
RELATIONSHIPS BETWEEN ACTUAL AND PERCEIVED BODY WEIGHT, PHYSICAL SELF-CONCEPT AND ANXIETY AMONG ADOLESCENT GIRLS

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Abstract

The purpose of the study was to explore physical self-concept and anxiety level in Slovenian female adolescents in relation to their actual and perceived body weight status. The sample included 197 high school girls between 15 and 19 years. Body mass index (BMI) was calculated from measured weight and height and body weight perception was assessed using a single questionnaire item. The State-Trait Anxiety Scale and the Physical Self-Description Questionnaire were used to measure anxiety level and physical self-perceptions, respectively. Significant differences were found in almost all components of physical self-concept and anxiety in relation to the perceived body weight, while only in two physical self-concept dimensions relative to the measured BMI. The findings suggest that perceived weight status has a greater impact on physical self-perceptions and anxiety level than actual weight status among female adolescents. In approximately 32% of the participants, body weight perceptions did not reflect the measured BMI; they most often misperceived as overweight. Results also revealed that participants with body weight misperception showed higher anxiety level and poorer global physical self-concept than their accurate recognition counterparts. These results have important practical value since body image dissatisfaction represents a risk factor for the development of undesirable health-related psychological outcomes.

Keywords: physical self-concept; anxiety; perceived body weight; body weight misperception; adolescents

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Introduction

Adolescence can be considered a transitional stage between childhood and adulthood when many physiological and psychosocial changes occur. These changes transform the young person's vision of the self into a more differentiated, organized and consistent picture. Self-concept is one of the most studied psychological constructs and refers to the way people perceive, evaluate and think about themselves. Given that the formation of a strong and stable sense of identity is considered the key developmental task of adolescence it is crucial to foster healthy self-concept in young people (Côté & Levine, 2016).

Physical self-concept is an important subdomain of overall self-concept that incorporates different components such as self-perceived health, physical appearance, perceived fitness and physical abilities (Marsh, 2002). It should be emphasized that physical self-concept represents a multidimensional construct wider than that of body image. While body image involves thoughts, feelings, and actions related to one's own body (*e.g.*, size, shape, and attractiveness), physical self-concept additionally includes perceived physical activity and sporting skills, such as physical strength, endurance, and coordination. Early adolescence is a critical period for physical self-concept formation. The physical changes experienced by the body during this stage, including changes in weight, height, body shape, body composition, as well as primary and secondary sex characteristics, probably affect the level of self-perceptions. These changes coincide with increased exposure to cultural norms and expectations about beauty (Voelker, Reel, & Greenleaf, 2015). Research has shown that especially in Western culture, standards of body attractiveness are often demanding and unrealistic, in particular for females, since a thin figure is still seen as a socially desired weight ideal (Rice, Prichard, Tiggemann, & Slater, 2016). Sources of promoting these ideal images to adolescents are, in addition to print media, current internet and television trends (Voelker et al., 2015). Research findings reveal that adolescent girls tend to have poorer physical self-perceptions (Revuelta, Esnaola, & Goñi, 2016) and lower body satisfaction (Weinberger, Kersting, Riedel-Heller, & Luck-Sikorski, 2016) than their male counterparts.

Physical self-perceptions are regarded particularly important for many health-related outcomes in adolescence (Mohamadian & Ghannae Arani, 2014). Positive physical self during this period contributes to better youth self-esteem (Harter, 2003), life satisfaction (Videra-García & Reigal-Garrido,

2013) and other dimensions of psychological well-being (Delfabbro, Winefield, Anderson, Hammarström, & Winefield, 2011), whereas poor physical self-concept is associated with social physique anxiety and low self-worth (Crocker, Sabiston, Kowalski, McDonough, & Kowalski, 2006; Hagger, Hein, & Chatzisarantis, 2011). In addition, physical self-perceptions are of great importance in determining body satisfaction or dissatisfaction during adolescence (Fernández-Bustos, González, Contreras, & Cuevas, 2015). Previous research also suggests that physical self-concept is inversely related to unhealthy lifestyle habits, in particular to eating disorders (Rodríguez-Fernández & Goñi, 2012).

Furthermore, physical self-concept has been identified to play a significant role in the field of physical activity and sport (Babic et al., 2014). Adolescents engaged in regular sports activities showed more favorable self-perceptions, in particular in terms of perceived athletic competence and physical fitness compared to their less active peers. Moreover, research findings suggest that physical activity allows the development of motor skill competence, which in turn is associated with an increase in self-esteem and confidence (Haugen, Ommundsen, & Seiler, 2013). In a more recent study, healthy fitness levels were associated with a positive physical self-concept in adolescents (Grao-Cruces, Fernandez-Martinez, & Nuviala, 2017).

Besides physical activity, body mass index (BMI) significantly contributes to body-related perceptions and self-esteem of adolescents (Voelker et al., 2015; Altıntaş et al., 2014). Many studies have shown that BMI, viewed as an objective assessment of body size (determined by height and weight), is often inversely related to body perceptions (Zamani Sani, Eskandarnejad, & Fathirezaie, 2016). A study conducted among adolescent boys and girls aged 13-18 years revealed that the overweight BMI category reported lower physical self-concept in domains of body satisfaction, perceived physical activity level and motor skills compared to the normal-weight BMI category (Dolenc, 2015). This confirms that weight status is also associated with the level of physical abilities. Gulias-González and colleagues (2014) reported lower objectively measured physical fitness levels in overweight and obese adolescents compared to normal weight subjects. Furthermore, results indicate that higher BMI is associated with worse perceptions in adolescent girls, especially in relation to physical appearance, and a more devalued self-concept (Fernández-Bustos et al., 2015).

