Assessment of Obesity Stigmatization in Children and Adolescents: Modernizing a Standard Measure

Janet D. Latner, Murray Simmonds,† Juliet K. Rosewall,† and Albert J. Stunkard‡*

Abstract

LATNER, JANET D., MURRAY SIMMONDS, JULIET K. ROSEWALL, AND ALBERT J. STUNKARD. Assessment of obesity stigmatization in children and adolescents: modernizing a standard measure. *Obesity.* 2007;15:3078–3085.

Objective: Stigmatization of overweight children is highly prevalent. However, the measurement of stigma has varied widely across studies. An up-to-date version of a commonly used measure of weight-related stigma is needed.

Research Methods and Procedures: Poser 5 (DAZ software) was used to develop 12 modernized figures, using three-dimensional models rendered as high-resolution images. They depicted one overweight, one non-overweight, and four disabled children of each sex. Children recruited from public and private schools ($N = 261$; mean age, 11.3 years; median BMI z-score = 0.33; 77.0% white, 11.5% Asian, and 7.7% Maori) ranked these figures in order of liking. Participants also ranked traditionally used line drawings depicting comparable images. Participants rated each new figure on measures of liking and stereotypical attributes on 100-mm visual analog scales (VASs).

Results: Rankings of liking of the new figures were highly correlated with rankings of corresponding old figures, especially for overweight figures [boys: ρ (77) = 0.72, $p < 0.001$; girls: ρ (153) = 0.68, $p < 0.001$]. Rankings of overweight and other figures were also highly correlated with VAS assessment of liking and with a composite, internally consistent VAS measure of liking and stereotypical attributes. Only negative stereotypes about the intelligence of overweight boys and girls contributed significantly to the variance in liking.

Discussion: An updated and modernized tool for assessing children's weight stigma was developed and its construct validity supported. The present findings suggest that stereotypes about low intelligence may contribute to weight stigma among children. More research is needed on the causes and components of weight stigma so that it can be effectively reduced.

Key words: stigma, weight-related discrimination, childhood obesity

Introduction

The stigmatization of overweight children is highly prevalent across multiple settings and sources, including peers (1), family members (2,3), and even educators (4–6). The stigma against overweight children appears to have increased over the past 4 decades (7), despite the increase in prevalence and the increased visibility of childhood obesity (8). Weight stigma may have numerous negative effects. For example, weight-related teasing can increase risk of later eating disturbances (9), and childhood obesity is associated with several negative psychological outcomes (10).

The assessment of the stigmatization of obesity among children has differed greatly across studies. The earliest studies of this phenomenon evaluated children's liking for a specific set of figures with various physical characteristics (11–14). Other studies used different sets of figures and different means of assessing children's judgments, such as asking them to assign adjectives to endomorphic and ectomorphic figures (15–18). Some investigators have used more elaborate procedures, such as rating target children wearing (vs. not wearing) fat suits (19) or asking parents to create stories about children who were (or were not) overweight (20). The differences among measures used make it difficult to draw comparisons among studies. The ability to make such comparisons across different populations is necessary for the development of an understanding of cultural,

Received for review November 19, 2006.
Accepted in final form April 15, 2007.
*Department of Psychology, University of Hawaii, Honolulu, Hawaii; †Department of Psychology, University of Canterbury, Christchurch, New Zealand; and ‡Department of Psychiatry, University of Pennsylvania, Philadelphia, Pennsylvania.
Address correspondence to Janet D. Latner, Department of Psychology, University of Hawaii at Manoa, 2430 Campus Road, Honolulu, HI 96822.
E-mail: jlatner@hawaii.edu

sex, age, and even generational differences in stigma. A measure standardized for more widespread use would permit investigations and comparisons of weight stigma across countries and cultures. Examining cultural differences in stigmatization may be important in reducing it. Specifically, research examining whether and why certain cultures are less stigmatizing can identify protective factors that can be used to prevent stigma.

