer SRH and LS in the final model (model IV) (overweight SRH OR 0.796, underweight SRH OR 0.701, overweight LS OR 0.884, underweight LS OR 0.676). While it is shown that both perceived underweight and perceived overweight subjects have lower LS, this association is significant only in underweight category and not in the overweight category.

Table 4 presents the association between congruency in BMI-perceived weight status-combined variable, and LS/SRH. As it can be seen from this table, SRH was found to be lower in overweight/obese-overweight, underweight–

underweight and discordant categories of model III of which, underweight–underweight and discordant categories' results seem to be significant. LS on the other hand presented a different pattern in which discordant category in model III was shown to overall have poorer LS compared with concordant category.

Figures 3 and 4 illustrate adjusted OR for LS and SRH in different combinations of BMI-perceived weight status in model III between two genders. All of these combinations had significantly poorer LS in male except for underweight–overweight category, which was significantly higher. In comparison, only overweight–underweight category had significant lower LS in female.

SRH was shown to be significantly poorer in underweight–underweight, healthy weight–underweight and healthy weight–overweight categories in male, while only underweight–underweight category had significantly lower SRH in female.

Discussion

In our results, nearly 40 % of the participants misperceived their body image. These findings are in agreement with prior studies noting a mismatch between actual BMI and

Table 3 Odds ratios (95 % CI) for life satisfaction and self-rated health between BMI and perceived weight status in Iranian adolescents: the CASPIAN-III Study

	Self-rated health (good/ poor)		Life satisfaction (satisfied/ dissatisfied)	
	OR	95 % CI	OR	95 % CI
BMI^a				
Model I^b				
Underweight	0.926	0.786–1.091	1.030	0.892–1.188
Normal	1	–	1	–
Overweight	1.119	0.885–1.415	1.116	0.913–1.364
Obesity	0.943	0.759–1.172	1.320	1.087–1.603
Model II^c				
Underweight	0.904	0.766–1.066	0.961	0.831–1.110
Normal	1	–	1	–
Overweight	1.135	0.897–1.437	1.078	0.881–1.319
Obesity	0.943	0.758–1.172	1.252	1.030–1.523
Model III^d				
Underweight	0.846	0.698–1.027	0.980	0.819–1.172
Normal	1	–	1	–
Overweight	1.100	0.838–1.444	0.981	0.769–1.253
Obesity	0.848	0.652–1.103	0.958	0.754–1.218
Model IV^e				
Underweight	0.925	0.756–1.131	1.085	0.900–1.308
Normal	1	–	1	–
Overweight	1.127	0.848–1.498	0.957	0.741–1.236
Obesity	0.917	0.688–1.221	0.970	0.746–1.262
Perceived weight				
Model I^b				
Underweight	0.621	0.539–0.715*	0.677	0.599–0.765*
Normal	1	–	1	–
Overweight	0.727	0.620–0.852*	0.941	0.818–1.083
Model II^c				
Underweight	0.607	0.527–0.700*	0.626	0.553–0.710*
Normal	1	–	1	–
Overweight	0.739	0.630–0.867*	0.928	0.805–1.069
Model III^d				
Underweight	0.687	0.581–0.813*	0.690	0.591–0.805*
Normal	1	–	1	–
Overweight	0.794	0.658–0.957*	0.862	0.725–1.024
Model IV^f				
Underweight	0.701	0.588–0.835*	0.676	0.577–0.793
Normal	1	–	1	–
Overweight	0.796	0.647–0.980*	0.884	0.729–1.072

^a Underweight: BMI < 5th; Normal weight: BMI: 5th–85th; Overweight: BMI: 85th–95th; obesity: BMI > 95th

^b Without adjusted (crude model)

^c Adjusted for age and sex

^d Additionally adjusted for other characteristics including socio-economic status, parent s education, birth order, family history of chronic disease, breast-feeding duration, sedentary lifestyle

^e Additionally adjusted for perceived weight status

^f Additionally adjusted for BMI

* Statistically significant

body image in adults and children [23–25]. In a study by Herman et al. [9], nearly 20 % of adults misclassified themselves which was lower than our results, which can be justified by different study population. It can therefore be assumed that aging is associated with a closer to reality body image. In our findings, misperception percentage was approximately equal in two genders. However, these results differ from some previous studies in which females seemed to qualify their body image more accurately than males [9, 26, 27], and researches in which females acted poorer in assessing their body image than males [5, 28].

