

ORIGINAL ARTICLE

Perceived or True Obesity: Which Causes More Suffering in Adolescents?

Findings of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS)

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SUMMARY

Introduction: The consequences of perceived obesity on quality of life are compared with those of genuine obesity in adolescents.

Methods: Within the framework of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS), the height and weight of the participants were measured. Children over 11 years of age were asked whether they thought of themselves as underweight, normal, or overweight. As a measure of their health-related quality of life they completed the internationally employed KINDL-R generic questionnaire.

Results: While 74.8% of 11- to 17-year-old girls and boys are of normal weight, only 40.4% believe that they are "just the right weight." Only 60.9% of obese girls and 32.2% of obese boys think of themselves as overweight. The data showed that genuinely obese adolescents, as classified by body mass index, have a better quality of life than those who only perceive themselves as being overweight.

Discussion: A realistic body image on the part of obese adolescents is a prerequisite for their acceptance of interventions. The marked deterioration in quality of life resulting from perceived obesity, even for young people of normal weight, illustrates the complexity of the struggle against obesity.

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Key words: child, adolescent, survey, obesity, perception, body weight, quality of life

The German Health Interview and Examination Survey for Children and Adolescents (KiGGS) is the first representative health study for children and adolescents aged 0 to 17 years to record the prevalence of overweight and obesity throughout the whole of Germany: 15% of German children and adolescents aged 3 to 17 years are overweight and 6.3% of them suffer from obesity (1).

76.2% of the girls and boys in the 14- to 17-year age group (n = 3716) are of normal weight, 17.1% are overweight, and 8.5% of these latter are obese.

These figures are consistent with the recently published results of the National Nutrition Survey II (Nationale Verzehrstudie II). This study included altogether only 580 girls and boys in the 14- to 17-year age group and found 75.7% normal-weight and 18.1% overweight adolescents (<http://www.was-esse-ich.de/index.php?id=44>; more detailed results and differentiation according to gender and social class are not yet available).

If the prevalence of overweight and obesity is broken down according to age, gender and social status, groups of children and adolescents are identified in which obesity occurs with a prevalence of up to 15% (figure 1). Girls aged from 11 to 17 years from socially disadvantaged families (2), for example, have a high proportion of obese individuals. This represents five-fold the statistically estimated prevalence of obesity of 3%.

Health problems known to result from extreme overweight are arterial hypertension as well as elevated blood glucose and cholesterol levels. Diseases that formerly did not occur until adulthood are now already being diagnosed in children, such as type 2 diabetes, fatty liver, joint damage, high blood pressure, breathing difficulties during sleep, and arteriosclerosis (3, 4). Longer-term effects of childhood and adolescent overweight and obesity on later health include cardiovascular diseases, stroke, diabetes and musculoskeletal diseases, and even reduced life expectancy (5).

This publication explores the extent to which objective overweight and subjectively perceived overweight

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impacts the quality of life and mental health of children and adolescents.

