Available online at www.sciencedirect.com
ScienceDirect
Appetite 51 (2008) 214–217
Appetite
www.elsevier.com/locate/appet

Short communication

Mirror exposure reduces body dissatisfaction and anxiety in obese adolescents: A pilot study

Anita Jansen [a,*], Dafne Bollen [b], Brunna Tuschen-Caffier [c], Anne Roefs [a], Ann Tanghe [d], Caroline Braet [d,e]

[a] Department of Clinical Psychological Science, Maastricht University, P.O. Box 616, 6200 MD, Maastricht, The Netherlands
[b] Kliniek Broeders Alexianen, Liefdesstraat 10, 3300 Tienen, Belgium
[c] Department for Clinical Psychology and Psychotherapy, University of Freiburg, Engelbergerstraße 41, 79106 Freiburg, Germany
[d] Zeepreventorium VZW, Koninklijke Baan 5, 8420 De Haan, Belgium
[e] Department of Developmental Personality and Social Psychology, Ghent University, H. Dunantlaan 2, 9000 Gent, Belgium

Received 11 December 2007; received in revised form 29 December 2007; accepted 25 January 2008

Abstract

Many obese adolescents show intense body shape and weight concerns that render them vulnerable to cognitive biases, psychological distress and eating disorders. Current treatments, however, generally do not address negative body image in obese adolescents. The present pilot study tested if body exposure and describing one's body in a neutral way is an effective approach for increasing body satisfaction in obese adolescents. The exposure was shown to be a powerful strategy to decrease anxiety and to increase body satisfaction. Also body weight at post-treatment was a significant predictor of positive feelings. These results indicate that adding body exposure and neutral description of one's body to a weight reduction programme might be an effective way to increase body satisfaction in obese adolescents.

Keywords: Body image; Mirror exposure; Obesity

Introduction

Behaviour therapy is currently the treatment of choice for childhood obesity. It mainly focuses on teaching children, and sometimes also their parents, how to eat healthily and how to increase physical activity levels. These behavioural treatments have been shown to be effective in the short term (Wilson, 1994), but a general finding is that most children are still extremely concerned about their weight and shape after treatment (Braet, Tanghe, Decaluwe, Moens, & Rosseel, 2004).

It is not always acknowledged that obese children show intense body shape and weight concerns. This increased body dissatisfaction might follow from negative experiences: obese children are susceptible to weight-related teasing and this teasing was found to be a powerful predictor of body dissatisfaction (Wardle, Waller, & Fox, 2002). Studies show that levels of body dissatisfaction in obese adults are higher in people who became obese at an early age (Grilo, Wilfley, Brownell, & Rodin, 1994). These findings, and the fact that severe body dissatisfaction is a risk factor for eating disorders (Wardle et al., 2002) and cognitive biases (Jansen et al., 2007), point to the importance of reducing body dissatisfaction in obese adolescents. Current treatments, however, do not pay much attention to negative body image in obese adolescents and might, therefore, be less effective than they could otherwise be.

Inclusion of strategies that reduce body dissatisfaction and increase body esteem could improve treatment effects. Recently, Tuschen-Caffier and co-workers developed an exposure technique to reduce body dissatisfaction in overweight adults (Hilbert, Tuschen-Caffier, & Vögele, 2002). During exposure, participants were encouraged to describe their physical appearance in a detailed neutral way using a mirror or video technique. By describing one's body as precisely and as neutrally as possible, negative evaluations such as "I am a fat nobody" were de-emphasized. It was found that this prolonged body exposure and neutral describing (body EXP + ND) decreased negative feelings associated with the body (e.g., disgust and anxiety) in overweight/obese adults (Hilbert et al., 2002). The aim of the present pilot study was to experimentally investigate whether mirror exposure and

* Corresponding author.
E-mail address: a.jansen@psychology.unimaas.nl (A. Jansen).