Our crude analysis showed a negative association between obesity and lower LS and SRH. However, when association was adjusted for potential confounders, the observed relationship was no longer detected. Perceived weight status on the other hand was associated significantly with the two items (LS and SRH). Some previous studies have reported a correlation between obesity and SRH [14, 29] and some suggested an association between obesity and LS [15, 16, 30, 31]. It seems possible that these results are due to not adjusting for perceived weight status.

The result of Herman et al. [9] study showed that the observed significant effect of BMI on SRH and LS vanished after adjusting for perceived weight status, which is concordant with our result. In another study conducted by Forste et al. [9] on adolescents, crude analysis showed poorer LS as BMI rises, but when adjusted for confounding factors such as self-perception, peer perception, family perception and school perception, this association fades by 80 %.

Another interesting finding of current study involved concordance between actual BMI and perceived weight status and its association with LS and SRH. Initially, when comparing the SRH of subjects whom BMI and perceived weight status were congruent and subjects with discordance between BMI and perceived weight status, it seemed no significant disparity exists between these two groups. However, when dividing congruent group to three subcategories of “underweight–underweight,” “healthy weight–about right” and “overweight–overweight,” poorer SRH was shown, respectively, in “underweight–underweight,” “discordant” and “overweight–overweight” subcategory. LS, however, was lower in “discordant” group compared with “congruent” group initially. When dividing congruent group into three subcategories, poorer SRH was shown, respectively, in “discordant,” “underweight–underweight” and then “overweight–overweight.” In the study by Herman et al. [9], different results were obtained. Congruent groups were associated with higher odds of poor SRH, while discordance had a paradoxical protective effect. However, when dividing congruent group to three subcategories of “underweight–underweight,” “healthy weight–

Table 4 Odds (95 % CI) of self-rated health and life satisfaction according to congruence versus discordance between BMI and perceived weight status in Iranian adolescents: the CASPIAN-III Study

	OR (95 % CI)		OR (95 % CI)
Self-rated health (good/poor)			
Model I ^a			
Congruent BMI-perceived weight	1	Healthy weight–about right	1
		Overweight/obese–overweight	0.81 (0.65–1.00)
		Underweight–Underweight	0.60 (0.49–0.74)*
Discordant BMI-perceived weight	0.92 (0.81–1.05)	Discordant	0.74 (0.64–0.85)*
Model II ^b			
Congruent BMI-perceived weight	1	Healthy weight–about right	1
		Overweight/obese–overweight	0.81 (0.65–1.01)
		Underweight–Underweight	0.59 (0.48–0.73)*
Discordant BMI-perceived weight	0.89 (0.78–1.02)	Discordant	0.72 (0.62–0.83)*
Model III ^c			
Congruent BMI-perceived weight	1	Healthy weight–about right	1
		Overweight/obese–overweight	0.83 (0.64–1.07)
		Underweight–Underweight	0.60 (0.47–0.77)*
Discordant BMI-perceived weight	0.98 (0.83–1.15)	Discordant	0.80 (0.67–0.94)*
Life satisfaction (satisfied/dissatisfied)			
Model I ^a			
Congruent BMI-perceived weight	1	Healthy weight–about right	1
		Overweight/obese–overweight	1.14 (0.94–1.38)
		Underweight–underweight	0.79 (0.66–0.96)*
Discordant BMI-perceived weight	0.84 (0.75–0.94)*	Discordant	0.80 (0.71–0.90)*
Model II ^b			
Congruent BMI-perceived weight	1	Healthy weight–about right	1
		Overweight/obese–overweight	1.09 (0.90–1.32)
		Underweight–underweight	0.73 (0.60–0.88)*
Discordant BMI-perceived weight	0.77 (0.68–0.86)*	Discordant	0.73 (0.65–0.83)*
Model III ^c			
Congruent BMI-perceived weight	1	Healthy weight–about right	1
		Overweight/obese–overweight	0.92 (0.73–1.16)
		Underweight–underweight	0.79 (0.63–1.00)
Discordant BMI-perceived weight	0.77 (0.67–0.89)*	Discordant	0.72 (0.62–0.83)*

^a Without adjusted (crude model)

^b Adjusted for age and sex

^c Additionally adjusted for other characteristics including socioeconomic status, parent s education, screen time and physical activity

* *P* value is statistically significant

about right” and “overweight–overweight,” poorer SRH was shown, respectively, in underweight–underweight subgroup, overweight–overweight and then discordant subcategory. Initially, congruence between BMI and body weight perception was associated with lower LS and

discordance was not associated at all, but when dividing the congruence category into three subgroups, poorer LS was shown, respectively, in underweight–underweight, overweight–overweight and then discordant subcategories [9].