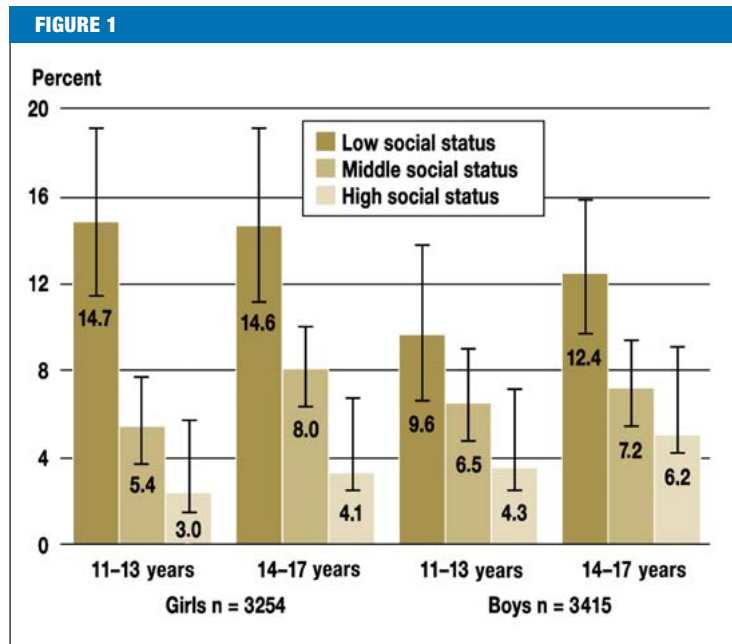
Methods

The aim of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) was to generate comprehensive, representative data on the state of health of children and adolescents aged 0 to 17 years for the entire Federal Republic of Germany. 17 641 participating children and adolescents underwent medical and physical examinations and tests. Children and adolescents aged 11 years and above were also questioned in writing. In addition, all parents completed a questionnaire and a standardized computer-assisted personal interview (CAPI). A full laboratory diagnostic program was performed with blood and urine samples. Details of the study design such as sampling technique, study implementation and procedure, data management, quality assurance, and inclusion of migrants are available (in German) (6) and can be accessed free of charge as a pdf download (www.kiggs.de/experten/erste_ergebnisse/Basispublikation/index.html).

Social status was determined using a multidimensional index based on parents' statements about their school education and professional qualification, occupational position, and net household income (net income of all household members after deduction of taxes and social security contributions). This allowed a classification into lower, middle, and high status groups. Since the sociodemographic data of both parents were documented in the KiGGS study, the status index could be calculated separately for mother and father. The higher index score was assigned to the household – and thus also to the child or adolescent studied. For parents living apart, the decisive factor was the parent with whom the child principally resides. Another presentation of KiGGS has already been published in *Deutsches Ärzteblatt* (7).

The primary measure used for the epidemiological determination of overweight and obesity in this study was body mass index (BMI), which is calculated from body weight (in kg) divided by height (in meters) squared. Height and weight were determined in a standardized manner in the KiGGS. Height was measured to an accuracy of 0.1 cm using a stadiometer with the person standing. Weight in underwear was measured to an accuracy of 0.1 kg on a calibrated weighing machine.

Overweight and obesity were defined using the BMI reference values of Kromeyer-Hauschild (8) according to the recommendations of the German Working Committee on Obesity in Children and Adolescents (AGA, Arbeitsgemeinschaft Adipositas im Kindes- und Jugendalter, see www.a-g-a.de). Due to a lack of representative data, however, these reference values were calculated using height and weight data gathered between 1985 and 1998 in various regions of Germany in different age groups and using different methods. To allow the results of the German Health



Obesity in boys and girls in the 11- to 13- and 14- to 17-year age group according to social status (measurements based on parent information about their school education and occupational qualification, occupational position, and net household income)

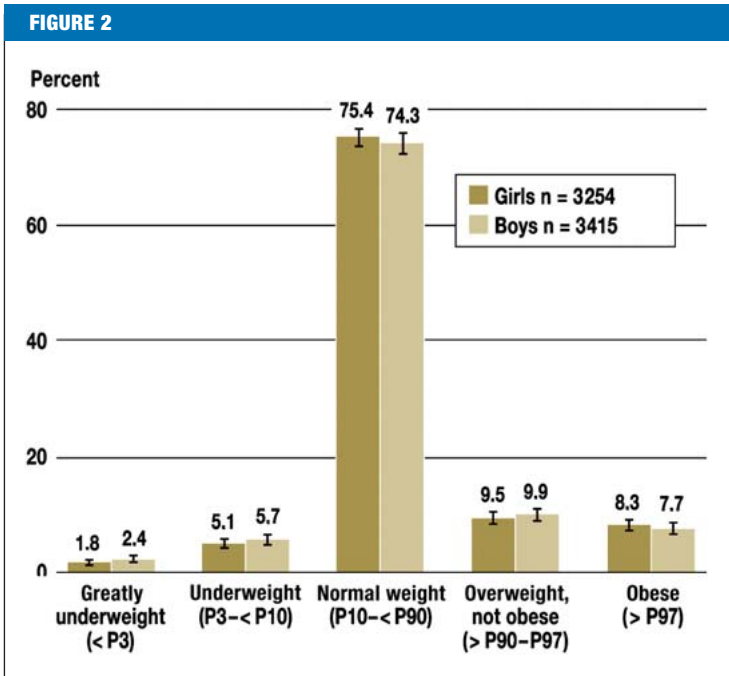
Interview and Examination Survey for Children and Adolescents to be presented in relation to previous findings, the purely statistical definitions of overweight, obesity, normal weight, underweight, and extreme underweight were adopted. Accordingly, a child with a BMI above the 90th age and gender specific percentile of the reference population from the years 1985 to 1998 is overweight. A child with a BMI above the 97th percentile is obese. Children and juveniles with a BMI below the age and gender specific tenth percentile are by definition underweight. Below the third percentile they are extremely underweight.

