Body image: a survey of children in Caribbean Bonaire

Joana Kist-van Holthe, Laura Melchers, Tirza Blom, Teatske Altenburg, Marian Luinstra-Passchier, Alcira Janga-Jansen, Tahirih van Kanten, Aleid Wirix, Remy Hirasing, Mai Chinapaw

ABSTRACT

Background In Bonaire, the prevalence of overweight and obesity is twice as high compared with Northern Europe but similar to other Caribbean Islands and the USA. Having a realistic body image may be an important tool in the battle against childhood obesity. Previous studies have demonstrated associations between having a realistic body image and efforts to control weight. The aim of the study was to explore the body image of children in Bonaire.

Methods In a cross-sectional study from March to May 2015 in Bonaire, weight and height were measured in all children aged 10–14 years attending school. Body mass index (kg/m²) was classified according to the International Obesity Task Force. The children were asked about their body image using a validated questionnaire.

Results Body mass index was measured in 939 of 1029 (91.3%) children aged 10–14 years (51.5% boys) in Bonaire. Of all children, 9.7% was underweight, 57.6% was normal weight, 32.7% was overweight (including obesity) and 11.6% was obese. The question pertaining to body image was completed by 750 of 939 (79.9%) children. Having a realistic perception of body image varied per weight category from 65% in underweight girls to 13% in obese boys. The percentage of obese children who underestimate their weight is high (boys 87%, girls 77%).

Conclusions In many children in Caribbean Bonaire, perceived body image is not in agreement with actual weight status. This applies especially to obese children. Disagreement between perceived body image and actual weight status may prevent weight management in overweight children. Future research is needed to elucidate determinants of disagreement between body image and actual weight status.

BACKGROUND

Childhood overweight and obesity has rapidly increased worldwide in the last decades. The prevalence of overweight and obesity in children in Bonaire, an island in the Caribbean, is approximately twice as high compared with Northern Europe but similar to other islands in the Caribbean and to the USA. Overweight and obesity can lead to serious health problems, for example, type 2 diabetes, cardiovascular disease including hypertension, fatty liver disease, psychological problems and musculoskeletal disorders. In 2013, 35% of the adult population in Bonaire was overweight and 25% was obese. This is of great concern because the Afro-Caribbean population (approximately 85% of the population of Bonaire is Afro-Caribbean) is already at a higher risk for type 2 diabetes and hypertension compared with West African blacks and Caucasians.

Having a realistic body image may be an important tool to prevent childhood obesity. Previous studies in obese adolescents have demonstrated associations between having an accurate body image and efforts to control weight. Adolescents with BMI ≥85th percentile, self-perceived as obese, were more likely to try to lose weight than those that underestimated their weight. Knowledge of how children in the Caribbean perceive their weight status can help with devising a tailored obesity prevention programme. However, studies on body image in children and adolescents in the Caribbean are scarce and inconsistent. In a study in Jamaica, 122 adolescent girls generally had accurate perception of
their size. In contrast, about 28% of 363 students aged 15–18 years in Trinidad and Tobago misclassified their body weight and perception of body weight influenced weight loss behaviours more than actual body weight. In a study in 250 schoolchildren in Puerto Rico, most overweight/obese children did not perceive themselves as such. Although slightly more girls tended to perceive themselves as overweight, there was no significant difference between boys and girls.

The aim of the study was to explore the body image of children in Bonaire, an island in the Caribbean, to compare their perceived weight with their actual weight and to evaluate if there are gender and age differences in having a correct body image.

**METHODS**

**General**

This study is part of a cross-sectional study of the prevalence of overweight and obesity in children in Bonaire. From March to May 2015, weight and height were measured in all children 10–14 years of age attending school (seven elementary and one high school). One small school (103 children) declined to participate in the study for unknown reasons. In addition, the children were asked to complete a questionnaire pertaining to lifestyle. The study was approved by the VU University Medical Ethical Committee. Parental permission for participation in the study was given by means of passive informed consent.

