

Obesity, Shame, and Depression in School-Aged Children: A Population-Based Study

Rickard L. Sjöberg, MD, PhD; Kent W. Nilsson, BA; and Jerzy Leppert, MD, PhD

ABSTRACT. *Objectives.* To investigate whether there is an association between adolescent obesity and depression in a nonclinical population and whether psychosocial and economic status and subjective experiences of shame (defined as experiences of being degraded or ridiculed by others) may account for such an association.

Method. We examined associations between self-reported body mass index (BMI) and depression, controlling for gender, shame, parental employment, parental separation, and economy. The study was performed on a sample of 4703 adolescents (71% of the target population of 15- and 17-year-old students in 1 Swedish County) who answered the Survey of Adolescent Life in Vestmanland 2004.

Results. Obesity was significantly related to depression and depressive symptoms among 15- and 17-year-olds. Obesity was also significantly related to experiences of shame. All significant association between BMI grouping and depression according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* disappeared when shaming experiences, parental employment, and parental separation were controlled for. Adolescents who reported many experiences of shame had an increased risk (odds ratio: 11.3; confidence interval: 8.3–14.9) for being depressed.

Conclusions. There is a significant statistical association between adolescent obesity and depression. Effects of experiences of shame, parental separation, and parental employment explain this association. These results suggest that clinical treatment of obesity may sometimes not just be a matter of diet and exercise but also of dealing with issues of shame and social isolation. *Pediatrics* 2005;116:e389–e392. URL: www.pediatrics.org/cgi/doi/10.1542/peds.2005-0170; *depression, obesity, adolescent depression, population-based studies, psychological impact.*

ABBREVIATIONS. SALVe, Survey of Adolescent Life in Vestmanland; DSRS, Depression Self-Rating Scales; DSM-IV, *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.*

Children associate obesity with a number of undesirable traits^{1,2} and prefer to associate themselves with nonobese peers.^{3,4} Overweight children are more likely to be victims or

perpetrators of bullying behavior than other children are,⁵ and there are observations to suggest that obesity may influence college-admission rates negatively.⁶

Such findings indicate that child and adolescent obesity may frequently elicit behaviors of degradation and ridicule in social interactions. Such mechanisms may normally serve the purpose of social control by regulating behavior.⁷ Encounters with such behaviors may be described as experiences of shame and may be hypothesized to lead to depressive symptoms if the individual who is subject to them is unable to avoid them by a change in behavior.

Another factor that might further increase the risk for obese children to develop depressive symptoms is the fact that psychosocial and economic status correlate negatively with both obesity and depression.⁸

Studies of clinical samples of children who seek treatment for problems related to obesity seem to support the idea of an association between depression and obesity.^{9,10} However, population-based studies of the relation between body mass index (BMI), obesity, and depressive symptoms among children and adolescents have been inconclusive.^{9,11,12}

The Survey of Adolescent Life in Vestmanland (SALVe) is a population-based survey that has been distributed triannually since 1997–1998 to students in the county of Västmanland, Sweden, to monitor the psychosocial health of the adolescent population of the county. Some of the aspects covered by the SALVe-2004 was self-reported BMI, parental employment, parental separation, depressive symptoms, and experiences of shame (defined as self-reported experiences of being humiliated and/or degraded by others).

The purpose of the present study was to use the SALVe-2004 to answer the question of whether BMI, obesity, and depression are associated in an adolescent population-based sample and whether experiences of shame and psychosocial and economic status can explain such a possible association.

METHODS

Study Population

The results are based on records from the SALVe-2004, which is a survey that is regularly distributed by the County Council of Vestmanland to monitor the psychosocial health of the adolescent population of the county. During the spring of 2004, 3505 individuals in Vestmanland attended the mandatory ninth grade (15-year-olds) of the primary school (grundskolan), and 3073 individ-

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uals attended the second grade (17-year-olds) of college (gymnasium). These 6578 individuals comprised the target population. To be included in the study, individuals had to answer the questionnaire and give a reasonable estimation of their length and weight. (Individuals reporting measures of height and weight yielding a BMI outside the interval of 12–42.9 were not included in the study.) In the group of 15-year-olds, 2679 individuals (1357 boys and 1322 girls) fulfilled these criteria. In the group of 17-year-olds, 2024 individuals (1033 boys and 991 girls) fulfilled these criteria. These 4703 individuals comprised 71% of the target population.