In addition, the 3254 girls and 3415 boys in the 11- to 17-year age group were asked to assess their own weight using the questionnaire:

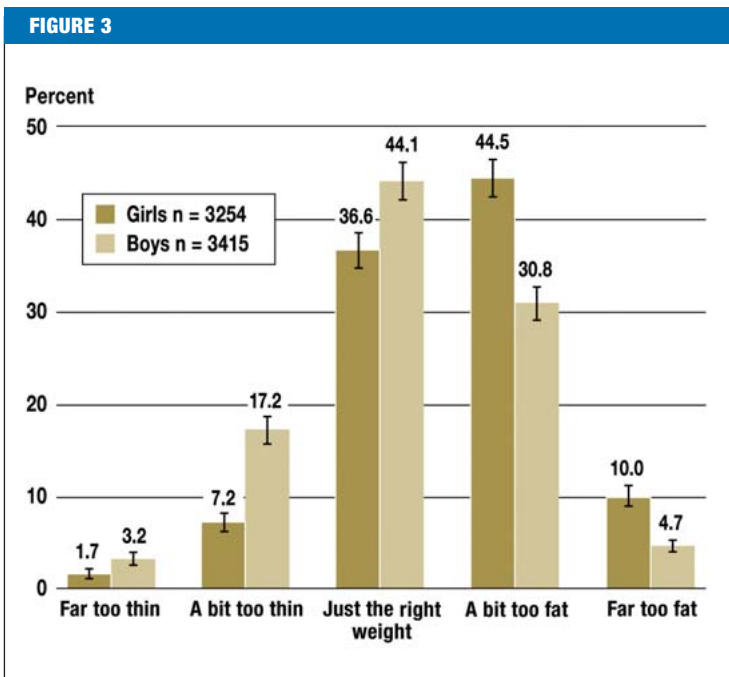
"Do you think you are

- far too thin
- a bit too thin
- just the right weight
- a bit too fat
- far too fat?"

In the KiGGS, health-related quality of life was recorded using the KINDL-R questionnaire (9). For the 11- to 17-year-olds, the KINDL-R questionnaire was completed both by the parents and by the children and adolescents themselves. The results reported below are invariably the self-reported data. The KINDL-R inquires about six different dimensions of quality of life for one week retrospectively: "physical well-being," "emotional (psychological) well-being," "self-esteem," "family," "friends," and "everyday functioning (school)."



Distribution of BMI classes among 11- to 17-year-old boys and girls



Body self-image in 11- to 17-year-old boys and girls

Altogether 24 items are assigned to six subscales each offering the response options "never, rarely, sometimes, often, always." An overall score ("total") can be derived from the six subscales. All measured values are reported on scales of 0 to 100 points, with higher values indicating better quality of life on all scales. Standard KINDL-R data from the KiGGS survey sample have been published in (10).

To allow representative statements, the analyses were performed using a weighting factor to correct deviations in the net sample from the population structure (as on: 31 December 2004) in terms of age (in years), gender, region (East/West/Berlin), and nationality (11). All calculations were performed using SPSS 14 statistical software.

Results

The analysis of the BMI data of 3254 girls and 3415 boys aged 11 to 17 years revealed the distribution of previously defined weight classes shown in figure 2:

75.4% of the girls and 74.3% of the boys in the age group are of normal weight. 17.8% of the girls and 17.6% of the boys are overweight or obese. 6.9% of the girls and 8.1% of the boys in this group are underweight.

An analysis of the children's and adolescents' self-rated body image, however, reveals a different situation as presented in figure 3:

