# THE RELATION BETWEEN ACTUAL AND PERCEIVED BODY WEIGHT IN ADOLESCENCE

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**ABSTRACT**

Previous research showed that self-perceived body image is subject to misrepresentation and appearance appraisals are strongly influence by cultural norms. The thin ideal is a cultural norm that is considered to have a strong influence over body image, when internalized and transformed in a personal standard. Teenage girls are a vulnerable group regarding the pressure to be thin. This can lead to distortions in body perception and bias in interpretation of body related information. The aim of the present study is to explore the relation between body mass index and possible distortions in shape and size perception, and the extent to which body esteem and socio-cultural attitude toward appearance might be relevant factors related to misrepresentation of body image. 124 adolescent girls (15-18 years) completed questionnaire measures on body-esteem, thin-ideal internalization and rated their self-perceived weight on a three Likert scale (from underweight to overweight). Also they were asked to complete the Contour Drawing Rating Scale (Thompson &Gray, 1995) by selecting the figure that best represents their current size. Each perceived score was compared to actual size based on BMI to measure distorted self-image. Results showed that thin-ideal internalization is related to overestimation of the body size and low scores in body-esteem. Positive body-esteem favored distortions toward normal weight. Overall there was a significant difference between BMI and body perception and this difference was connected to thin ideal internalization. The present research findings give us further perspective in exploring the role of thin-ideal internalization in body image perception

**Keywords***:* perceived body image, thin ideal internalization, body esteem.

## Introduction

Researches regarding the perception of the body image, in terms of size and weight, show that there is a significant lack of accuracy in the perception of the body (K. Thompson, et al, 1999; M.P. McCabe, L. Ricciardelli, G. Sitaram & K. Mikhail, 2006). Distortions in body image perception were identified first in studies about anorexia nervosa. Models of the development of anorexia nervosa underlined a causal link between overestimation of the body size, body dissatisfaction and eating disorders. Researchers proposed the hypothesis of a dysfunction in sensorial input integration (P. Slade & D. Brodie, 1994) accurate. Therefore, the model accepted was that overestimation is due to cognitive factors related to beliefs, assumptions regarding the centrality of the appearance for the self, attitudes toward the cultural ideal of body image. All these factors lead to negative affect that, in turn, activate cognitive bias and size distortions (L.J. Heinberg, et al, 1999). The conclusion would be that accuracy of perception should be related to body image satisfaction. A contraire, K.L. Allan, et al, 2008), in a prospective study, showed that an objective weight perception, in an overweight group, was related to dissatisfaction and the relation between body image concern and body perception accuracy was stronger that the reverse relation, concluding that concerns about body image might precede the development of a specific pattern in body size perception. Also, depression was proved to be a predictor of accuracy of perception (K.L. Allan et al, 2008). The theoretical background for this finding comes from studies regarding self-enhancement (R.F. Baumeister et al 1989). It is a self-protective process of distorting the reality in a positive way, for maintaining high self-esteem. When under threat, individuals are choosing downward comparison or are focusing on another domain they consider superior, in order to maintain their positive self-view. Wilson, Cressman and Buote (2006), mentioned that this mechanism does not work in body image perception, especially for women. This suggests that the relation between accuracy of shape and size perception and body image satisfaction is not linear. There are factors that not just moderate the relation but also change the meaning of it. One of these factors is BMI. In the context of a positive body image, overweight people have the tendency to underestimate, while underweight people overestimate their body size (M.A. Smeets, et al, 1998; M. McCabe, et al, 2006). But, in their study, regarding the role of hypothesis declined because the perception of neutral objects seemed to be

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biopsychosocial factors in the estimation of body size, M. McCabe et al. (2006) found that for women, media and peer influences but not the BMI, predicted the overestimation of the body size. Therefore, the socio-cultural ideal of body image might have an influence on what is considered normal in terms of body image. Previous researches underlined the sensitivity of women toward the cultural ideal of body image. Teenage girls are also a vulnerable group because of the centrality of thin ideal in many girls self-concept (H. Dittmar, et al, 2009). Because of the thin ideal promoted, underweight teenager girls might consider they have a normal weight. In this case, the overestimation should be related to a positive body image. Following the same pattern, normal weight teenage girls might consider themselves overweight.