For the SALVe-2004, no analysis of missing cases was performed. However, such an analysis is available for a similar survey performed in 2001 (SALVe-2001). This analysis followed up a subsample of 365 nonresponders. The results showed that nonresponders had significantly ($P = .002$) higher BMIs (22.1 kg/m^2) than those responding to the survey (mean: 21.5 kg/m^2). (Depression scores and questions regarding shame were not asked in the SALVe 2001.)

Estimations of BMI and BMI Groupings

Height and body mass were based on self-report. The BMI was calculated as body mass divided by height squared (kg/m^2). Results from a previous, similar study from the same county suggests that self-reported BMI is relatively reliable (correlation of 0.88–0.98 with objective measures) among similar age groups.¹³

The international age- and gender-specific BMI cutoff points for children developed by the Childhood Obesity Working Group of the International Obesity Task Force¹⁴ were used to define subjects as normal weight, overweight (preobese), or obese. These cutoff points were derived from the data of a number of large international cross-sectional growth-study surveys. Cutoff points were determined through centile curves that at 18 years were drawn through the widely accepted cutoff points, 25 and 30 kg/m^2 , for adult overweight and obesity, respectively.

Depressive Symptoms and Depression

We used a self-rating scale (Depression Self-Rating Scales [DSRS]¹⁵) of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (A-criterion) for major depression, with a reported sensitivity of 96.1% and specificity of 59.4% for major depression. The depressive-symptom index ($N = 5066$; mean: 2.91; SD: 2.50) was calculated as a summation of symptoms reported on the scale. Each symptom was counted only once. (Thus, for instance, on the third criterion of significant weight reduction or addition, the participants could only score once even if they have had experienced both weight loss and weight gain in the previous 2 weeks.)

If ≥ 5 symptoms were present and at least 1 of the 2 general criteria was fulfilled, the individual was classified as “depressed.”

Shame and Psychosocial and Economic Status

In this study the shame index was built through a summation index of the following questions: Have you during the latest period of 3 months experienced that someone

1. treated you in a degrading manner?
2. made fun of you in front of others?
3. questioned your sense of honor?
4. talked about you in a degrading manner?
5. ignored you or behaved as if you did not exist?

Answers were given on a 5-point scale: 1, no never; 2, rather seldom; 3, sometimes; 4, rather often; and 5, almost always. These 5 items had a Chronbach’s α value of .845. In a factor analysis, principal component analysis, method varimax, the 5 items had an eigenvalue of 3.192, explaining 63.85% of the variance in 1 component with factor scores from .704 to .830. The principal component analysis index and the summation index were highly correlated ($r = 0.999$; $P < .00001$). Because of this, only the summation index was used in additional analyses.

Those 25% who reported the lowest number of shame experiences were categorized as the low-shame group. Those who reported such experiences between 26% and 75% of the time formed an intermediate group, and the remaining individuals were placed in the high-shame group.

A family-economy index ($N = 5066$; mean: 3.47; SD: 1.27) was

measured through questions of whether the family owned a computer; had Internet access; owned a house in the country for leisure activities; owned a boat big enough to sleep in; owned a caravan; or used to go for vacations in foreign countries and go alpine skiing on vacations. These questions could be answered with “yes” or “no.” Every “yes” answer was counted as 1 point in the socioeconomic summation index (range: 0–7). The survey also included questions regarding parental separation (whether the parents of the subjects were separated or living together) and parental employment (whether their parents worked or were unemployed). Adolescents who had at least 1 unemployed parent was coded as “unemployed parent.”

Statistical Analysis

We used χ^2 tests for association between BMI grouping and depression according to DSM-IV and analysis of variance and post hoc Scheffé’s test for BMI groupings and relations to the depression index (DSRS) and the shame index. To measure the relation of employed versus unemployed parents and parental separation in relation to BMI, we used independent sample t test. The relation between BMI, family-economy index, shame index, and depression index was calculated with Pearson’s r . Additionally, we used multiple regression to test our model of independent variables and their relation to the variation of the depression index. Finally, we used binary logistic regression to test our model in relation to depression according to DSM-IV.

RESULTS

There were significantly more boys who were overweight and obese in all age groups ($P < .001$), whereas more girls were depressed according to DSM-IV A-criterion ($P < .001$) (Table 1).

In the total sample, there were no significant differences in mean BMI between those with unemployed parents compared with those whose parents were employed ($P = .18$). Likewise, those who came from families in which the parents were separated had no differences in mean BMI compared with individuals who lived with both of their parents ($P = .228$). However, both these variables were related to depressive symptoms ($P < .001$). Family economy was also negatively correlated to depressive symptoms ($P < .001$) (data not shown in the tables).