One measure that has been used to examine changes in children's responses to their overweight peers over time and, thus, investigate generational trends in weight stigma (7) was developed by Richardson et al. in 1961 (13). Other recent studies (published and in process) have used this measure or variants of it across cultures and in several different countries (e.g., Mexican, Italian, Guatemalan, Cuban, Irish, and African-American cultures) with children and adults (21–23) (D. Cowman, personal communication; D. Lopez Esquivel, personal communication; L. Kleiman, personal communication; M. Koroni, personal communication; W. Novoa, personal communication; A. R. Ojea, personal communication). The measure consists of six line drawings of children: four children with various disabilities, one slender child, and one overweight child. Respondents are asked to rank them in order of how much they like each child. The consistent use of this measure across studies has allowed us to document significant increases in modern-day obesity stigma (7). It has also demonstrated lower stigma among Mexican children (21) and African-American participants, relative to whites, and among adults relative to children (23).

However, a number of limitations of this measure need to be addressed. Although many previous studies have used line drawings to depict children with and without obesity and other physical characteristics, it has been suggested that line drawings may no longer be the optimal stimuli for measuring esthetic preferences for body morphology (24,25). Computer technology is now available to produce more realistic, three-dimensionally modeled figures. Such technology also allows the standardization of figures' appearance, with the precise manipulation of only one key feature at a time, such as weight or other physical aspects, while keeping constant incidental features such as hair, face, and pose. Computerized figures also allow the weight of figures to be increased systematically across the body, by realistically and evenly distributing added weight to a thin figure's physique. Finally, previously used figures could be brought up-to-date stylistically, with modern clothing, hairstyles, and shoes. Such modernization would potentially increase the ecological validity of stimuli and evoke more realistic responses.

The purpose of the present study was to update the measure of stigmatization originated by Richardson et al. in 1961 (13). We aimed to examine the construct validity of this new measure by comparing responses to it with responses to the original measure. We also sought to test its construct validity by comparing responses to it with responses to visual analog scale (VAS)[1] questions about participants' attitudes toward overweight children. It was predicted that rank-order responses to the new figures would be significantly correlated with both rank-order responses to the old figures and VAS ratings. Finally, this study aimed to identify the extent to which specific attributions contributed to the stigmatization of overweight children as measured by rankings and VAS ratings of the updated figures. The attributions examined included intelligence, laziness, and control over appearance. The selection of these specific attributes was based on previous research showing that the stigma of overweight children was associated with judgments of them as unintelligent, lazy (15,26,27), and not being in control of their physical appearance (28,29).

Research Methods and Procedures

Participants

Ninety boys and 171 girls took part in the study. Their mean (standard deviation) age was 11.30 (0.75), range 10 to 13 years. The ethnic background of participants was 77.0% New Zealand European or other white, 11.5% Asian or part Asian, 7.7% Maori or part Maori, 0.8% African, and 0.8% Pacific Islander or part Pacific Islander. An additional 2.2% of children did not specify their ethnic background. (These values are not dissimilar from population statistics for Christchurch, New Zealand: 87.0% European, 6.9% Maori, and 5.5% Asian; available online at http://www.bigcities.govt.nz/pdf/Ethnicity.pdf). BMI percentiles and *z*-scores for age and sex were computed using the Centers for Disease Control and Prevention BMI-for-age growth charts (available online at www.cdc.gov/growthcharts). Using this classification, no participants were underweight (<5th percentile), 70.3% were in the normal-weight range (5th percentile to <85th percentile), 18.1% were at-risk-for-overweight (85th to <95th percentile), and 11.6% were overweight (95th percentile or greater). Their median BMI *z*-score was 0.33 (0.83). Participants were recruited from a range of schools throughout Christchurch: one private girls' school and six public co-educational schools. The mean decile rating of these schools was 8.14 (2.12), indicating that, on average, the children were from moderate to high socioeconomic communities. (The decile rating is a government-issued rating that uses a 10-point scale to indicate the proportion of students from low socioeconomic communities.)

Measures

Stimuli. Using Poser 5 (DAZ software; DAZ Productions, Inc., Draper, UT), six male and six female figures were

[1] Nonstandard abbreviations: VAS, visual analog scale; SAS, Stigmatizing Attitudes Scale.