0195-6663/$ – see front matter © 2008 Elsevier Ltd. All rights reserved.
doi:10.1016/j.appet.2008.01.011

training in the 'neutral describing' technique would also be effective in reducing negative body-related feelings in obese adolescents. It was hypothesized that body EXP + ND would be a powerful strategy to reduce anxiety and to increase positive feelings. The experimental body EXP + ND group was compared to a control group that participated in the same weight loss program but did not receive the body EXP + ND intervention.

Method

Participants

Sixteen obese adolescents (8 boys, 8 girls) participated in the study. Their mean age was 15.4 years (S.D. = 1.4, range 13–17). They took part in a 1-year multidisciplinary residential treatment for obesity, focusing on diet management, physical activity, medical care, psychological counseling and social support (Braet et al., 2004). Dutch-speaking adolescents that recently started treatment were invited to take part in the study. Both the children and their parents gave informed consent, and the exposure started 6–10 weeks after admission ($M = 9.3$, S.D. = 1.6). The Ethical Committee of the Psychology Faculty of Maastricht University approved the study.

At admission, mean Body Mass Index (BMI = weight (kg)/height $(m)^2$) of participants was 35.6 (S.D. = 4.1, range 28.9–46.1). All participants had a BMI above P_{95} according to BMI-for-age percentiles (National Center for Health Statistics, 2000). At the actual start of the experiment, mean BMI was 31.6 (S.D. = 4.2, range 25.8–41.2) and inspection of the BMI of each individual showed that all but two participants were still obese and above P_{95} according to age-referenced BMI tables. The BMI-for-age percentile of the two overweight participants (one in the experimental and one in the control group) was above P_{90}.

Stratified for gender, participants were randomly assigned to the experimental (E) or control (C) group. The groups did not differ in age (E: $M = 15.5$ yrs, S.D. = 1.4, C: $M = 15.3$ yrs, S.D. = 1.4, $t < 1$), BMI (E: $M = 32.3$, S.D. = 4.9, C: $M = 30.9$, S.D. = 3.7, $t < 1$), gender division (4♀ and 4♂ in E, 4♀ and 4♂ in C) or the gap between admission to the clinic and the start of the exposure sessions (E: $M = 9.5$ weeks, S.D. = 1.4, C: $M = 9.0$ weeks, S.D. = 1.9, $t < 1$). There were no group differences in depression (see assessment) during pre measurement (E: $M = 14.4$, S.D. = 5.8, C: $M = 14.4$, S.D. = 5.2, $t < 1$).

Assessment

Anxiety

A line was used to measure state anxiety. At the left side of the scale a sad face was depicted to illustrate the presence of anxiety, at the right side a happy face was depicted to illustrate the lack of anxiety. The participant put a mark on the line between the faces and the position of the mark was measured. A scoring of zero was given for the happy face and a score of 100 for the sad face; higher scores signified more anxiety.

Feelings

Five lines were used to measure current feelings of ugliness, pride, general satisfaction, beauty, and how the participant felt in general. All scales used a sad face at the left side of the scale to illustrate feeling bad about the characteristic, and a happy face at the right side to illustrate feeling good about the characteristic. The participant put a mark on the line between the faces and the position of the mark was measured. A score of zero was given for the sad face and a score of 100 for the happy face. Because of highly significant correlations between the five ratings, their mean was taken as a general measure of feelings (0 = negative feelings, 100 = positive feelings).

Children's Depression Inventory (CDI; Timbremont & Braet, 2002)

The CDI is a questionnaire assessing depression in children and adolescents. It contains 27 items; a score of 13 or more is an indication of depression.

Procedure

Before the exposure sessions started, all participants (in both conditions) completed the ratings after they were instructed about how to fill them in. They also completed the CDI, and had their height and weight measured.