When the BMI grouping was used in the total sample, we found that obese adolescents had more shaming experiences (mean: 10.26; SD: 5.04) than normal-weight (mean: 8.36; SD: 3.44) and overweight

TABLE 1. Distribution of BMI According to International Cutoff Points and Major Depression According to DSM-IV, A-Criterion, Divided by Age and Gender

Age	Boys	Girls	Total
15-year-olds, n (%)			
Normal weight	1081 (79.7)	1177 (89.0)	2490 (84.3)
Preobese	231 (17.0)	177 (8.9)	348 (13.0)
Obese	45 (3.3)	28 (2.1)	73 (2.7)
Total	1357	1322	2679
17-year-olds, n (%)			
Normal weight	797 (77.2)	872 (88.0)	1669 (82.5)
Preobese	199 (19.3)	98 (9.9)	297 (14.7)
Obese	37 (3.6)	21 (2.1)	58 (2.9)
Total	1033	991	2024
15-year-olds, n (%)			
Not depressed	1286 (88.7)	1043 (73.3)	2329 (81.1)
Depressed	164 (11.3)	379 (26.7)	543 (18.9)
Total	1450	1422	2872
17-year-olds, n (%)			
Not depressed	968 (88.2)	839 (77.8)	1807 (83.0)
Depressed	129 (11.8)	240 (22.2)	369 (17.0)
Total	1097	1079	2176

(mean: 8.44; SD: 3.68) adolescents ($P < .001$). Obese adolescents also had significantly more depressive symptoms (mean: 3.84; SD: 2.84) than overweight (mean: 2.82; SD: 2.42) and normal-weight (mean: 2.87; SD: 2.49) adolescents ($P < .001$).

Multiple-Regression Model of Predictors of Depressive Symptoms

In our multiple-regression model of depression we found that the relation between BMI and depression disappeared when controlling for parental employment, family situation, family economy, and shaming experiences (Table 2). We also found that female gender had a moderate relation to depressive symptoms. The socioeconomic variables of family constellation (separated parents) and parental employment (parental unemployment) significantly predicted major depression. However, the effect sizes were low. Family economy did not significantly contribute to the model. Shaming experiences accounted for 14% of the variation in depressive symptoms. The total model had an adjusted R^2 of 22.8%.

Binary Logistic Regression of Predictors of Depression

The result for BMI grouping and its association to depression analyzed in a logistic analysis shows that there was a significantly higher risk for obese adolescents to experience depression compared with normal-weight (reference category) and preobese adolescents (Table 3).

Almost the same pattern as in the multiple-regression model was found in the binary logistic model. The relation of BMI grouping to depression according to DSM-IV was nonsignificant when adjusted for socioeconomic variables and shaming experiences. From Table 4 we can observe that adolescents from separated families or unemployed parents have a higher risk for being depressed, and those adolescents from families with better socioeconomic circumstances have a significantly lower risk. However, those adolescents belonged to the high-shame group had an increased risk of >11 times (odds ratio) for being depressed, compared with those from the low-shame group, when all independent variables in the model were adjusted for. The model explained 21% of the self-reported major depressions (Nagelkerke R^2) in the study population.

TABLE 2. A Multiple-Regression Analysis of Psychosocial and Economic Variables, Shame, and BMI in Relation to Depressive Symptoms

Adjusted R^2 22.8%	Standardized Coefficients		
	β	t	P
(Constant)		-12.279	<.001
Gender (female)	.204	15.611	<.001
Separated families	.094	7.174	<.001
Parental unemployment	.073	5.536	<.001
Family-economy index	—	—	NS
Shame index	.383	29.757	<.001
BMI	—	—	NS

Dependent variable: depression-symptom index according to DSRS/DSM-IV. NS indicates not significant.

TABLE 3. The Binary Logistic Analysis of the Relation Between BMI Groupings and Major Depression According to DSM-IV, A-Criterion

Nagelkerke R^2 0.02%	% Depressed	Odds Ratio (Confidence Interval)	df	P
Normal weight	17.5	—	2	.036
Preobese	16.9	0.958 (0.767–1.196)	1	.704
Obese	26.7	1.668 (1.119–2.488)	1	.012
(Constant)		.212	1	<.001

Dependent variable: major depressions according to DSRS/DSM-IV.