Body weight and its perception has a strong influence on health behaviors and constitute a significant determinant of physical and mental well-being (Sirang et al., 2013). Regardless of actual weight, based on BMI, body weight perception refers to the personal evaluation of one's weight as being 'too thin' or 'about the right weight' or 'overweight/obese' (Cheung, Ip, Lam, & Bibby, 2007). Body weight perception does not always reflect BMI; discrepancies between measured and perceived weight status are particularly common in adolescents in both Eastern and Western countries, since they have difficulties to perceive their weight status accurately (Deschamps, Salanave, Chan-Chee, Vernay, & Castetbon, 2015; Wang et al., 2018). For example, although a substantial proportion of overweight and obese adolescents believe they are 'overweight', a large number underestimate their weight status as being 'about right' (Robinson & Kersbergen, 2017) on the other hand, some normal-weight adolescents incorrectly believe they are 'overweight' (Sutin & Terracciano, 2015; Park, 2011). International data indicate that about 15% of 15-year-olds have an excess body weight in terms of the BMI, while twice as many persons of this age consider themselves too fat (Kleszczewska, Dzielska, Nałęcz, & Mazur, 2017).

There is a substantial weight misperception among adolescents, with girls more likely to hold misperceptions compared to boys (Deschamps et al., 2015). Adolescents who incorrectly estimate their actual body size often express a certain degree of body dissatisfaction which may generate some psychological problems, such as distress, anxiety, low self-confidence, social isolation and suicidal ideation (Jansen, van de Looij-Jansen, de Wilde, & Brug, 2008; Kim, 2009). Many studies indicate that normal-weight or underweight adolescents, who perceive themselves as overweight, tend to adopt unhealthy weight control practices, representing a risk factor for eating disorders such as anorexia nervosa (Ibrahim, El-Kamary, Bailey, & St George, 2014; Jáuregui-Lobera, Ezquerro-Cabrera, Carbonero-Carreño, & Ruiz-Prieto, 2013). Conversely, overweight adolescents who underestimate their body size may be less motivated to engage in health behavior changes and to improve their physical activity habits (Patte, Laxer, Qian, & Leatherdale, 2016), therefore increasing the risk of chronic disease.

Objectives

Previous research has shown that body weight perception is a better predictor of body management and related behaviors than BMI. Namely, the results of two recent studies conducted on adolescents suggest that perceived weight status may be significantly associated with depressed mood more so than objective weight (Lim & Kim, 2017; Richard, Rohrmann, Lohse, & Eichholzer, 2016). Given the importance of physical self-concept formation in adolescence and weight perception accuracy, the present study aimed to examine the weight status of Slovenian adolescent females and the occurrence of weight misperceptions. Furthermore, we investigated multidimensional physical self-concept and anxiety symptoms in relation to actual and perceived body weight status.

Method

Participants

The empirical study is based on a convenience sample of female adolescents. The invitation to take part in the research was sent to various secondary schools in the three largest cities of Slovenia and six agreed to participate. The sample included 197 female secondary school students, aged between 15 and 19 years ($M=16.4$, $SD=1.2$). Exclusion criteria were limited to students without parental consent and those who were unable to participate in physical activity due to serious illness or disability.

Instruments

The Slovenian version of the *Physical self-description questionnaire - short form (PSDQ-S)* was used (Dolenc, 2016) to measure multidimensional physical self-concept. The instrument was adapted from the English version of the PSDQ-S (Marsh, Martin, & Jackson, 2010) and confirmed the original 11-factor structure as well as demonstrated good internal consistency. The questionnaire includes the following nine specific and two more general dimensions of the physical self-concept: health (*i.e.*, »I am sick so often that I cannot do all the things I want to do«), coordination (*i.e.*, »Controlling movements of my body comes easily to me«), physical activity (*i.e.*, »I do sports, exercise, dance or other physical activities almost every day«), sports competence (*i.e.*, »I am good at most sports«), body fat (*i.e.*, »My waist is too

large«), appearance (*i.e.*, »I am good looking«), strength (*i.e.*, »I have a lot of power in my body«), flexibility (*i.e.*, »I am quite good at bending, twisting, and turning my body«), endurance (*i.e.*, »I can be physically active for a long period of time without getting tired«), global physical self (*i.e.*, »I am satisfied with the kind of person I am physically«), and self-esteem (*i.e.*, »Overall, most things I do turn out well«). Each dimension/subscale consists of three to five items that are scored on a 6-point true/false scale. Higher scores represent better physical self-concept in a specific area. In the present study, Cronbach's alpha coefficients for the subscales ranged from .80 to .91.

The State-Trait Anxiety Inventory (STAI) is a commonly used self-report measure, designed to measure both state and trait anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). While state anxiety refers to a temporary condition in response to some perceived threat, trait anxiety describes a personality characteristic rather than a temporary feeling and refers to relatively stable individual differences manifested in the tendency to react to situations perceived as threatening with an increase in anxiety. For the purpose of our study, the Slovenian version of the trait anxiety scale (Lamovec, 1988) was assessed. The scale consists of 20 items. Trait anxiety items include: »I worry too much over something that really doesn't matter« and »I am a steady person«. All items are rated on a 4-point Likert scale (*e.g.*, from 'almost never' to 'almost always'). Values range from 20 to 80, with a higher score reflecting greater symptomatology of anxiety. Internal consistency coefficients for the scale have ranged from .86 to .95 (Spielberger et al., 1983). Content validity of the Slovenian version of the STAI was determined on the basis of strong associations with other anxiety measures ($r=.80$ between the STAI and the Manifest Anxiety Scale; Lamovec, 1988). In the present study, Cronbach's alpha coefficients for the trait anxiety scale was .88.