Figure 1: Updated figures of six girls and six boys: a non-overweight, non-disabled child, a child on crutches, a child in a wheelchair, a child with a missing left hand, a child with a facial disfigurement (a large scar on the left side of the face), and an overweight child.

developed. One figure of each sex represented a non-overweight, non-disabled child designed to appear ~11 years old. Another pair represented an overweight child of each sex (increased in horizontal dimensions by 20% to 30% for different body parts). The four remaining pairs of drawings represented boys and girls with disabilities or disfigurements: a child on crutches, a child in a wheelchair, a child with a missing left hand, and a child with a facial disfigurement (a large scar on the left side of the face). These figures were not only stylistically improved and updated over the original versions (13) but also improved on certain aspects of the originals; specifically, a clearer depiction of the missing hand that could not be mistaken for being a hand held behind the child's back and a more even distribution of excess weight on the overweight child.

The Poser 5 standard figures of children ("Penny" and "Will") were morphed to create the six 3-dimensional models used in each set and then rendered in full color with cast shadows as high-resolution images. These images were then post-processed in Paint Shop Pro 7 (JASC Software, Inc., Eden Prairie, MN) to enhance the contours and to desaturate the colors of the images. The pastel-shaded images were retained and are available from the authors. In addition, a grayscale version of the images was prepared; this was the version used in the present study (Figure 1).

Questionnaires. Written questionnaires consisted of three parts. First, children were shown the six new figures and asked to circle the one they liked the best. They were then shown another set of the figures below the first set and asked to circle the one they liked second best. They were then shown a third set and asked which they liked third best, and so on, until all six rankings were obtained. The questionnaire then requested that the participants check their answers and make sure they circled each figure once and only once. All children completed this measure twice, once for female target figures and once for male targets.

In the second part of the questionnaire, children were shown each of the 12 new figures separately and asked to answer 5 questions about each figure by drawing a small line across a 100-mm VAS anchored at the left and right by the phrases "not at all" and "very much." On the left of the 5 questions appeared a copy of the target drawing about which they were to answer the questions. The questions were "How much do you like the girl [or boy] on the left?" "Does this girl [or boy] have control over the way [s]he appears?" "How much would you yourself want to be like this girl [or boy]?" "How smart would you guess this girl [or boy] is?" and "How lazy would you guess this girl [or boy] is?" The final item was reverse coded (by subtracting responses from 100). Thus, lower ratings indicated greater stigmatization. Together, the VAS questions on the over-

weight figures were combined to form an overall scale of stigmatizing attitudes (the Stigmatizing Attitudes Scale; SAS). The internal consistency (Cronbach's α) of this 10-item scale was 0.65. Using Pearson's product-moment correlations, all items correlated with the scale total with r value of at least 0.30, and all but the two reverse-coded items related to laziness correlated with an r value of at least 0.50. The mean of the item-total correlations was 0.53. Cronbach's α for the 8 items excluding the laziness items was 0.77. The mean item-total correlation for this shorter version of the scale was 0.63.

In the third part of the questionnaire, participants filled out the same six ranking questions used in the first measure, but this time the questions featured the original figures (13) rather than the new figures. In keeping with previous research on this measure, drawings on this measure were matched to the sex of the participant: girls ranked figures of girls and boys ranked figures of boys. Finally, participants were asked to write down their ethnic background (phrased as an open question) and age.

Procedures

Letters outlining the nature of the study were distributed to 12 schools requesting participation of their 5th and 6th grade students for this study. Seven schools consented to participate, and teachers sent forms home with children in their classes to request parental consent to participate. Participation took place in school classrooms. Before participation, children signed assent forms. Before filling out the questionnaire, children were told that there were no right or wrong answers so they should answer the questions as honestly as possible. They were instructed not to share their answers with other children and to work on their own. They were asked not to put their names on their form so that their answers would remain confidential and were told that the investigators were the only people who would know their answers. They were also asked to remain quiet throughout the study, unless they had a question, in which case they were instructed to raise their hand and wait for an investigator to come and assist them. Finally, they were told that, if they felt uncomfortable filling out the questionnaire, they could inform the investigator and stop the activity. One female student discontinued participation mid-investigation, and all others completed participation. After completion of the questionnaires, all children were weighed on a digital scale and their height was measured. Weighing was conducted in a closed-off area to ensure the privacy of the participants. These procedures were approved by the Human Ethics Committee of the University of Canterbury.