The aim of the present study is to explore the relation between BMI and possible distortions in shape and size perception, and the extent to which body esteem and socio-cultural attitude toward appearance might be relevant factors related to misrepresentation of body image. We are expected that underestimation will be related to a positive body image because being thin is socially accepted. In the normal weight group, we are expected that a correct perception of the body size is related to positive body esteem, while overestimation might be related with negative body esteem. In the overweight group, those that consider their weight normal should have low scores in thin ideal internalization. Therefore, there will be significant differences between adolescents that evaluate their weight and body size accurate and those who underestimate or overestimate it, in terms of body-esteem and socio-cultural attitude toward appearance.

**Methods**

***Participants***:

Participants were 124 high-school girls, in grades 10 to 12, attending two theoretical high-schools from Alba Iulia. The majority of girls were within the 15 to 18 years (mean age 16.96). The mean BMI for girls across all grades was 20.00 kg/m² (SD = 2.72). According to international age based cutoff points for BMI (WHO), 46 were under-weight, 67 were having normal weight and 11 were overweight.

***Measures:***

*Body Mass Index*

BMI was calculated from the equation (weight in kg)/(height in m²), using self-reported weight and height.

*Self-evaluation of weight*

The perception of own weight was assessed by asking participants to rate their body weight based on three options *("I consider myself thin / having a normal weight / being overweight")*

*Body-esteem*

Body-esteem was measured by Body Esteem – Weight subscale of "The Body Esteem Scale for Adolescents and Adults" (BESAA; B.K. Mendelson et al 1997). The subscale consists on 8 statements that address the satisfaction with weight and shape (*"I think I have a good body"*), negative affect ("*My weight makes me unhappy*") and investment ("*I am preoccupied with trying to change my body weight*"). Respondents indicated their degree of agreement with each statement on a 5-point Likert scale ranging from 0 (never) to 4 (always), with higher scores that indicate higher body-esteem. A mean score for each individual was calculated. The authors reported an internal consistency coefficient of ά = .94 and high 3-month test-retest reliability (r=.92, p<.001) (Mendelson et al. 1997).

*Socio-cultural attitude toward appearance*

The attitude toward thin ideal was measure by the internalization subscale of Socio-cultural Attitudes towards Appearance Scale (SATAQ, Heinberg, Thompson & Stormer, 1994). Respondents were asked to indicate their agreement with 8 different statements ("*I believe clothes look better on thin models*", "*I tend to compare my body to people in magazines and on TV*") on a 5-point Likert scale ranging from "completely disagree" (1) to "completely agree" (5). For each participant, a mean score was calculated. High scores indicated a high tendency to internalize the thin ideal. The authors reported an internal consistency coefficient of ά = .88.

*Contour Drawing Rating Scale (MA. Thompson & JJ.Gray, 1995)*

The perception of body size was measured by Contour Drawing Rating Scale (M.A. Thompson & J.J. Gray, 1995), consisting of 9 female contour drawings, ordered from thin to overweight. The author reported a significant one week test retest reliability data (r=.78, p<.0005) For the Contour Drawing Scale, the participants were instructed to circle the image that best represents their actual size. Of the nine images, three were underweight, three represented normal weight body size while three were situated in the overweight range.

***Procedure***

Participants were invited to participate in a study titled "My body". After receiving their consent, the paper and pencil questionnaire was administered. The original scales have been translated in Romanian

and then back in English, by another translator, in order to make sure the meaning was not changed. The research team checked that all items had been translated in a correct and meaningful way. Regarding body-mass index, self-reported body weight and height were calculated, based on the formula weight (in kilos)/ height² (in meters). Then, international cut-off scores were used, in order classify the subjects.