Body Mass Index. Anthropometric data were collected in smaller groups in a quiet place during physical education classes using a standardized procedure. Participants were measured barefoot and wearing light clothing. Participants' height and weight were recorded by a validated stadiometer and electronic digital scale. Both were rounded to the first decimal place. The BMI was calculated as the body mass in kilograms divided by the square of height in meters (kg/m^2). BMI categories were obtained using the International Obesity Task Force criteria, following the age-and sex-adjusted cutoff values for normal weight,

underweight (Cole, Flegal, Nicholls, & Jackson, 2007), overweight, and obese (Cole, Bellizzi, Flegal, & Dietz, 2000).

Perceived Body Weight Status. Self-perception of body weight was measured using a single questionnaire item, on the basis of literature in this field (Hayward, Millar, Petersen, Swinburn, & Lewis, 2014). Participants responded to the question »how you consider your weight« using the following response options: 'too thin', 'a little thin', 'about right', 'a little fat' or 'too fat'. The responses were categorized into: perceived underweight (too thin/a little thin), perceived normal-weight (about right), and perceived overweight (too fat/a little fat).

Procedure

The purpose of the study and the procedures were fully explained to all the participants and written informed consent was obtained from their parents or legal guardians. Ethical consideration including anonymity, confidentiality, and voluntary participation was provided in accordance with the American Psychological Association's Ethical Principles of Psychologists and Code of Conduct. All the measures used in the study were administered collectively at school, during physical education classes by a trained psychologist and physical education teachers.

Data Analysis

The data were analyzed with the IBM SPSS Statistics 24 for Windows. In addition to descriptive statistics, Cronbach's alpha was calculated to assess internal consistency of the measurement instruments. To determine the differences in physical self-concept and anxiety symptoms between participants regarding their actual and perceived weight status the Kruskal-Wallis non-parametric test was calculated using eta squared (η^2) as the effect size measure (ES) with small $\eta^2 \geq .01$; medium $\eta^2 \geq .06$; large $\eta^2 \geq .14$) *Post-hoc* comparisons were performed using Mann-Whitney test with Bonferroni correction with r being calculated as the ES. Thresholds for r were set to small $r \geq .1$; medium $r \geq .3$; large $r \geq .5$.

Cohen's Kappa statistic was conducted to determine consistency among measured BMI and body weight perception. As a rule, Kappa values from 0 to .20 are considered slight agreement, .21 to .40 fair, .41 to .60 moderate, .61-.80 good, and .81-1.00 very good or almost perfect agreement (Fleiss, Levin, & Paik,

2013). Differences between accurate and inaccurate weight status perception were assessed using the Mann-Whitney test, again with r being calculated as the ES.

Results

Descriptive statistics for the whole sample (mean, standard deviation, skewness and kurtosis values) are presented in Table 1. Although the mean values for most of the PSDQ-S subscales were slightly above the average, considerable variability was observed, particularly in physical activity, sports competence, and endurance PSDQ-S subscales. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests were used to verify the normality assumption. The results revealed that most of the data did not follow normal distribution, therefore non-parametric statistics were performed in further analysis.

Table 1. Descriptive statistics for the studied variables (N = 197)

	M	SD	Skewness	Kurtosis
Age (years)				
Height (cm)	16.67	1.24	.240	.206
Body weight (cm)	168.15	6.00	.059	-.611
BMI (kg/m ²)	58.39	7.65	.739	.561
	20.64	2.34	1.445	2.845
<i>PSDQ-S</i>				
Health	4.28	0.92	.881	.206
Coordination	3.98	0.86	-.421	-.026
Physical Activity	3.86	1.36	-.457	-1.245
Body Fat	4.01	1.15	-.369	-.775
Sports Competence	3.76	1.24	-.452	-.540
Global Physical Self	3.95	1.16	-.558	-.529
Appearance	3.97	0.92	-.376	-.232
Strength	3.62	1.04	-.125	-.195
Flexibility	4.16	1.09	-.515	-.708
Endurance	3.49	1.28	-.102	-.975
Self-esteem	4.33	0.76	-.612	-.242
Anxiety	40.90	8.76	.111	.827

Based on the calculated BMI, 150 (76.1%) participants were normal-weight, 18 (9.1%) were underweight, 27 (13.7%) were overweight, and 2 (1.1%) were obese. Because of the small number of participants with obesity, this category was included in the overweight group in further analysis.

Differences in PSDQ-S subscales between the BMI groups are presented in Table 2. Pairwise comparisons revealed that underweight participants scored higher in the body fat subscale than normal-weight ($U=265.5$, $Z=-3.135$, $p<.01$; $r=.24$) and overweight participants ($U=12.5$, $Z=-3.541$, $p<.001$, $r=.53$) with small and large ES, respectively. It should be noted that a higher value on the above scale means better self-perception in terms of body size and greater body satisfaction. Furthermore, normal-weight participants scored higher than overweight participants in both body fat ($U=393$; $Z=-3.068$, $p<.01$; $r=.23$) and physical activity subscales ($U=535.50$; $Z=-2.045$, $p<.05$; $r=.15$) with small ES for both dimensions. There were no significant differences observed in anxiety scores among the three BMI categories ($H=3.21$, $p=.201$, $\eta^2=.006$).