TABLE 4. Binary Logistic Model of the Relation Between BMI Groupings, Psychosocial and Economic Variables, and Shame in Relation to Major Depression According to DSM-IV, A-Criterion

Nagelkerke R^2 21%	Odds Ratio (Confidence Interval)	df	P
Gender	2.393 (2.017–2.840)	1	<.001
Separated families	1.370 (1.193–1.574)	1	<.001
Unemployed parent	1.351 (1.130–1.616)	1	.001
Family economy	0.905 (0.846–0.968)	1	.004
Reference: low-shame group		2	<.001
Intermediate-shame group	2.770 (2.075–3.699)	1	<.001
High-shame group	11.340 (8.292–14.926)	1	<.001
BMI	—	1	NS
(Constant)	0.009	1	<.001

Dependent variable: major depressions according to DSRS/DSM-IV. NS indicates not significant.

DISCUSSION

In this study we investigated the relation between obesity, depression, shame, and psychosocial and economic status in a population-based sample of 4703 Swedish adolescents. The results show that BMI was associated with depressive symptoms. Moreover, those adolescents who belonged to the group with the highest BMI (obese group) significantly more often suffered from major depression according to the DSM-IV A-criterion, which were used in this study. Obesity was also associated with experiences of shame (such as experiences of being degraded or ridiculed by others). It is interesting to note that associations between BMI and depressive symptoms as well as associations between obesity and major depression according to DSM-IV A-criterion disappeared when gender, parental separation, parental employment, and shame were entered with BMI into multivariate models.

One possible explanation for these interesting but hardly surprising results is the fact that obese adolescents are at increased risk of being treated in a ridiculing and degrading way by their peers.⁵

The data presented in this study are correlational, which means that conclusions regarding directions of cause and effect must be considered tentative. Another limitation of the study is that it is entirely based on self-reports, which means that we have not controlled for possible response biases (eg, the possibility that depressed individuals may systematically answer questions in a more negative way than those who are not depressed). However, we believe that it is highly unlikely that such biases account for all of the patterns described here. The fact that we used a very sensitive measure of depression may

have made trends easier to discover in the material but, on the other hand, may have led to an overestimation of the prevalence of major depression in the studied population.

As far as shame is concerned, it should be noted that the questions used in this study have not been used previously. Questions such as "Have you during the latest period of 3 months experienced that someone treated you in a degrading manner?" obviously have high face validity as indicators of subjective experience of having been treated in a degrading way by others. Additionally, the psychometric properties of this set of questions were solid in the present study. Additional studies of shame and shaming experiences remain to be described in the future.

As noted in the introduction, previous studies of associations between adolescent obesity and depression have been inconclusive. Erickson et al,¹¹ in a study of 868 children, found a modest but significant relation between BMI and depression, which was moderated by weight concerns but not controlling for psychosocial variables. However, Britz et al⁹, studying 1655 adolescents, did not find any clear associations. Onyike et al,¹² who used a sample of 8410 individuals who were between 15 and 39 years old, found a significant association between obesity and depression even after results were controlled for age but did not analyze adolescents separately. Finally, a number of population-based studies on adult samples demonstrate similar, inconclusive patterns, possibly suggesting a moderate relation between obesity and depressive symptoms.¹⁶

An important strength of the present study is that it is based on a larger sample than those previously described and that a number of clearly relevant variables besides obesity and depression have been measured and controlled for.

In a modern society in which people lead their lives in close proximity to one another, mechanisms for social control are necessary. Shame, according to sociologists such as Elias,¹⁷ may be one of the most powerful of these mechanisms. Unfortunately, our results suggest that these mechanisms may also be activated by cues of physical appearance such as obesity, which may thus become a stigmatizing feature and put adolescents at psychosocial risk. The results also suggest that clinical treatment of obesity should take psychosocial aspects of the condition into account. Treating obesity may not just be a matter of diet and exercise but also of dealing with issues of shame and social isolation.

It is important for future research to identify possible interventions that will increase the capability of individuals to cope with experiences of shame and to investigate whether these experiences interact with

the ability of these patients to benefit from traditional medical treatment.

CONCLUSIONS

In the present population-based study of 15- and 17-year-old boys and girls we found an association between adolescent obesity and depression. Effects of experiences of shame, parental separation, and parental employment explain this association. These results suggest that clinical treatment of obesity may sometimes not just be a matter of diet and exercise but also of dealing with issues of shame and social isolation.

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