**Results**

***The relation between BMI and self evaluation of weight status***

Based on self evaluation of weight status, 19 students (15.3%) considered they were thin, 85 students (68.5%) thought they had normal weight, while 20 students (16.1%) declared they considered themselves overweight. Figure 1 shows the results regarding the frequency for underestimation, overestimation and correct evaluation of weight, deducted from self-reported evaluation, for each category, based on BMI (thin: BMI<18.5, normal weight: BMI from 18.5 to 24.9 and overweight: BMI from 25 to 29.9). Chi-square = 48.89, df=4, p< 0.0001, confirms a significant difference between BMI and self evaluation of weight status. 58.7% of underweight subjects considering their weight situated in the normal range, while only 41.3% recognized their underweight status. In the normal weight category, 21.7% considered to be overweight, while 75.4% perceived their weight correctly. In the overweight category, 54% considered their weight normal, while 45% recognized their overweight status.

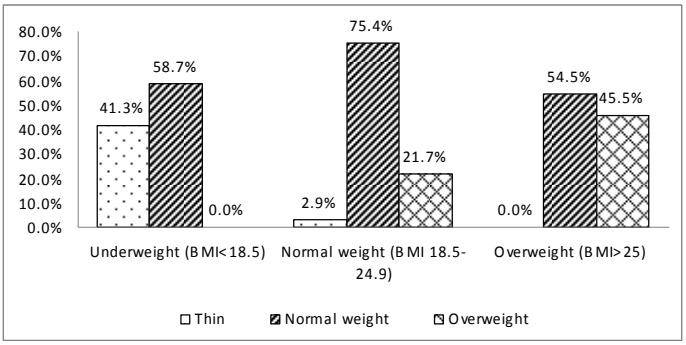


Figure 1. Verbal evaluation of weight

***Thin ideal internalization and body-esteem for each category based on BMI and self evaluation of weight status***

Table 1 represents the mean scores for the each evaluated dimension in the underweight group (BMI<18.5) that was split in two categories: subjects that evaluated themselves thin, therefore according to their BMI status and subjects that considered themselves having a normal weight, in contrast with their actual BMI. Those that overestimated their weight toward normal range, scored higher in body esteem (t= 5.701, df = 44, p = 0.0001). No significant differences were found in thin ideal internalization..

Table1 Underweight group statistics

| **Group Statistics** | | | | | |
|---|---|---|---|---|---|
| | Weight perception | N | Mean | Std. Deviation | Std. Error Mean |
| Body esteem | Thin | 19 | **16.37** | 6.525 | 1.497 |
| | normal_weight | 27 | **26.04** | 4.981 | .959 |
| Thin ideal internalization | Thin | 19 | 22.00 | 8.253 | 1.893 |
| | normal_weight | 27 | 22.11 | 6.841 | 1.316 |

Table 2 represents the mean scores for each evaluated dimension, in the normal weight group. Subjects who evaluated themselves having normal weight scored higher than subjects who considered being overweight, in body esteem (t = 4.203, df =65, p = 0.0001). Thin ideal internalization scores are higher in the group that considered been overweight (t = -5.343, df = 65, p = 0.0001).

Table 2 Normal weight group statistics

| Group Statistics | | | | | |
|---|---|---|---|---|---|
| | Verbal weight perception | N | Mean | Std. Deviation | Std. Error Mean |
| Body esteem | normal_weight | 52 | **21.87** | 6.161 | .854 |
| | overweight | 15 | **14.20** | 6.439 | 1.662 |
| Thin ideal internalization | normal_weight | 52 | 22.06 | 5.428 | .753 |
| | overweight | 15 | 30.40 | 4.940 | 1.275 |

Table 3 represents the mean rank for subjects that perceived their weight correct compared to subjects that underestimated their weight. In the overweight group (N=11), body esteem has higher scores for cases where the weight is considered normal compare to subjects that recognize their overweight status. Internalization scores are higher for subjects that recognized their overweight status.