**Measurements**

Two trained assistants performed the anthropometric measurements at school. Body weight was measured to the nearest 0.1 kg using a digital scale (Seca 877, Hamburg, Germany) in children in light summer clothes (shorts and light shirt or light dress) without shoes. Correction for clothing was performed for children 4–6 years: 300 g; 7–9 years: 600 g; 10–11 years: 800 g and ≥12 years: 1000 g. Height was measured without shoes with a microtoise (Seca 206, Hamburg, Germany) to the nearest 0.1 cm. Body mass index (BMI) was calculated as weight (kg)/height (m²) and was classified according to the International Obesity Task Force.

The children were asked to complete a lifestyle questionnaire during class. The questionnaire was available in Papiamento and in Dutch. The question pertaining to body image read: ‘Do you think you are too fat or too thin?’ The children could choose one answer: (1) I am much too thin; (2) I am a bit too thin; (3) I am not too thin, not too fat; (4) I am a bit too fat or (5) I am much too fat. The question was derived from the Energy-project, a cross-European study to gain insight in energy balance-related behaviours in children. The question was tested good to excellent for test–retest reliability as well as construct validity (reliability 0.87 agreement 83%; validity 0.68 agreement 74%).

A realistic body image for underweight children was defined as ‘much too thin or a bit too thin’; for normal weight children: ‘not too thin, not too fat’; for overweight (excluding obese) children: ‘a bit too fat or much too fat’ and for obese children: ‘much too fat’.

**Statistics**

Analyses were performed with SPSS V.22.0 (IBM, New York, USA). The association of perceived and correct body weight in girls and boys was tested with the Pearson’s $X^2$ test. A p value of <0.05 was considered significant. Logistic regression analysis using gender and age was performed for prediction of underestimation of body image.

**RESULTS**

Nine hundred and thirty-nine of 1029 (91.3%) children aged 10–14 years (51.5% boys) in Bonaire participated in the study. Anthropometric measurements were missing in 90 children (8.7%) because of the absence of school on the day of the measurements or because the parents objected to their participation in the study. Seven hundred and fifty of 939 (79.9%) children answered the question pertaining to body image. Of the children, 9.7% was underweight, 57.6% was normal weight, 32.7% was overweight (including obesity) and 11.6% was obese. Figure 1 depicts body image of the children per weight category (underweight, normal weight, overweight and obesity) separately for boys and girls. There were no significant differences in realistic body image between boys and girls. Table 1 shows body image (underestimation, realistic or overestimation of body image) per weight category (underweight, normal weight and overweight (including obesity). Having a realistic body image varied per weight category: from 65% in underweight girls to 13% in obese boys. Of all overweight (including obese) children, 36.7% think they are normal weight or too thin. Gender ($\beta$ 0.20; 95% CI 0.59 to 1.14) or age ($\beta$ 0.74; 95% CI 0.84 to 1.03) predicted underestimation of body weight.

**DISCUSSION**

In Bonaire, half (56%) of all children aged 10–14 years had a realistic body image. This is in concert with a study from Puerto Rico, likewise an island in the Caribbean, where half of 230 children (mean age 9.5 years) correctly identified their weight. However, this is lower than in the USA (The National Health and Nutrition Examination Survey 2011–2012) where 67% of children aged 8–11 years and 73% of adolescents aged 12–15 years have a realistic body image. Having a realistic body image in our study as well as in the USA was similar for boys and girls but varied by weight status.