Table 2. Differences in the PSDQ-S subscales and anxiety between participants according to BMI

	Underweight M(SD)	Normal-weight M(SD)	Overweight M(SD)	<i>H</i>	<i>p</i>	η^2
<i>PSDQ-S</i>						
Health	4.29(1.16)	4.27(0.89)	4.34(0.92)	0.75	.688	.006
Coordination	3.77(0.82)	4.04(0.87)	3.61(0.71)	3.61	.164	.008
Physical Activity	3.36(1.42)	4.02(1.32)	2.76(1.48)	7.99	.018	.030
Body Fat	5.04(0.84)	4.04(1.07)	2.88(1.08)	21.98	.000	.103
Sports Competence	3.97(1.14)	3.81(1.21)	3.17(1.41)	2.95	.229	.005
Global Physical Self	4.25(1.01)	3.99(1.11)	3.24(1.36)	4.07	.131	.011
Appearance	3.82(0.59)	4.03(0.94)	3.60(0.57)	3.52	.173	.008
Strength	3.06(1.11)	3.61(1.01)	3.86(1.05)	5.67	.082	.019
Flexibility	4.12(0.97)	4.24(1.07)	3.55(1.21)	4.70	.095	.014
Endurance	3.55(1.12)	3.52(1.31)	3.01(1.42)	1.39	.499	.003
Self-esteem	4.23(0.83)	4.39(0.74)	4.21(0.81)	0.79	.674	.006
Anxiety	42.36(8.15)	40.27(8.57)	44.78(10.21)	3.21	.201	.006

Concerning body weight perception, 125 (63.4%) participants perceived themselves as being the right weight, 50 (25.4%) as being overweight, and 22 (11.2%) as being underweight. Significant differences between these groups were found in almost all PSDQ-S subscales although small ES was observed, except for body fat (large ES) and global physical self (medium ES) (Table 3). Multiple comparison tests have shown that adolescent girls who perceived themselves as overweight exhibited poorer self-perceptions compared to their peers with normal-weight perceptions in terms of body fat ($U=419.5$, $Z=-6.570$, $p<.001$, $r=.50$), appearance ($U=1017.5$, $Z=-2.994$, $p<.01$, $r=.23$), physical activity practice ($U=1048$, $Z=-2.884$, $p<.01$, $r=.22$), sports competence ($U=999$,

$Z=-3.056$, $p<.01$, $r=.23$), endurance ($U=1030.5$, $Z=-2.859$, $p<.05$, $r=.22$), and global physical-self ($U=699$, $Z=-4.722$, $p<.001$, $r=.36$). Moreover, females who perceived themselves as underweight reported lower values in physical activity practice ($U=326.5$, $Z=-3.152$, $p<.05$, $r=.26$), endurance ($U=398$, $Z=-2.452$, $p<.05$, $r=.20$), and physical strength ($U=291.5$, $Z=-3.451$, $p<.01$, $r=.28$) compared with females who perceived their weight as normal. Participants who perceived themselves as overweight had also poorer self-perceptions in terms of body fat ($U=25.5$, $Z=-5.030$, $p<.001$, $r=.59$) in comparison with participants who perceived themselves as underweight.

A significant difference was also found on the anxiety scale. Pairwise comparisons revealed that participants with overweight perceptions expressed higher levels of anxiety than participants who perceived themselves as normal weight ($U=988$, $Z=-3.097$, $p<.01$, $r=.23$)

Table 3. Differences in the PSDQ-S subscales and anxiety between participants according to their perceived body weight

	Perceived underweight M(SD)	Perceived normal-weight M(SD)	Perceived overweight M(SD)	<i>H</i>	<i>p</i>	η^2
<i>PSDQ-S</i>						
Health	3.73(1.21)	4.42(0.78)	4.18(1.01)	4.27	.118	.012
Coordination	3.56(0.77)	4.14(0.82)	3.74(0.90)	9.10	.011	.037
Physical Activity	2.86(1.44)	4.22(1.32)	3.20(1.48)	15.25	.000	.068
Body Fat	5.00(0.86)	4.28(0.94)	2.86(0.86)	49.87	.000	.247
Sports Competence	3.19(1.24)	4.02(1.18)	3.22(1.17)	12.16	.002	.052
Global Physical Self	4.07(1.00)	4.21(1.05)	3.12(1.09)	23.55	.000	.111
Appearance	3.82(0.84)	4.14(0.92)	3.60(0.85)	9.16	.010	.037
Strength	2.65(1.05)	3.76(0.98)	3.64(0.94)	11.83	.003	.051
Flexibility	3.85(1.03)	4.25(1.01)	3.72(1.22)	6.81	.033	.025
Endurance	2.81(1.25)	3.78(1.26)	3.00(1.33)	11.72	.003	.050
Self-esteem	4.21(0.85)	4.42(0.76)	4.29(0.78)	5.73	.057	.019
Anxiety	42.40(6.01)	39.01(7.93)	45.00(10.28)	10.88	.004	.46

Kappa test revealed that the strength of agreement between perceived body weight and actual BMI was considered fair ($Kappa=.302$, $p<.001$). In fact, 61.1% who were actually underweight perceived themselves as underweight, 71.1% who were actually normal weight perceived themselves as normal weight, and 56.6% who were actually overweight perceived themselves as overweight. Among all participants, about 68% correctly evaluated their weight status, while

others had distorted weight perception, among them 12% misperceived as underweight and 20% as overweight.

Results also revealed that participants with body weight misperception showed higher anxiety level ($U=1493$, $Z=-2.68$, $p<.01$; $r=.19$) and poorer global physical self-concept ($U=1518.5$, $Z=-2.41$, $p<.05$; $r=.17$) than their accurate recognition counterparts. The effect sizes are small in both cases.