Table 3 Overweight group statistics

| Ranks | | | | | |
|---|---|---|---|---|---|
| overweight | Body esteem regarding weight | normal_weight | 6 | 8.50 | 51.00 |
| | | overweight | 5 | 3.00 | 15.00 |
| | | Total | 11 | | |
| | Thin ideal internalization | normal_weight | 6 | 5.42 | 32.50 |
| | | overweight | 5 | 6.70 | 33.50 |
| | | Total | 11 | | |

***The relation between BMI and visual estimation of body size***

Figure 2 shows misrepresentations resulted from visual perception of pictorial body images for each category, based on BMI. Chi-square = 64.9, df=4, p< 0, 0001, confirms a significant difference between BMI and visual perception of body size. 78% of underweight subjects choose a pictorial body image that was situated in the underweight class while 23.9% choose a pictorial from the normal weight range. In the normal weight group, 21.7% selected an underweight figure while 59.4% selected a normal weight figure. The visual perception of body size seems more accurate than the self evaluation of weight status.

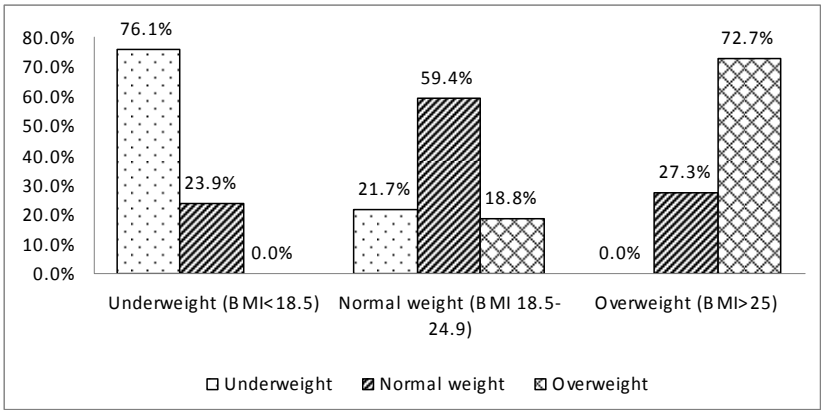


Figure 2 Visual evaluation of weight

***Thin ideal internalization and body-esteem for each category based on BMI and visual estimation of body-size***

By looking at each group based on BMI, in the underweight group, there is a significant difference in terms of body-esteem between subjects that acknowledge their underweight status and those that view their weight normal (Tab. 4).

Tab.4 Underweight group statistics

| | Visual weight perception | N | Mean | Std. Deviation |
|---|---|---|---|---|
| Body esteem regarding weight | underweight | 35 | **20.46** | 7.406 |
| | normal_weight | 11 | **27.09** | 4.700 |
| Thin ideal internalization | underweight | 35 | 22.66 | 7.746 |
| | normal_weight | 11 | 20.18 | 5.930 |

In the normal weight group, there is a significant difference in terms of thin ideal internalization, based on visual weight perception (F=6.60, p=.002). Those that perceive their weight correct or underestimate it, have lower scores than those that overestimate their size. Overestimation is related to internalization of thin ideal. No significant differences were found in terms of body-esteem

Tab. 5 Normal weight group statistics

| | Visual weight perception | N | Mean | Std. Deviation |
|---|---|---|---|---|
| Body esteem regarding weight | underweight | 13 | 22.87 | 4.58 |
| | normal_weight | 41 | 20.22 | 7.24 |
| | overweight | 13 | 17.23 | 7.32 |
| Thin ideal internalization | underweight | 13 | 22.77 | 5.790 |
| | normal_weight | 41 | 22.61 | 6.016 |
| | overweight | 13 | 29.23 | 5.403 |

***The relation between self evaluation of weight status, body-esteem regarding weight and thin ideal internalization, for each BMI category.***

Regarding associations between variables, it was found that body-esteem negatively correlates with BMI (r= -.405, p<.01). Socio-cultural attitude also negatively correlates with body-esteem (r=.364, p<.01).