Statistical Analyses

Rankings of the extent to which each child in the two sets of images was liked were coded with numbers ranging from 1 (most liked) to 6 (least liked). The correlations between the rankings of the new figures and those of the old figures were calculated using Spearman's ρ (a non-parametric version of the Pearson product-moment coefficient for use with ordinal data based on ranks). The correlations were computed separately for figures of boys and girls. In addition, the correlations between rankings of the new figures with responses to the same figure on the VAS question on liking were calculated using Spearman's ρ. Correlations between SAS scores and rankings of overweight figures were also computed. Additionally, multiple regression analysis was used to assess the relative contributions of judgments of laziness, control, and intelligence to VAS ratings of liking of overweight children, with all variables entered simultaneously. Finally, levels of stigmatization were compared across participants' ethnicity, age, BMI z-score, and sex. Because weight stigma consists of negative attitudes toward overweight people that influence interpersonal interactions (a form of weight bias or prejudice), and stigmatized individuals possess a characteristic that leads to a devalued social identity, results indicating lower liking of overweight children were interpreted as indicating greater stigma.

Table 1. Correlations (Spearman's ρ values) between old and new figures of boys and girls (children ranked same-sex figures)

	Boys (n = 90)	**Girls (n = 171)**
Non-overweight	0.48*	0.77*
Crutches	0.43*	0.59*
Wheelchair	0.53*	0.50*
Hand	0.57*	0.51*
Face	0.52*	0.42*
Overweight	0.72*	0.68*

* $p < 0.01$.

Results

Correspondence Between New and Old Figures

As shown in Table 1, the correlations between the rank of each new boy and girl figure with its corresponding original version were significant at the $p < 0.01$ level. All of these Spearman correlations were >0.4, indicating a moderate to large degree of correspondence between the new version of the figures and their original version (31). In particular, the correlation between the ranking of overweight figures was high for both males and females [ρ (77) = 0.72, $p < 0.001$ for boys; ρ (153) = 0.68, $p < 0.001$ for girls]. Wilcoxon signed ranks test comparing rankings of old and new figures indicated that the updated female and male overweight

Table 2. Correlations (Spearman's *rho* values) between new figures of boys and girls and corresponding visual analog ratings of liking of the same figures (children ranked figures of both sexes; $n = 261$)

	Boys	Girls
Non-overweight	−0.16*	−0.18†
Crutches	−0.08	−0.16*
Wheelchair	−0.29†	−0.33†
Hand	−0.18†	−0.15*
Face	−0.39†	−0.09
Overweight	−0.18†	−0.37†

* $p < 0.05$.
† $p < 0.01$.

figures were ranked higher than their corresponding original figures [girls: Z (153) = 4.82, $p < 0.001$, boys: Z (77) = 2.91, $p < 0.005$], which may suggest relatively more empathy for the new figures.

Correspondence Between New Figures and VAS Responses

The rankings of most of the new figures were significantly correlated with VAS-assessed liking of the same figure, as shown in Table 2. For the overweight figures, correlations between rankings and VAS liking were moderate [ρ (237) = −.18, $p < 0.005$ for boys; ρ (239) = −.37, $p < 0.001$ for girls]. However, rankings of two figures, the boy on crutches and the girl with a facial disfigurement, did not significantly correlate with VAS liking of these same figures.

The mean score on the 10-item SAS was 28.03 (11.64), range = 3.60 to 72.20; on the 8-item version, the mean was 23.51 (13.32), range = 0 to 73.75. Spearman correlations showed that responses on the 10-item SAS were significantly associated with rankings of both female and male overweight figures [ρ (240) = −0.22, $p < 0.001$ for girls; ρ (240) = −0.17, $p < 0.01$ for boys]. The 8-item version of the SAS was also significantly associated with rankings of female and male overweight figures [ρ (240) = −0.23, $p < 0.001$ for girls; ρ (240) = −0.16, $p < 0.01$ for boys]. Means, standard deviation, and indices of distribution of rankings of and VAS responses to overweight figures are shown in Table 3.