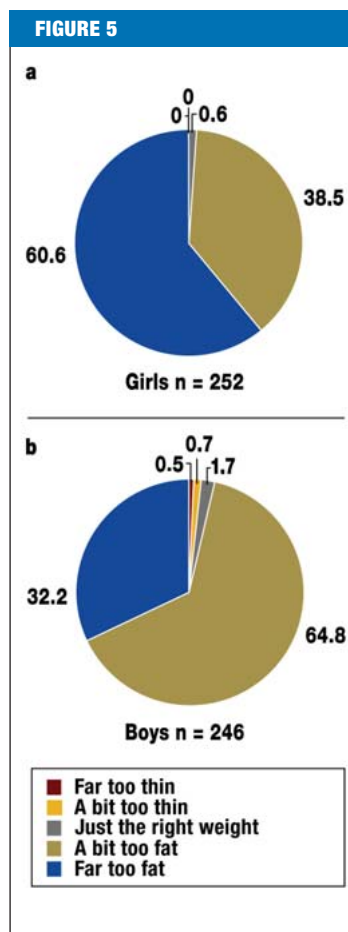
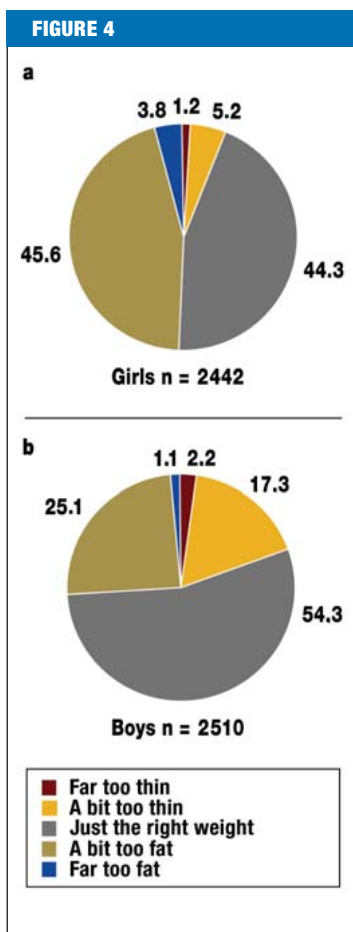
Girls consider themselves "a bit too fat" or "far too fat" significantly more often (54.5%) than boys of the same age (35.5%). Only 36.6% of the girls consider their weight to be "just right," while this is the case for 44.1% of the boys. A comparison of the BMI classification and the juveniles' self-rated weight already suggests that their subjective perception often gives a distorted picture of the reality. This is clearly illustrated by the ratios presented in figure 4.

A high percentage of both normal-weight girls and boys perceive themselves as overweight. Although this estimation is more common among the girls than the boys (49.4% compared to 26.2%), it is found in both sexes. This pattern is reversed among the obese participants: in this case the girls show a more realistic perception and rate themselves as "far too fat" in 60.6% of cases. Among the boys, only 32.2%, just under one third, reach this conclusion. The majority of obese participants consider themselves "a bit too fat." No differences in social class were found for these estimations (figures 4 and 5).

Calculation of quality of life in dependence of BMI (normal-weight and obese children and adolescents) and self-rated body image ("just the right weight" and "far too fat") produced the values compiled in table 1:

- Obese children and adolescents are impaired in their quality of life in almost all measured domains, which is reflected by slightly, but nevertheless significantly lower scale values of the KINDL total scores (table 1a).
- With the exception of the scale values for familial quality of life and psychological well-being, which are lower but do not deviate significantly, all scale values show sex-specific dependence:
 - In obese girls physical well-being is impaired. This is not the case in boys.
 - Obese boys, in contrast, show significant impairment in their circle of friends.
 - The self-esteem scale is significantly reduced in obese girls in contrast to the boys.

Body self-image of normal-weight 11- to 17-year-old boys and girls



Body self-image of obese 11- to 17-year-old boys and girls

● Children and adolescents with obesity show significant losses in quality of life in the school domain.

A comparison of the quality of life scales of the group of adolescents who consider their weight "just right" with those of the subjectively "far too fat" participants reveals drastic differences. In all scales and for both sexes, the values of those who consider themselves "far too fat" are significantly reduced (table 1b).

Their scale values are also much lower than those of the obese individuals. Self-esteem and psychological quality of life are enormously impaired especially among the girls. Familial quality of life, which was hardly affected among the obese participants, is significantly worsened in the subjectively "too fat" individuals. At the same time, the adolescents who consider their weight "just right" show a trend towards better, although not always significantly so, quality of life values than participants of actual normal weight.

Since the boys and girls who consider themselves "far too fat" include a high proportion of obese individuals, a quality of life comparison was performed in the normal-weight group for the subgroups "just the right weight" and "far too fat" in order to separate the effects (table 1c). The scale values of the normal-weight children and adolescents with the correct subjective estimation of their own weight hardly differed

from the group of all the individuals with the estimation "just right." In comparison, the scale values of the "far too fat" participants among the normal-weight individuals are reduced further: self-esteem as well as psychological and familial quality of life are drastically reduced.