Means and standard deviations by BMI, self evaluation of weight status and visual perception of body size, for body-esteem and socio-cultural attitudes toward appearance are presented in Table 6. As can be seen, body-esteem vary significantly based on BMI (F=7.11, p=.0001), underweight student girls having the highest body-esteem, followed by normal weight and overweight students.

The analysis of variance (One-Way ANOVA) of body esteem, for the three categories, based self evaluation of weight status, showed a global significant difference (F=29.13, p = 0.0001). Post hoc analysis with Bonferoni, revealed a significant difference in body-esteem, between girls that evaluated their weight as being in the normal range and girls that perceived their weight as being thin or overweight. No significant differences in body-esteem were observed for those that considered being thin and overweight.

For thin ideal internalization, the mean in underweight group (N=19) is 22.00 (SD 8.25), normal weight group, N=85 (M=21.98, SD 6,04) and overweight group N=20 (M=28.6, SD 6.16). The analysis of variance (One-Way ANOVA) also showed a significant difference in terms of socio-cultural attitude toward appearance (F=8.86, p=.0001). Post hoc analysis with Bonferoni, demonstrated a significant difference between girls that perceived their bodies as being thin and girls that evaluated their body as being overweight. Overall, perceived overweight group had significantly higher scores in thin ideal internalization compared to underweight and normal weight.

Looking at the variation of body-esteem, based on visual perception of body size, One-Way ANOVA showed a global significant difference (F=6.55, p=.002). Post hoc analysis revealed that body-esteem of girls that saw their body size in the normal or underweight group was significantly higher compared with girls that chose an overweight pictorial. Also thin ideal internalization was seen to vary between the three

groups (F=3.62, sig.030), but post hoc analysis showed significant differences only between girls that saw their weight as been normal or underweight compared to overweight.

**Table 6** Means and standard deviations for body-esteem and sociocultural attitude toward appearance, based on BMI, self evaluation of weight status and visual perception of body size

| Variable | BMI | | | | | | |
|---|---|---|---|---|---|---|---|
| | Underweight | | Normal weight | | Overweight | | |
| | M | SD | M | SD | M | SD | F(124) |
| BE | 22.04 | 7.38 | 20.15 | 6.96 | 12.91 | 8.06 | 7.112*** |
| SATAQ | 22.07 | 7.36 | 23.93 | 6.34 | 21.82 | 7.36 | 1.209 |
| | Visual perception of body size | | | | | | |
| | Underweight | | Normal weight | | Overweight | | |
| | M | SD | M | SD | M | SD | F(124) |
| BE | 21.1 | 6.79 | 21.42 | 7.28 | 15 | 8.13 | 6.55** |
| SATAQ | 22.69 | 7.2 | 22.02 | 6.00 | 26.57 | 7.19 | 3.62* |
| | Self evaluation of weight status | | | | | | |
| | Underweight | | Normal weight | | Overweight | | |
| | M | SD | M | SD | M | SD | F(124) |
| BE | 16.37 | 6.52 | 23 | 6.06 | 12 | 6.88 | 29.130*** |
| SATAQ | 22 | 8.25 | 21.98 | 6.04 | 28.6 | 6.16 | 8.863*** |