Discussion

According to measured BMI, 14.8% of high school girls were found to be overweight or obese, although it should be noted that participants with obesity represented a very small proportion (only 1%). As regards the overweight category, the results are quite comparable to some international data studies conducted in a female adolescent population in Europe (Bibiloni, Pons, & Tur, 2013; Kleszczewska et al., 2017). However, the proportion of overweight girls in our study was lower than those obtained in a large sample of Slovenian adolescent females in the year 2014 (Sedej, Lusa, Battelino, & Kotnik, 2016). Despite overweight and obesity prevalence in Slovenian adolescents entering high school has stabilized recently, Slovenia remains among the European countries with the highest prevalence of overweight and obesity among youth (Grammatikopoulou et al., 2014). The proportion of underweight females was about 9%, which is comparable to similar target populations from western counties (Kantanista & Osiński, 2014).

In addition to objectively measured body weight, perceived weight status was also assessed. Although most female students described their weight as 'just right', almost 25% perceived themselves as 'too fat', while proportions of measured and perceived underweight were quite similar. Some studies report even larger proportions of overweight perception among adolescent females (Suchert, Hanewinkel, & Isensee, 2016).

A discrepancy between BMI and body weight perception was found in 32% of adolescent girls; most of them overestimated their weight status. Overestimation was most common in the normal-weight BMI group, while underestimation was primarily present in overweight girls who consider themselves to be in a healthy weight range. These findings are quite consistent with other recent studies that report significant body weight misperception in females, especially among adolescent girls (Sirang et al., 2013; Wang et al., 2018). Almost one-third of adolescents fail to correctly evaluate their weight

status (Deschamps et al., 2015). According to international data obtained from 42 European countries, the percentage of adolescents who consider themselves overweight is 32.7%, which is two times higher than the percentage of actual excess body weight among adolescents. Authors also reported clear geographical and cultural differences in the level of discrepancies between self-perception and objective measurements of body weight among teenagers. In particular, Slovenian 15-year-old girls demonstrated considerable more problems with the correct assessment of their body weight compared to their peers in other countries. About 47% of girls with BMI in a normal range considered themselves overweight (Kleszczewska et al., 2017). These results should be of particular concern, given recent evidence that self-perceived overweight during teenage years may affect the development of body weight from adolescence into young adulthood (Cuypers et al., 2012).

In determining multidimensional physical self-concept among high school girls, significant differences were found in several physical-self components in relation to perceived weight status, while only in two physical-self dimensions relative to BMI. Similarly, anxiety level was associated with perceived, but not with actual weight status. Both overweight girls and those who perceived as overweight were less satisfied with their body size and reported lower physical activity levels compared to their peers with actual and perceived normal-weight. Furthermore, girls who considered to be overweight (regardless of their BMI), exhibited poorer sports competence and physical fitness than girls with normal-weight perceptions. This in accordance with results from previous studies indicating that overweight perceptions in adolescent girls could represent an important barrier for achieving the recommended levels of physical activity, which in turn might influence the acquisition of motor skills (Grao-Cuces et al., 2017; Sutin & Terracciano, 2015). Girls with overweight perceptions exhibited lower physical appearance and global physical self-concept, as well as higher anxiety level compared to girls with normal-weight perceptions.

Results also revealed some differences in the studied psychological variables in relation to body weight accuracy. In particular, girls who overestimate their weight status showed poorer global physical self and more anxiety symptoms than their accurate recognition counterparts. Although studies report significant differences in physical self-perceptions of adolescents in relation to their BMI scores (Zamani Sani et al., 2016), our findings suggest that weight perception can even be a better predictor of physical self-concept and

anxiety level among female adolescents than actual weight status. This is in line with other studies which emphasize the importance of investigating body weight accuracy among adolescents, since adverse psychological consequences seem to be more strongly associated with body weight perception, regardless of BMI (Jansen et al., 2008; Robinson & Kersbergen, 2017).

Adolescents are likely to exhibit distortion in their perceived body weight status due to their physical growth and increased concern over their appearance (Lim & Kim, 2017). In this developmental stage, weight perception is influenced by many factors such as objective weight, nutritional behavior, cultural norms and expectation, peer relationships, lifestyle habits, including physical activity. In particular, models of ideal body offered by the mass media may affect weight perceptions of youth and result in body weight distortion. Overestimation of body weight is more often present in girls, showing dissatisfaction with their body and appearance even being in the normal-weight range (Kleszczewska et al., 2017; Park, 2011; Sutin & Terracciano, 2015). Some authors have demonstrated that adolescents with greater body dissatisfaction are more vulnerable to cultural pressures of a slimmer body and might be at higher risk of potentially harmful weight-control practices and eating disorders, such as anorexia nervosa (Rodríguez-Fernández & Goñi, 2012). While underreporting of body weight was found to be more common in overweight adolescent girls (Robinson & Kersbergen, 2017). Underestimation in actually overweight or obese females can be seen as some kind of defensive mechanism that protects the individual's self-esteem and personal integrity. However, inaccurate weight perceptions can lead to a decline in motivation to engage in health behavior changes in order to achieve weight loss. In fact, overweight or obese people who perceived their weight as healthy were reportedly more likely have poor diets and less likely to be physically active (Murillo, Ali, Carmack, & Doss, 2016; Skinner, Weinberger, Mulvaney, Schlundt, & Rothman, 2008). Both underestimation and overestimation could result in inappropriate and unhealthy eating behaviors (Yan et al., 2018). Many studies have shown a close association between body dissatisfaction and maladaptive outcomes among adolescents such as low self-confidence, impaired mood and psychological well-being (Choi & Choi, 2016).