Then, the experimental group received 6 exposure sessions of 50 min each over 3 weeks, 2 sessions per week. The control group received no exposure sessions. During the exposure sessions, the participant was dressed in a swimming suit and (s)he described his or her entire body. The second author, who was trained in the exposure procedure by the third author, led all the exposures and used a standardized interview that guided the self-descriptions. The participant learned to describe all body parts in a neutral way. Before and after each exposure session, all ratings were completed (only in the experimental group).

After the exposure sessions were finished, all participants (in both conditions) again completed the ratings and their height and weight were measured again.

Analysis

In order to test the predictions, changes from pre- to post-measurement in anxiety and positive feelings were analysed using 2 (Group: Exposure vs. Control) × 2 (Time: Pre vs. Post) ANOVAs. Further backward regression analyses were used to test whether the experimental manipulation was a unique significant predictor of the feelings during post-measurement. Changes in BMI were controlled for. Finally, changes in feelings of beauty and ugliness during the exposure, as an index of body image changes, were further analysed by means of paired t-tests within each group.

Results

Before testing the hypotheses, BMI change over the three weeks of exposure was analysed. The ANOVA showed no main effect for Group, $F < 1$, but a highly significant main effect for

Time, F (1,14) = 190.4, $p < 0.0001$, and a significant Group - × Time interaction, F (1,14) = 6.9, $p = 0.019$. The BMI of both groups dropped significantly, $t(7)$s > 7, ps < 0.001, but the control group lost significantly more weight than did the experimental group, $t(14) = 2.6$, $p = 0.019$; the BMI of the experimental group reduced from 32.3 (S.D. = 4.9) to 31.2 (S.D. = 5.1) and the BMI of the control group dropped from 30.9 (S.D. = 3.7) to 29.2 (S.D. = 3.6).

Anxiety

It was hypothesized that body EXP + ND would be a powerful strategy to reduce anxiety. The ANOVA showed no main effects for Group, $F < 1$, or Time, $F < 1$, but a marginally significant Group × Time interaction emerged, F (1,14) = 4.3, $p = 0.058$, see Fig. 1. Post hoc t-tests showed that both groups did not differ in anxiety at pre-measurement (Exposure: $M = 51.5$, S.D. = 42.9, Control: $M = 37.3$, S.D. = 19.6, $t < 1$), whereas the exposure group was somewhat less anxious at post-measurement than was the control group (Exposure: $M = 28.4$, S.D. = 25.7, Control: $M = 54.1$, S.D. = 27.7, $t(14) = 1.93$, $p = 0.075$).

In a backward regression analysis it was further tested whether the experimental manipulation was a unique significant predictor of less anxiety during post-measurement. Anxiety during post-measurement was the outcome variable, and condition (experimental or control), anxiety at pre-measurement, BMI at post-measurement (BMI post), BMI change during treatment, and depression (CDI score) were entered as the predictor variables. The criterion to remove a variable was 10% (significance level ≥.10).

Condition, BMI post and BMI change were the only variables that remained in the model; anxiety at pre-measurement ($p = 0.2$) and depression ($p = 0.93$) were both removed. In the final model, both BMI post, $\beta = 0.48$, $t = 2.9$, $p = 0.014$, BMI change, $\beta = 0.52$, $t = 2.6$, $p = 0.023$, and condition, $\beta = 0.87$, $t = 4.6$, $p = 0.001$, were significant predictors of anxiety during post-measurement, $R^2 = 0.71$, F (3,12) = 9.9, $p = 0.001$: a lower BMI during post-measurement, more weight loss during treatment, and participation in the exposure condition predicted less anxiety during post-measurement.

Positive feelings

It was hypothesized that body EXP + ND would be a powerful strategy to increase positive feelings. The 2 × 2 ANOVA showed a marginally significant effect of Time, F (1,14) = 4.2, $p = 0.06$, but no interaction effect, $F < 1$, and no main effect for Group, $F < 1$. In both groups, feelings became more positive, Exposure: from 58.3 (S.D. = 6.1) to 69.9 (S.D. = 5.4), Control: from 55.0 (S.D. = 6.1) to 62.8 (S.D. = 5.5).