Regression Analyses

To examine the relative contributions of stereotypes about intelligence, laziness, and control to the stigmatization of obesity, multiple regression analyses examined these VAS ratings as predictors of the VAS rating of how much participants liked the overweight child. Separate regression analyses for boys and girls accounted for 21% of the variance for boys [F (3,240) = 21.26, $p < 0.001$] and 23% for

Table 3. Means, standard deviations, and measures of distribution (skewness, kurtosis) for rankings of the original and updated figures and VAS ratings of updated figures of overweight children

	Mean	SD	Skewness	Kurtosis
Girls rank-original	4.93	1.31	−1.01	−0.10
Girls rank-updated	5.14	1.23	−1.33	0.73
Boys rank-original	5.11	1.17	−1.20	0.46
Boys rank-updated	5.11	1.17	−1.13	0.24
Girls VAS liking	21.35	21.37	0.94	0.05
Girls VAS control	32.19	27.72	0.39	−1.32
Girls VAS be like	8.41	12.64	2.37	6.74
Girls VAS smart	32.40	20.68	0.06	−0.74
Girls VAS lazy	52.34	29.83	−0.70	−1.10
Boys VAS liking	18.59	19.79	1.14	0.58
Boys VAS control	34.30	29.34	0.28	−1.47
Boys VAS be like	8.08	12.94	2.61	8.17
Boys VAS smart	31.27	20.27	0.06	−0.73
Boys VAS lazy	55.36	30.11	−0.81	−0.97

VAS, visual analog scale; SD, standard deviation. Rankings of original figures of boys and girls were performed by only same-sex participants; other responses were made across the entire sample.

girls [F (3,240) = 23.46, $p < 0.001$]. Judgments about intelligence, but not laziness or control, significantly predicted liking for overweight boys and girls. Laziness perceptions had marginally significant β values among boys, and control perceptions had marginally significant β values among girls (Boys: $\beta_{\text{intelligence}} = 0.44$, $p < 0.001$; $\beta_{\text{laziness}} = -0.10$, $p = 0.08$; $\beta_{\text{control}} = 0.05$, $p = 0.40$; Girls: $\beta_{\text{intelligence}} = 0.44$, $p < 0.001$; $\beta_{\text{laziness}} = -0.08$, $p = 0.15$; $\beta_{\text{control}} = 0.12$, $p = 0.05$). Collinearity diagnostics were computed to examine whether the lack of significance for certain predictors may have been due to problems with multicollinearity. Condition indices (square roots of the ratios of the largest eigenvalue to each successive eigenvalue) >15 can indicate a possible problem with collinearity, and indices over 30 suggest a serious problem (SPSS, Inc., Chicago, IL). In the present analyses, condition indices were all <6.

Ethnicity, Age, BMI, and Sex Differences

ANOVA was used to compare rankings of overweight figures and VAS total scores (the 8-item SAS was used because of its superior internal consistency) among participants of different ethnic groups. No differences were found among groups for rankings of overweight children. One-way ANOVA did show a difference, however, on the SAS [F (4243) = 3.91, $p < 0.005$]. A post hoc Tukey's honestly significant difference test identified the difference as the greater liking of overweight children among whites than among Asian participants (mean = 24.78 and 15.91; $p < 0.005$). There were no significant correlations between age and rankings of overweight children or SAS ratings, or between BMI z-scores and rankings of overweight children or SAS ratings. However, sex differences did emerge in rankings of overweight children. Girls were more negative than boys in their rankings of overweight male figures, as shown by Mann-Whitney U tests [Z (240) = 3.60, $p < 0.001$]; boys were more negative than girls in their rankings of overweight female figures [Z (242) = 3.57, $p < 0.001$]. SAS scores did not differ between girls and boys.

Discussion

The present study demonstrated that a revised and updated measure of obesity stigmatization has important areas of convergence with an older-fashioned but widely used measure of obesity stigma. The correspondence between the old and new versions in the rankings of overweight and other figures demonstrates the construct validity of the new measure. The high correlation between responses to overweight children across the old and new measures, even higher than correlations between old and new figures representing other targets of stigma, was especially striking. This result underlines the pervasiveness and stability of weight stigma across different measures of assessment. It also suggests that the new measure performs as well as or better than the original one. The construct validity of the updated measure was further supported by its significant association with different methods of measuring obesity stigma, including a visual analog assessment of liking, as well as a multi-dimensional and internally consistent visual analog questionnaire assessing attitudes toward overweight children.