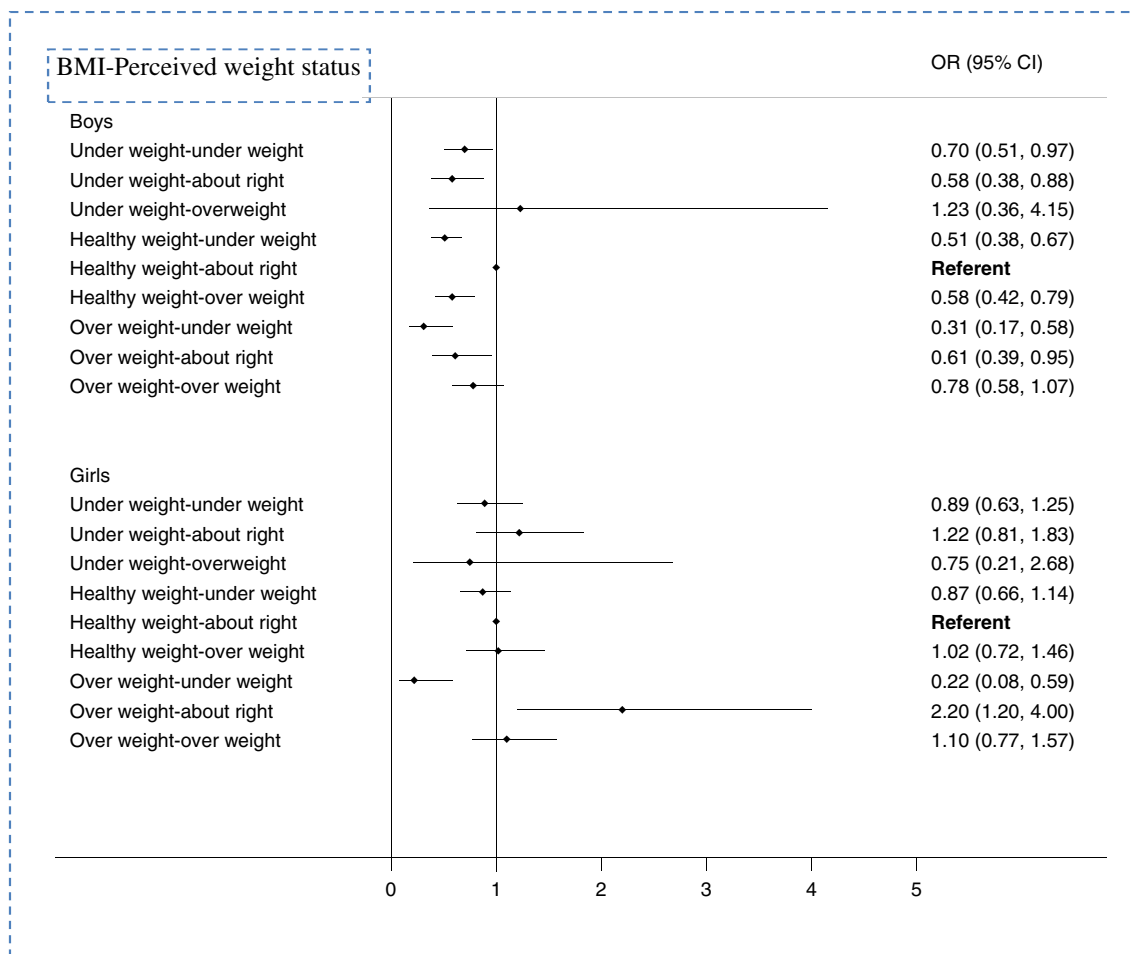


Fig. 3 Adjusted OR (95 % CI) of being satisfied with life in adolescents aged 10–18 years, by combined categories of BMI and perceived weight status by sex: the CASPIAN-III Study. Adjusted for age, sex, socioeconomic status, parent s education, screen time and physical activity

Therefore, it can be suggested that BMI only operates through the pathway of one’s perception of his/her weight in order to affect the subject’s interpretation of LS and SRH and in other words lacks an independent role in mentioned result. While the findings of the current study do not support the previous research on the account of BMI independently resulting in poorer SRH/LS, it corroborates the findings of recent studies such as Herman et al., suggesting the association between perceived weight status and LS/SRH.

A mismatch exists between actual (objective) BMI and perceived weight status. While BMI has no significant independent effect in affecting the individuals with their SRH or LS, perceived weight status is independently associated with poorer levels of LS and SRH. In addition, incongruence between BMI and perceived weight status has a negative effect on LS and SRH. Therefore, awareness

around consequences of weight misperception in adolescents should be taken into consideration.