In a backward regression analysis it was then tested which factor(s) explained the feelings at post-measurement. Rated feelings during post-measurement was the outcome variable, and condition, feelings at pre-measurement, BMI at post-measurement, BMI change during treatment, and depression (CDI score) were entered as the predictor variables. The criterion to remove a variable was 10% (significance level ≥.10).

Condition and BMI post were the only variables that remained in the model; hence, feelings at pre-measurement, $p = 0.68$, BMI change, $p = 0.99$, and CDI score, $p = 0.45$, all were removed. In the final model, both BMI post, $\beta = 0.74$, $t = 3.9$, $p = 0.002$ and condition, $\beta = 0.41$, $t = 2.2$, $p = 0.046$ were significant predictors of feelings during post-measurement, $R^2 = 0.57$, F (2,13) = 8.6, $p = 0.004$: a lower BMI during post-measurement and participation in the exposure condition predicted more positive feelings at post-measurement.

For the experimental group, changes in feelings of beauty and ugliness during the exposure, as an index of body image changes, were further analysed. Ratings on the ugly scale were reversed (0 = not ugly at all, 100 = extremely ugly). Fig. 2 shows gradually increasing feelings in beauty, and corresponding decreases in feelings of ugliness over the course of the exposure sessions. Paired t-tests confirmed that, between the start of the first and the end of the last exposure session, there was a significant increase in perceived beauty, $t(7) = 4.3$,

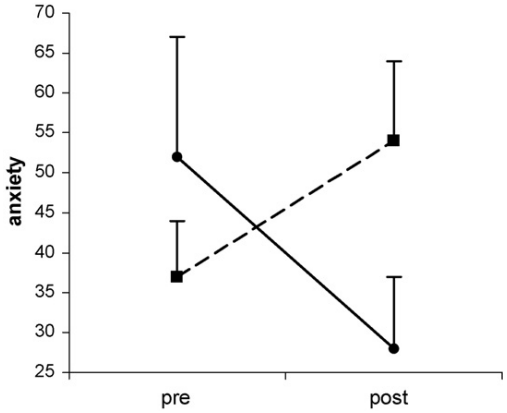

Fig. 1. Means (S.E.M.) for anxiety in the exposure (circle) and control (square) group, pre- and post-treatment (0 = not anxious, 100 = very anxious).

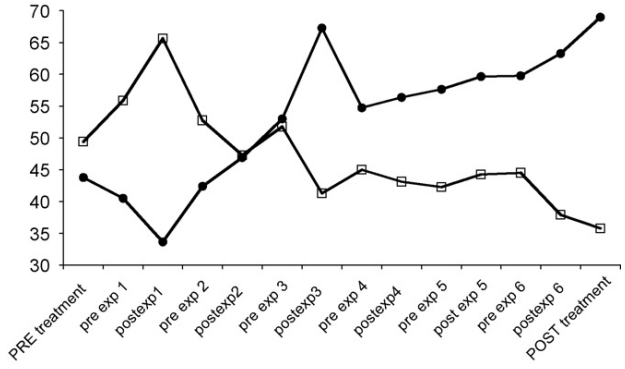

Fig. 2. Perceived beauty (circle; 0 = not beautiful at all, 100 = extremely beautiful) and perceived ugliness (square; 0 = not ugly at all, 100 = extremely ugly) for the experimental group pre- and post-treatment, and before (pre) and after (post) each exposure session.

$p = 0.003$, and a marginally significant decrease in perceived ugliness, $t(7) = 2.1$, $p = 0.075$.