Among overweight (including obese) children aged 10–14 years in Bonaire, more than one-third (37%) was not aware he/she is overweight. This resembles overweight (including obese) children aged 10–12 years in
Europe of whom 43% think they are normal weight or too thin.17 Likewise, in the Health Behaviour in School-aged Children survey (229614 children) conducted in 24 countries across Europe and North America in 2010, 19% overweight (including obese) boys and 36% overweight (including obese) girls underestimated their weight.18 However, in Puerto Rico, more overweight (including obese) children (59%) misperceived their weight status.17 In the USA, these percentages were even higher: 76% of overweight (excluding obesity) youth and 42% of obese youth did not have a reality-based body image.16 Compared with the USA, in Bonaire, the percentage of obese children who underestimate their weight (children who classified their weight as underweight, normal weight or a little too fat) is much higher (boys 87%, girls 77%).

There may be different reasons for the disagreement between children’s actual weight status and their perceived body image. The increasing adiposity levels worldwide have normalised the image of overweight and obesity among the population, leading to reduced recognition of excess weight.19 Additionally, children may adopt the point of view of their parents. In Puerto Rico, 62% of parents correctly classified their children’s weight status, which is an only slightly better achievement than the 51% of the children that correctly classified their weight status.12 Another reason for disagreement between perceived body image and weight status may be of a cultural origin. Overweight and obesity in children is often not seen as a negative trait, on the contrary, it is frequently considered a sign of beauty and prosperity.20 Adolescents in Trinidad, like Bonaire an island in the Caribbean, associated obesity with wealth, and also—but to a lesser extent—with happiness.21 However, there may be a thin line between having a correct body image and the negative psychological consequences of childhood obesity, such as low

![Figure 1](https://bmjpaedsopen.bmj.com/)

**Figure 1** Body image in underweight, normal weight, overweight and obese and boys and girls aged 10–14 years in Bonaire (n=750).

Table 1 Percentage of children that underestimate, have a realistic body image or overestimate their body weight per weight category in 750 (aged 10–14 years) children in Bonaire*

| Underestimation of body weight*, % | Realistic body image†, % | Overestimation of body weight, % |
|----------------------------------|---------------------------|---------------------------------|
| Underweight                     | 0                         | 58.9                            | 41.1                        |
| Normal weight                   | 32.9                      | 52.1                            | 15.0                        |
| Overweight‡                     | 36.7                      | 63.3                            | 0                            |
| Total                            | 30.9                      | 56.4                            | 12.7                        |

*Weight category was classified according to the International Obesity Task Force.13
†A realistic body image for underweight children was defined as ‘much too thin or a bit too thin'; for normal weight children: ‘not too thin, not too fat'; for overweight (including obese) children: ‘a bit too fat or much too fat’ or ‘much too fat’. There was no significant difference in body image per weight category between boys and girls.
‡Overweight including obesity.
self-esteem, depression and body dissatisfaction. Body dissatisfaction has been linked to a number of unhealthy eating disorder behaviours such as skipping meals, fasting, self-induced vomiting and use of diet pills or laxatives. In Australia, overweight/obese adolescents who perceived themselves as being overweight had lower quality of life than those with ‘about right’ perceptions. The authors concluded that practitioners need to exercise caution when educating adolescents about their weight status, as such reality checks may negatively impact quality of life.

Strengths and limitations
The strengths of this study are that nearly all (91.3%) children aged 10–14 years in Bonaire participated in the study and that the anthropometric measurements were performed by the same two trained assistants. However, a limitation of the study is that BMI is not the golden standard for fat percentage. Children with high muscle mass will be erroneously classified as overweight or obese, overestimating their BMI. A further limitation is that there are no validated questionnaires examining body image in Caribbean children, we used a questionnaire that was validated for European children. Although it would be interesting, the study was not set up to get information about the socioeconomic status because the children filled out the questionnaire without involvement of the parents. Furthermore, children may have given socially acceptable answers; this may especially apply to overweight and obese children. When classifying body image, we hypothesise that socially acceptable answers can lead to underestimation of reality-based body image in overweight children.