Discussion

Both the distorted perception of their own body image and the quality of life impairments of obese children and adolescents have already been described in the literature. For example, girls generally overestimate their body weight more often than boys, while the latter frequently underestimate their body weight. In NHANES III, the third phase of the National Health and Nutrition Examination Survey in the USA, altogether 1932 adolescents aged 12 to 16 years were measured, weighed, and questioned. In this case 52% of the normal-weight girls rated themselves as overweight, compared to 25% of the boys (12). (Result of the present study: 37.2% of the girls and 26.2% of the boys). Similar sex differences were also confirmed in an Australian study with a sample of 213 adolescents aged 14 to 15 years (13) and in a Stuttgart health study with 546 adolescents in the age group 14 to 16 years (14). These findings are seen as related to today's

TABLE 1

Quality of life comparisons between normal-weight and obese boys and girls and between the groups with the subjective body self-image "just the right weight" and "far too fat"

a) KINDL BMI classes acc. to Kromeyer (11–17 years)														
	Total*		Body		Psyche		Self-esteem		Family		Friends		School	
	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI
Normal weight														
Boys, n = 2510	74.2	(73.7–74.6)	74.5	(73.8–75.1)	82.0	(81.4–82.6)	60.9	(60.0–61.7)	82.4	(81.7–83.0)	78.8	(78.1–79.4)	66.7	(65.8–67.5)
Girls, n = 2442	71.7	(71.2–72.2)	67.8	(66.9–68.6)	80.7	(80.0–81.4)	56.9	(56.1–57.6)	81.5	(80.7–82.2)	77.1	(76.4–77.8)	66.4	(65.5–67.3)
Total, n = 4952	73.0	(72.6–73.3)	71.2	(70.6–71.7)	81.4	(80.9–81.8)	58.9	(58.3–59.5)	81.9	(81.4–82.4)	78.0	(77.5–78.5)	66.6	(65.9–67.2)
Obese														
Boys, n = 246	71.9	(70.5–73.4)	72.0	(69.8–74.3)	81.8	(80.0–83.7)	58.1	(55.7–60.6)	81.9	(79.8–84.0)	74.2	(72.0–76.3)	63.2	(60.7–65.7)
Girls, n = 252	68.5	(66.6–70.3)	63.1	(60.6–65.7)	77.9	(75.5–80.2)	51.9	(48.6–55.2)	81.3	(78.9–83.7)	74.4	(71.7–77.0)	61.7	(58.5–64.8)
Total, n = 498	70.2	(68.9–71.5)	67.5	(65.8–69.3)	79.8	(78.2–81.4)	55.0	(52.9–57.2)	81.6	(79.9–83.3)	74.3	(72.4–76.2)	62.4	(60.4–64.5)
b) KINDL body image (11–17 years)														
	Total*		Body		Psyche		Self-esteem		Family		Friends		School	
	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI
Just the right weight														
Boys, n = 1527	75.8	(75.2–76.3)	76.5	(75.7–77.3)	83.2	(82.5–83.9)	62.2	(61.0–63.3)	83.8	(83.0–84.6)	80.2	(79.4–81.0)	68.9	(67.9–69.9)
Girls, n = 1186	74.6	(73.9–75.3)	71.2	(70.0–72.3)	82.9	(82.0–83.7)	60.4	(59.3–61.5)	84.4	(83.4–85.4)	78.5	(77.6–79.4)	70.1	(68.9–71.3)
Total, n = 2713	75.2	(74.8–75.7)	74.1	(73.4–74.8)	83.0	(82.5–83.6)	61.4	(60.6–62.2)	84.1	(83.4–84.7)	79.4	(78.8–80.1)	69.4	(68.6–70.2)
Far too fat														
Boys, n = 161	68.4	(66.4–70.3)	68.2	(65.2–71.2)	78.4	(76.1–80.7)	54.3	(51.2–57.4)	78.0	(74.7–81.2)	72.0	(69.2–74.9)	59.7	(56.4–63.0)
Girls, n = 320	64.7	(63.0–66.4)	61.5	(59.3–63.7)	74.5	(72.1–76.9)	45.0	(42.2–47.7)	77.4	(75.1–79.7)	72.1	(69.6–74.5)	57.5	(54.6–60.4)
Total, n = 481	65.9	(64.6–67.2)	63.7	(62.0–65.4)	75.8	(74.0–77.5)	48.0	(45.9–50.1)	77.6	(75.7–79.5)	72.0	(70.1–74.0)	58.2	(56.0–60.4)
c) KINDL body image (11–17 years) of normal-weight participants														
	Total*		Body		Psyche		Self-esteem		Family		Friends		School	
	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI	MV	95% CI
Just the right weight														
Boys, n = 1381	75.7	(75.1–76.3)	76.5	(75.8–77.3)	83.1	(82.4–83.9)	62.2	(61.0–63.4)	83.6	(82.8–84.5)	80.2	(79.4–81.0)	68.8	(67.7–69.8)
Girls, n = 1079	74.8	(74.1–75.5)	71.5	(70.3–72.6)	83.1	(82.3–84.0)	60.6	(59.5–61.7)	84.7	(83.7–85.8)	78.6	(77.6–79.5)	70.1	(68.9–71.4)
Total, n = 2460	75.3	(74.9–75.8)	74.3	(73.6–75.0)	83.1	(82.6–83.7)	61.5	(60.7–62.3)	84.1	(83.4–84.8)	79.5	(78.9–80.1)	69.4	(68.5–70.2)
Far too fat														
Boys, n = 29	66.6	(61.8–71.5)	67.4	(59.4–75.5)	78.6	(70.9–86.2)	49.3	(42.7–55.9)	78.2	(70.7–85.7)	72.5	(65.6–79.5)	57.3	(49.3–65.3)
Girls, n = 95	62.3	(59.1–65.5)	61.7	(57.8–65.6)	70.2	(65.8–74.6)	44.0	(39.0–49.0)	71.7	(67.4–76.0)	71.7	(67.6–75.7)	55.0	(49.8–60.2)
Total, n = 124	63.2	(60.8–65.6)	62.9	(59.8–66.0)	72.0	(68.4–75.5)	45.2	(41.3–49.0)	73.1	(69.5–76.7)	71.9	(68.4–75.3)	55.5	(51.3–59.7)