Discussion

These data indicate that body EXP + ND is a promising strategy to increase body satisfaction and to decrease anxiety in obese adolescents. Whereas the control group showed an increase in anxiety during the inpatient treatment, the exposure group showed a decrease. Exposure was not the only significant predictor of decreased anxiety; actual BMI at the time of measurement and the amount of weight lost were also significant predictors of decreased anxiety. The amount of weight lost was not important for the increase in positive feelings, but BMI at post-measurement and condition were. The data indicate that adding body EXP + ND to a weight reduction program might be an effective way to increase body satisfaction in obese adolescents.

A fascinating question is why the body EXP + ND led to more positive feelings and increased body satisfaction. Speaking behaviourally, it might be argued that the body is a conditioned stimulus (comparable to a phobic stimulus) and negative thinking is the unconditioned stimulus, leading to negative feelings, such as anxiety and disgust, and eventually avoidance of the body. During the body EXP + ND, the participant is exposed to the body without negative thinking, leading to the extinction of negative feelings. This model assumes that cognitive restructuring during body exposure is required for a change in body image. To test whether cognitive restructuring is indeed crucial for producing changes in body image, it is necessary to compare the effectiveness of exposure without neutral describing with the present EXP + ND in future studies.

Body-related negative feelings might be related to depression. It is well known that many overweight/obese people suffer from mild to moderate and sometimes even severe depression (Jansen, Havermans, Nederkoorn, & Roefs, submitted for publication; Werrij, Mulkens, Hospers, & Jansen, 2006). The present sample showed clinically significant depression scores but, interestingly, depression did not hinder the positive changes in body satisfaction and anxiety in this study, meaning that this exposure intervention might well be suitable and effective in the depressed obese.

The present study was a pilot study using a very small sample and lacking follow-ups. In spite of these limitations, the data are promising and they might tempt one to replicate this study with a larger sample, including more specific process- and follow-up measurements and adequate control groups to test the theoretical assumptions and the long-term effects of this promising strategy.

Acknowledgments

Thanks are expressed to Evi Stremersch for her support during data collection and to Jen Coelho for her comments on an earlier draft of this article.

References

Braet, C., Tanghe, A., Decaluwe, V., Moens, E., & Rosseel, Y. (2004). Inpatient treatment for children with obesity: Weight loss, psychosocial well-being, and eating behavior. *Journal of Pediatric Psychology, 29*, 519–529.

Grilo, C. M., Wilfley, D. E., Brownell, K. D., & Rodin, J. (1994). Teasing, body image and self-esteem in a clinical sample of obese women. *Addictive Behaviors, 19*, 443–450.

Hilbert, A., Tuschen-Caffier, B., & Vögele, C. (2002). Effects of prolonged and repeated body image exposure in binge-eating disorder. *Journal of Psychosomatic Research, 52*, 137–144.

Jansen, A., Smeets, T., Boon, B., Nederkoorn, C., Roefs, A., & Mulkens, S. (2007). Vulnerability to interpretation bias in overweight children. *Psychology & Health, 22*, 561–574.

Jansen, A., Havermans, R., Nederkoorn, Ch., & Roefs, A. (submitted for publication). Jolly fat or sad fat? Subtyping non-clinical obesity along an affect dimension. *Appetite*.

National Center for Health Statistics (2000). Growthcharts. http://www.cdc.gov/growthcharts.

Timbremont, B., Braet, C. (2002). Children's Depression Inventory. Translation of Kovacs, M. (1992) Children's Depression Inventory. Lisse, Swets & Zeitlinger.

Wardle, J., Waller, J., & Fox, E. (2002). Age of onset and body dissatisfaction in obesity. *Addictive Behaviors, 27*, 561–573.

Werrij, M. Q., Mulkens, S., Hospers, H., & Jansen, A. (2006). Overweight and obesity; the significance of a depressed mood. *Patient Education and Counseling, 62*, 126–131.

Wilson, G. T. (1994). Behavioral treatment of childhood obesity: theoretical and practical implications. *Health Psychology, 13*, 371–372.