Therefore, programs and comprehensive interventions are needed to help adolescents develop accurate body weight perceptions as means of managing physical and mental health. Educational setting is particularly important to

address misperceptions and promote weight-related social norms in order to prevent the development of unrealistic body ideals (Mikolajczyk et al., 2010). School-based interventions, including dietary guidelines and health care classes, should be established for adolescents. We agree with Neumark-Sztainer and colleagues (2018) which highlight the need for wide-reaching interventions in schools and communities that address a broad spectrum of eating, activity, and weight-related problems. Thus, there are many ways to encourage accurate body weight assessment and healthy physical self-perceptions: correct knowledge acquisition on obesity, eating disorders, and healthy eating, emphasizing self-acceptance and avoiding unrealistic weight goals, and critical weight-related comments. It seems beneficial to enable environments that encourage a healthy body, rather than just a skinny body for females or muscular body for males. For instance, providing recommended amounts of physical activity and reducing time adolescents engage in screen-based sedentary behaviors could be a promising strategy to promote a healthy lifestyle among youth. Moreover, focusing primarily to increase physical activity levels, rather than only dietary intervention, might be a much more constructive approach for overweight and obese adolescents. An improvement in physical skills can significantly contribute to a higher exercise motivation, which in turn results in increased energy consumption and thus allow a more effective weight loss.

This study though is subject to a number of limitations. The cross-sectional design precludes making causal inferences about the impact of weight status on psychological health, in terms of anxiety level. Further examinations should therefore investigate the mediating role of physical self-concept in the relationship between body weight status and mental health outcomes.

In addition, the sample shows limitations due to its size. Since our study focused only on female adolescents from urban high schools, future research needs to include a larger and more representative sample, including adolescents of both genders attending different types of secondary schools. In future research, also obese adolescents should be addressed in the context of weight status and physical self-concept and anxiety.

Conclusion

The findings of the present study suggest that perceived weight status has a greater impact on physical self-perceptions and anxiety level than measured

weight status among adolescent females. These results have important practical value since body dissatisfaction represents a risk factor for undesirable health-related psychological outcomes. Parents and school professionals should closely monitor not only current weight status of adolescents but also their own weight perceptions and beliefs. Physical self-concept can be seen as a good indicator of possible eating disorders since dissatisfaction with one's own body is clearly linked not only to general self-concept but also to poor physical self-concept (Sánchez-Miguel, González, Sánchez-Oliva, Alonso, & Leo, 2018). Further research should highlight the above-mentioned relationship and include some additional variables associated with a health-related lifestyle of adolescents, such as dietary habits and practices, as well as physical activity and inactivity levels.

References

- Altıntaş, F. H., Aşçı, A., Kin-İşler, B., Güven-Karahan, S., Kelecek, A., Özkan, A., Yılmaz A., & Kara, F. M. (2014). The role of physical activity, body mass index and maturity status in body-related perceptions and self-esteem of adolescents. *Annals of Human Biology, 41*(5), 395-402.
- Babic, M. J., Morgan, P. J., Plotnikoff, R. C., Lonsdale, C., White, R. L., & Lubans, D. R. (2014). Physical activity and physical self-concept in youth: systematic review and meta-analysis. *Sports Medicine, 44*, 1589-1601.
- Bibiloni, M. D. M., Pons A, & Tur, J. A. (2013). Prevalence of overweight and obesity in adolescents: a systematic review. *ISRN Obesity, 2013*, 392747. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3901970/>.
- Cheung, P., Ip, P., Lam, S. T., & Bibby, H. (2007). A study on body weight perception and weight control behaviours among adolescents in Hong Kong. *Hong Kong Medical Journal, 13*(1), 16-21.
- Choi, E., & Choi, I. (2016). The associations between body dissatisfaction, body figure, self-esteem, and depressed mood in adolescents in the United States and Korea: A moderated mediation analysis. *Journal of Adolescence, 53*, 249-259.
- Cole T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity: international survey. *British Medical Journal, 320*, 1-6.

- Cole, T. J., Flegal, K. M., Nicholls, D., & Jackson, A. A. (2007). Body mass index cut-offs to define thinness in children and adolescents: international survey. *BMJ*, 335, 194-202.
- Côté, J. E., & Levine, C. (2016). *Identity formation, youth and development: A simplified approach*. New York: Psychology Press.
- Crocker, P. E., Sabiston, C. M., Kowalski, K. C., McDonough, M. H., & Kowalski, N. (2006). Longitudinal assessment of the relationship between physical self-concept and health related behaviour and emotion in adolescent girls. *Journal of Applied Sport Psychology*, 18, 185-200.
- Cuypers, K., Kvaløy, K., Bratberg, G., Midthjell, K., Holmen, J., & Holmen, T. L. (2012). Being Normal Weight but Feeling Overweight in Adolescence May Affect Weight Development into Young Adulthood - An 11-Year Followup: The HUNT Study, Norway. *Journal of Obesity*, 3, 601872. <https://doi.org/10.1155/2012/601872>.
- Delfabbro, P. H., Winefield, A. H., Anderson, S., Hammarström, A., & Winefield, H. (2011). Body Image and Psychological Well-Being in Adolescents: The Relationship Between Gender and School Type. *Journal of Genetic Psychology*, 172(1), 67-83.
- Deschamps, V., Salanave, B., Chan-Chee, C., Vernay, M., & Castetbon, K. (2015). Body-weight perception and related preoccupations in a large national sample of adolescents. *Pediatric obesity*, 10(1), 15-22.
- Dolenc, P. (2015). Telesna samopodoba srednješolcev s primerno in prekomerno telesno težo [The physical self-concept of normal-weight and overweight secondary school students]. *Pedagoška obzorja*, 30(2), 91-102.
- Dolenc, P. (2016). The Short Form of the Physical Self-Description Questionnaire: Validation Study among Slovenian Elementary and High School Students. *Journal of Psychological and Educational Research*, 24(2), 58-74.
- Fernández-Bustos, J. G., González, I., Contreras, O., & Cuevas, R. (2015). Relationship between body image and physical self-concept in adolescent females. *Revista Latinoamericana de Psicología*, 47, 25-33.
- Fleiss, J. L., Levin, B., & Paik, M. C. (2013). *Statistical Methods for Rates and Proportions*. New York: John Wiley & Sons.
- Grammatikopoulou, M. G., Poulimeneas, D., Gounitsioti, I. S., Gerothanasi, K., Tsigga, M., & Kiranas, E. (2014). Prevalence of simple and abdominal