*p<.05 **p<.01 ***p<.001

BE – body esteem – weight subscale

SATAQ - Sociocultural Attitudes Toward Appearance

**Discussions**

The aim of the study was to explore the relation between BMI, self evaluation of weight status and visual perception of body size, in relation to body-esteem and thin ideal internalization and to explore differences in terms of body-esteem and thin ideal internalization, between participants that evaluate their weight correct and participants that underestimate or overestimate their size. The findings revealed that, in line with previous research, self-perceived body image is subject to misrepresentation. The overall results show there is a significant difference between BMI and weight perception, for both self evaluation of weight status and visual estimation of body size. In the underweight group, more then a half declared they have normal weight, while in the normal weight group, a quarter considered themselves overweight. The overweight group had a reverse tendency, more then a half considering their weight normal. The results support previous findings that normal and underweight persons have the tendency to overestimate their body size (B.P. McCabe et al l, 2006), while overweight persons have the tendency to underestimate their body size (K.L. Allen et al, 2008). The visual estimation of body size was more accurate, compared to self evaluation of weight status. If asking the subjects to choose a pictorial body image from a series of nine, a more accurate perception was obtained. In line with the literature, these results suggest that overestimation is not as much a perceptual problem but a conceptual one regarding the meaning of being underweight and BMI is just one factor that contributes to self evaluation of weight status

A relevant factor, proposed to account for differences in weight perception is thin ideal internalization. In the context of the promotion of the thin ideal as a normative standard of beauty, these girls might consider their weight normal because it is in accord with these standards (H. Dittmar, 2007). Indeed, thin ideal internalization was found to be significantly higher for those that perceived their weight as being overweight compared to girls that evaluated them as normal or underweight. No significant differences were found between underweight and normal weight perception in terms of thin ideal internalization, but we registered a significant difference in terms of body-esteem. Actually, high body-esteem correlates with low levels of thin ideal internalization. This finding contradict our expectation that acknowledge of the thin status is related to high body esteem because being thin is socially valued. Even if very thin and apparently in accord with socio-cultural ideal, these girls were not both high in thin ideal internalization and high in body esteem. This might suggest the fact that thin ideal, if transformed in a personal standard relates to body dissatisfaction independently of BMI. *A.*Brown and H.Dittmar in their article, "Think thin and feel bad" shows that thin ideal internalization is related to negative affect and S. Grabe et al. 2008, brought evidence that body ideal internalization is an essential factor in explaining adolescents body-esteem. L.Smolak ,2004, suggests that girls, who score high on body ideal internalization, often compare themselves to the thin models and this lead to low body-esteem.

In the normal weight group, lower scores of body-esteem are related to higher scores in terms of socio-cultural attitude toward appearance and overestimation. Therefore, overestimation is related to

sensitivity toward socio-cultural pressure. In this context of a normal BMI, an accurate perception is related to high scores of body-esteem. In the overweight group, more than half considered their weight normal, had high levels of body esteem and low levels of thin ideal internalization, confirming Allen's finding that overweight persons underestimate their body size. As E.J. Strahan, A.E. Wilson, K.E. Cressman and V. Buote, 2006, argued, a dysfunction in perception of the body size might be benefic when misrepresentation is directed toward average size body.

**Limitations**

There are limitations to this study that need to be taken into account when interpreting the findings. First, BMI was calculated based on self-reported weight and high. Therefore we can expect a degree of inaccuracy that was not considered. Then the pictorial body image does not permit a very accurate estimation of the body size, as a technique where subjects have to identify their correct image from o series of self images with size distortion present or absent. Also the overweight group was underrepresented compared to normal and underweight group.

**Conclusions**

The study brings new evidence, that distortions in body image perception are rather related to non sensory factors, such as attitudes toward the body, than to visual perception inaccuracy. Therefore, future research regarding cognitive factors that might lead to misperception of body image would be very valuable. A second important finding is that the meaning of the misperception changes based on BMI. A differentiation between when misperception is maladaptive and when it does not lead to negative outcomes, it might help in identifying factors that lead to pathology as well as protective factors. As found in the present research, one relevant factor is BMI. In this particular group of teenage girls, only overestimation in normal and overweight group was related to a low body-esteem and thin ideal internalization. Cultural norms might be a significant factor that shapes the perception of the body and the meaning attached to this perception.

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