* KINDL total score, Body: physical well-being, Psyche: emotional (psychological) well-being, Self-esteem: feeling of self worth, Family: well-being in the family, Friends: well-being in relation to friends/same-age peers, School: well-being in the school domain; MV: mean value; 95% CI: between-groups differences with 95% confidence intervals that do not overlap are classified as statistically significant.

accepted ideal of beauty, which especially for girls elevates slimness in itself to an important objective. A London study in 2522 adolescents aged 11 to 14 years showed that in the group of overweight individuals a higher percentage of the girls had a realistic body self-image than

was the case for the boys (15). This result is also congruent with our own findings. This study also established the relationship between actual overweight and mental health. A higher degree of psychological distress was found in obese compared to normal-weight adolescents.

A Californian study (16) in 868 children aged 8 to 9 years investigated depressive symptoms as a function of BMI. Although the result disclosed a slight relationship between overweight and depressive symptoms in girls, this was not found for the boys. If the children were dissatisfied with their body weight, however, a correlation was found for both sexes. An evaluation (17) of the KINDL-R questionnaire for the influence of chronic diseases on various quality of life scales showed that obesity reduced the KINDL total score and most of the subscales. Another recent publication on overweight in Turkish adolescents and subjective body perception reveals an impairment of psychological well-being in adolescents who consider themselves overweight (18).

No study has so far examined the relationship between the subjective estimation of body weight and quality of life. The finding obtained in the present study that obese children and adolescents who consider their body weight "just right" have a higher quality of life than normal-weight participants who consider themselves "far too fat" has its origin more in the "perceived" than in the objective overweight. This is by no means intended to minimize the effects of obesity on physical health. The question arises, however, whether it is necessary for obese children and adolescents to achieve a realistic body self-image in order to promote a willingness to change if the price of this achievement is impaired quality of life?

It should also be considered very carefully to what extent the currently ubiquitous campaigns against overweight may in fact be responsible for causing an increase in the proportion of adolescents who unjustifiably consider themselves overweight. This situation affects a very large percentage of normal-weight boys and girls who find themselves "too fat" or "far too fat." This proportion appears to have undergone a further increase in the last few years, as emerges from a survey among 12- to 16-year-olds in Germany dating from 1992/93 (19). Whereas at that time 43.7% of 12- to 16-year-old girls and 22.9% of the boys thought themselves "a bit too fat" or "far too fat," today this figure is 54.5% and 35.5%, respectively. The proportion of those who suffer quality of life impairments because of their distorted body self-image has therefore increased to a greater extent than the proportion of actually overweight individuals in this age group.

The relationship between an inaccurate body self-image and eating disorders is obvious and has also previously been described (20).

The conclusion to be drawn from the results presented here could be that measures to combat overweight and to prevent eating disorders should not be implemented independently of each other but should go hand in hand.

Conflict of interest statement

The authors declare that no conflict of interest exists as defined by the guidelines of the International Committee of Medical Journal Editors.

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