- obesity in Greek adolescents: the ADONUT study. *Clinical Obesity*, 4, 303-308.
- Grao-Cruces, A., Fernandez-Martinez, A., & Nuviala, A. (2017). Asociación entre condición física y autoconcepto físico en estudiantes españoles de 12-16 años [Association between physical fitness and physical self-concept in 12-16 year-old Spanish schoolchildren]. *Revista Latinoamericana de Psicología*, 9(2), 128-136.
- Gulias-González, R., Martínez-Vizcaíno, V., García-Prieto, J. C., Díez-Fernández, A., Olivás-Bravo, A., & Sánchez-López M. (2014). Excess of weight, but not underweight, is associated with poor physical fitness in children and adolescents from Castilla-La Mancha, Spain. *European Journal of Pediatrics*, 173, 727-735.
- Hagger, M. S., Hein, V., & Chatzisarantis, N. L. (2011). Achievement Goals, Physical Self-Concept, and Social Physique Anxiety in a Physical Activity Context. *Journal of Applied Social Psychology*, 41(6), 1299-1339.
- Harter, S. (2003). The development of self-representations during childhood and adolescence. In M. Leary, & J. Tangney (Eds.), *Handbook of self and identity* (pp. 610-642). New York: Guilford Press.
- Haugen, T., Ommundsen, Y., & Seiler, S. (2013). The relationship between physical activity and physical self-esteem in adolescents: The role of physical fitness indices. *Pediatric Exercise Science*, 25, 138-153.
- Hayward, J., Millar, L., Petersen, S., Swinburn, B., & Lewis, A. J. (2014). When ignorance is bliss: weight perception, body mass index and quality of life in adolescents. *International Journal of Obesity*, 38(10), 1328-1334.
- Ibrahim, C., El-Kamary, S. S., Bailey, J., & St George, D. M. (2014). Inaccurate weight perception is associated with extreme weight-management practices in U.S. high school students. *Journal of Pediatric Gastroenterology and Nutrition*, 58(3), 368-375.
- Jansen, W., van de Looij-Jansen, P. M., de Wilde, E. J., & Brug, J. (2008). Feeling fat rather than being fat may be associated with psychological well-being in young Dutch adolescents. *The Journal of Adolescent Health*, 42(2), 128-136.
- Jáuregui-Lobera, I., Ezquerro-Cabrera, M., Carbonero-Carreño, R., & Ruiz-Prieto, I. (2013). Weight Misperception, Self-Reported Physical Fitness, Dieting and Some Psychological Variables as Risk Factors for Eating Disorders. *Nutrients*, 5, 4486-4502.

- Kantanista, A., & Osiński, W. (2014). Underweight in 14 to 16 year-old girls and boys: prevalence and associations with physical activity and sedentary activities. *Annals of Agricultural and Environmental Medicine*, 21(1), 114-119.
- Kim, D. S. (2009). Body image dissatisfaction as an important contributor to suicidal ideation in Korean adolescents: gender difference and mediation of parent and peer relationships. *Journal of Psychosomatic Research*, 66(4), 297-303.
- Kleszczewska, D., Dzielska, A., Nałęcz, H., & Mazur, J. (2017). Physical activity, BMI and body weight perception among 15-year-old boys and girls in Poland in the light of international comparisons. *Developmental Period Medicine*, 3, 235-247.
- Lamovec, T. (1988). *Manual for psychology of motivation and emotions*. Ljubljana: University of Ljubljana, Faculty of Arts.
- Lim, Y., & Kim, B. (2017). Body Mass Index, Body Weight Perception, and Depressed Mood in Korean Adolescents. *Journal of Korean Academy for Child and Adolescent Psychiatry*, 28(1), 31-37.
- Marsh, H. M., Martin, A. J., & Jackson, S. (2010). Introducing a short version of the Physical Self-Description Questionnaire: new strategies, short-form evaluative criteria, and applications of factor analyses. *Journal of Sport and Exercise Psychology*, 32(4), 438-482.
- Marsh, H. W. (2002). A multidimensional physical self-concept: A construct validity approach to theory, measurement, and research. *Psychology*, 9, 459-493.
- Mikolajczyk, R., Maxwell, A. E., El Ansari, W., Stock, C., Petkeviciene, J., & Guillen-Grimat, F. (2010). Relationship between perceived body weight and body mass index based on self-reported height and weight among university students: a cross-sectional study in seven European countries. *BMC Public Health*, 10(40). <https://doi.org/10.1186/1471-2458-10-40>.
- Mohamadian, H., & Ghannae Arani, M. (2014). Factors predicting the physical activity behavior of female adolescents: a test of the health promotion model. *Journal of Preventive Medicine and Public Health*, 47(1), 64-71.
- Murillo, R., Ali, S. A., Carmack, C., & Doss, D. (2016). Activity and Weight Misperception among Overweight and Obese US Adults. *American Journal of Health Behavior*, 40(1), 12-20.