Indeed, together with the measure asking respondents to rank their liking of overweight targets relative to non-overweight and disabled targets, the VAS measure of obesity stereotypes (the 8-item or 10-item SAS) may be a useful counterpart and even stand-alone assessment measure of weight stigma. The former may be more useful in assessing relative stigma, while the latter may be better for measuring different facets of weight stigma. Future data on the test-retest reliability of these measures, and their validity and generalization across populations, are especially needed. Ongoing research is also needed to assess whether the internal consistency of the 10-item version could be improved by phrasing all questions so that participants' answers fall in the same direction. It is possible that the relatively lower correlation between the item on laziness and the rest of the measure was due to a failure of some participants to realize that this question required a response in the opposite direction to the previous questions. An additional limitation of the present study was that the new measure was validated against an original measure used in numerous studies (7,11–14); however, this original measure itself may have had limitations in its validity. The examination of the correspondence between the rank-ordering task and the VAS measurement of obesity stigma provided an alternative test of the construct validity of the updated rank-ordering scale. Finally, VAS liking and rankings were not significantly correlated for 2 of the new figures, possibly due to lack of power.

The updated figures developed in the present study have several advantages, including greater realism, variation in only key features, and modernized appearance. The availability of these figures as three-dimensional models also allows them to be morphed into different ages, racial groups, or body shapes, or focused on other physical characteristics for future research. For example, research is needed to evaluate perceptions of overweight children of diverse cultural backgrounds, and the Poser software used here can create new figures representing different ethnic groups.

The hypothesis that obesity stigma among children is driven specifically by a stereotype about lack of intelligence was supported by the present study. On the other hand, although perceptions of laziness and control were correlated with liking, each was only marginally significant as a predictor of liking of overweight boys and girls (respectively). Further research using qualitative and non-forced choice measures is needed to understand the nature of obesity

stigma. For example, a free-response study by Hiller (31) had participants tell stories about drawings of obese or average-weight women. Stories about the obese drawing were gloomier and more unpleasant in tone. Parents asked to tell their preschool child stories about an overweight, average-weight, or handicapped child included more negative descriptions and disapproving peer reactions when discussing the overweight child (20). Similarly, participants asked to describe a day in the life of depicted obese or average-weight women represented obese women as less socially active and less attractive (unpublished data, G. McLeod, J. D. Latner, A. R. Gray).

Previous studies have also shown sex differences in obesity stigma. Girls have shown greater weight stigma toward same-sex peers than boys have (7,13,14). In the current study, both boys and girls were more negative in their attitudes toward overweight children of the opposite sex. This finding may reflect a general preference for same-sex peers at this age. It would be interesting to track this pattern over the course of development. Overweight adult women continue to be intensely stigmatized and rejected as romantic partners by men (22). Similar to previous research suggesting internalized stigma among overweight individuals (32,33), the present study found no reduction in stigma among participants with higher BMI *z*-scores. However, in contrast to limited previous research suggesting lower weight stigma among adult Asian-American participants (23), the present study showed a greater disliking of overweight peers by Asian children. However, sample sizes for the ethnic group comparisons were small. Further research is needed to examine stigma of target stimuli across different cultural backgrounds, and technology used in the present study could be used to develop such stimuli.

The present study examined the construct validity of a new technique for assessing obesity stigmatization in children. Given the absence of a standard, widely used measure in this field, two scales presented in this study may prove useful in future investigations. The first measures rankings of liking of overweight children relative to children with other physical characteristics, based on previous studies using this paradigm. The second measure, the 8-item or 10-item SAS, may be used when a measure of stigma generating interval data (rather than ordinal data) is needed. The standardization and validation of measures assessing obesity stigma in children may facilitate comparisons across different cultures and generations of previous research and could, thus, help to advance this rapidly growing field.

Acknowledgments

The authors thank Amy Chisholm for her assistance with data collection and preparation and Lorie Brinkman for her comments on this manuscript. There was no funding/outside support for this study.

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