Limitations and strengths

Current research was limited by its cross-sectional nature of conduction, and therefore, it would be difficult to conclude a causal association between perceived weight status, BMI and SRH/LS. To our knowledge, this is the first study conducted in a nationally representative sample of a pediatric population in the Middle East and North Africa (MENA) region of Iran and also the first research to address the association between perceived weight status and LS/SRH in adolescents. Large sample of participants is one of the other strengths of this study.

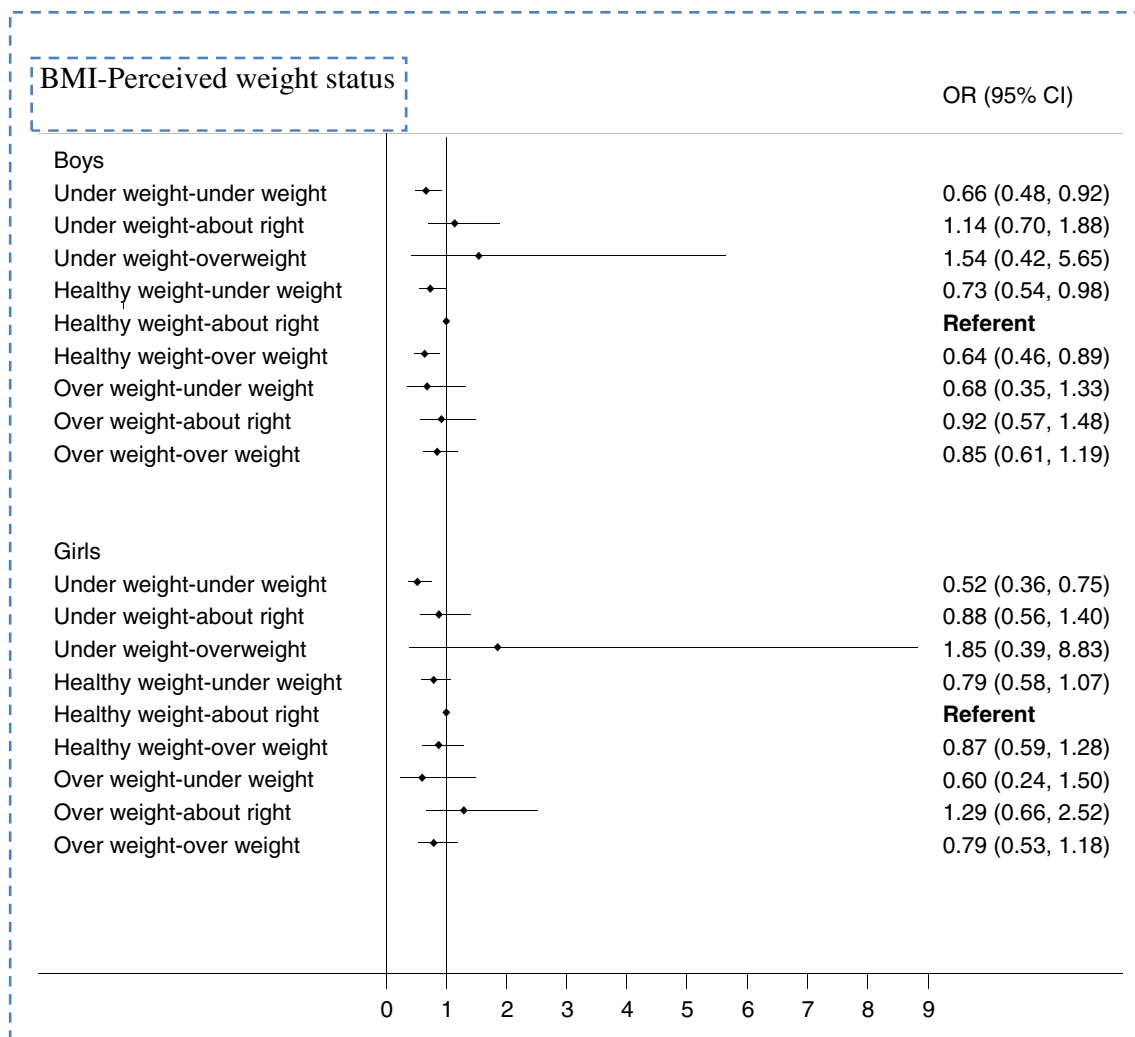


Fig. 4 Adjusted OR (95 % CI) of having fair SRH in adolescents aged 10–18 years, by combined categories of BMI and perceived weight status by sex: the CASPIAN-III Study. Adjusted for age, sex, socioeconomic status, parent s education, screen time and physical activity

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Conflict of interests The authors declared no conflict of interests.

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