- Neumark-Sztainer, D., Wall, M. M., Chen, C., Larson, N. I., Christoph, M. J., & Sherwood, N. E. (2018). Eating, Activity, and Weight-related Problems From Adolescence to Adulthood. *American Journal of Preventive Medicine*, 55(2), 133-141.
- Park, E. (2011). Overestimation and underestimation: adolescents' weight perception in comparison to BMI-based weight status and how it varies across socio-demographic factors. *Journal of School Health*, 1, 57-64.
- Patte, K. A., Laxer, R. E., Qian, W., & Leatherdale, S. T. (2016). An analysis of weight perception and physical activity and dietary behaviours among youth in the COMPASS study. *SSM - Population Health*, 2, 841-849.
- Revuelta, L., Esnaola, I., & Goñi, A. (2016). Relationships between Adolescent Physical Self-Concept and Physical Activity. *Revista Internacional de Medicina y Ciencias de la Actividad Física y del Deporte*, 16(63), 561-581.
- Rice, K., Prichard, I., Tiggemann, M., Slater, A. (2016). Exposure to barbie: effects on thin-ideal internalisation, body esteem, and body dissatisfaction among young girls. *Body Image*, 19, 142-149.
- Richard, A., Rohrmann, S., Lohse, T., & Eichholzer, M. (2016). Is body weight dissatisfaction a predictor of depression independent of body mass index, sex and age? Results of a cross-sectional study. *BMC Public Health*, 16(1), 863. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4995657/>.
- Robinson, E., & Kersbergen, I. (2017). Overweight or about right? A norm comparison explanation of perceived weight status. *Obesity Science & Practice*, 3, 36-43. doi: 10.1002/osp4.89.
- Rodríguez-Fernández, A., & Goñi, A. (2012). Risk of Eating Disorders and Physical Self-Concept in Adolescence. In I. Jáuregui Lobera (Ed.), *Relevant topics in eating disorders* (pp. 47-64). London: InTech Publisher.
- Sánchez-Miguel, P. A., González, J. J., Sánchez-Oliva, D., Alonso, D. A., & Leo, F. M. (2018). The importance of body satisfaction to physical self-concept and body mass index in Spanish adolescents. *International Journal of Psychology*. <https://doi.org/10.1002/ijop.12488>.
- Sedej, K., Lusa, L., Battelino, T., & Kotnik, P. (2016). Stabilization of Overweight and Obesity in Slovenian Adolescents and Increased Risk in Those Entering Non-Grammar Secondary Schools. *Obesity Facts*, 9, 241-250.
- Sirang, Z., Bashir, H. H., Jalil, B., Khan, S. H., Hussain, S. A., Baig, A., Taufeeq, M., Samad, K., & Kadir, M. M. (2013). Weight patterns and perceptions

- among female university students of Karachi: a cross sectional study. *BMC Public Health*, 13, 230. <https://doi.org/10.1186/1471-2458-13-230>.
- Skinner, A. C., Weinberger, M., Mulvaney, S., Schlundt, D., & Rothman, R. L. (2008). Accuracy of perceptions of overweight and relation to self-care behaviors among adolescents with type 2 diabetes and their parents. *Diabetes Care*, 31(2), 227-229.
- Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Suchert, V., Hanewinkel, R., & Isensee, B. (2016). Screen time, weight status and the self-concept of physical attractiveness in adolescents. *Journal of Adolescence*, 48, 11-17.
- Sutin, A. R., & Terracciano, A. (2015). Body weight misperception in adolescence and incident obesity in young adulthood. *Psychological Science*, 26, 507-511.
- Videra-García, A., & Reigal-Garrido, R. (2013). Physical self-concept, perceptions of health and life satisfaction in a sample of adolescents. *Anales de Psicología*, 29(1), 141-147. doi: 10.6018/analesps.29.1.13240
- Voelker, D. K., Reel, J. J., & Greenleaf, C. (2015). Weight status and body image perceptions in adolescents: current perspectives. *Adolescent Health, Medicine and Therapeutics*, 6, 149-158.
- Wang, Y., Liu, H., Wu, F., Yang, X., Yue, M., Pang, Y., Li, X., Ma, J., Zhou, G., Gong, P., Liu, M., & Zhang, X. (2018). The association between BMI and body weight perception among children and adolescents in Jilin City, China. *PLoS ONE*, 13(3). [https:// www.ncbi.nlm.nih.gov / pmc / articles/PMC5868793/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5868793/).
- Weinberger, N-A., Kersting, A., Riedel-Heller, S. G., & Luck-Sikorski, C. (2016). Body dissatisfaction in individuals with obesity compared to normal-weight individuals: A systematic review and meta-analysis. *Obesity Facts*, 9, 424-441.
- Yan, H., Wu, Y., Oniffrey, T., Brinkley, J., Zhang, R., Zhang, X., Wang, Y., Chen, G., Li, R., & Moore, J. B. (2018). Body Weight Misperception and Its Association with Unhealthy Eating Behaviors among Adolescents in China. *International journal of environmental research and public health*, 15(5), 936. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5981975/>.

Zamani Sani, S. H., Eskandarnejad, M., & Fathirezaie, Z. (2016). Body Image, Perceived Physical Fitness, Physical Activity, Body Mass Index and Age in Women. *Women Health Bulletin*, 3(3), e31886. <http://womenshealthbulletin.com/en/articles/21297.html>.

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