Conclusions
In many children in Bonaire, perceived body image is not in agreement with actual weight status. This applies especially to obese children, of whom only 13% of the boys and 23% of the girls perceived themselves as being much too heavy. Disagreement between perceived body image and actual weight status may prevent weight management in overweight children. Future research is needed to elucidate determinants of disagreement between body image and actual weight status.

Acknowledgements
We would like to thank all the children, school teachers and principal for their participation in the study. The study was supported by the Department of Public Health in Bonaire.

Contributors
JKVH, MLP, AJJ, TVK, RH and MC designed the study. TB and LM carried out the study. JKH, LM and TB wrote the manuscript. JKH, TA and MC analysed the data. TVK, TA, MLP, AJJ, RH and MC critically reviewed the manuscript.

Competing interests
None declared.

Ethics approval
The study was approved by the VU University Medical Ethical Committee.

Provenance and peer review
Not commissioned; externally peer reviewed.

Data sharing statement
All data are published and available upon request.

References
1. Ng M, Fleming T, Robinson M, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 2014;384:766–81.
2. Schieve L, van Rest J, Verhagen E, et al. Childhood obesity in the Caribbean. West Indian Med J 2011;60:442–5.
3. Singh DS. Childhood obesity – the shape of things to come. N Engl J Med 2007:357:2325–7.
4. van Emmerik NM, Renders CM, de Veer M, et al. High cardiovascular risk in severely obese young children and adolescents. Arch Dis Child 2012;97:818–21.
5. Central Bureau for Statistics. Overweight and obesity in Dutch Caribbean. http://www.cbs.nl/ni-NL/menu/themas/dossiers/ nederland-regional/publicaties/artikelen/archief/2014/2014-27feb-gezondheid-leefstijl-cn-2013-art.htm.
6. Bennett NR, Francis DK, Ferguson TS, et al. Disparities in diabetes mellitus among Caribbean populations: a scoping review. Int J Equity Health 2015;14:23.
7. Bidulescu A, Francis DK, Ferguson TS, et al. Disparities in hypertension among black Caribbean populations: a scoping review by the U.S. Caribbean Alliance for Health Disparities Research Group (USCARHDR). Int J Equity Health 2015;14:125.
8. Wang Y, Liang H, Chen X. Measured body mass index, body weight perception, dissatisfaction and control practices in urban, low-income African American adolescents. BMC Public Health 2009;9:183.
9. Yang K, Turk MT, Allison VL, et al. Body mass index self-perception and weight management behaviors during late adolescence. J Sch Health 2014;84:654–60.
10. Smith DE, Gogswell C. A cross-cultural perspective on adolescent girls’ body perception. Percept Mot Skills 1994;78(3 Pt 1):744–6.
11. Babwah T. Exercise, bodyweight perception and related weight loss behavior among adolescents in Trinidad and Tobago. Int J Adolesc Med Health 2016;28:31–7.
12. Rivera-Soto WT, Rodriguez-Figueroa L. Childhood obesity among Puerto Rican children: discrepancies between child’s and parent’s perception of weight status. Int J Environ Res Public Health 2012;9:1427–37.
13. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. Pediatr Obes 2012;7:254–94.
14. Brug J, te Velde SJ, Chinapaw MJ, et al. Evidence-based development of school-based and family-involved prevention of overweight across Europe: the ENERGY-project’s design and conceptual framework. BMC Public Health 2010;10:276.
15. Singh AS, Vik FN, Chinapaw MJ, et al. Test-retest reliability and construct validity of the ENERGY-child questionnaire on energy balance-related behaviours and their potential determinants: the ENERGY-project. Int J Behav Nutr Phys Act 2011;8:136.
16. Sarrafzadi N, Hughes JP, Borlund L, et al. Perception of weight status in U.S. children and adolescents aged 8-15 years, 2005-2012. NCHS Data Brief 2014;158:1–7.
17. Manios Y, Moschosin G, Karatzis K, et al. Large proportions of overweight and obese children, as well as their parents, underestimate children’s weight status across Europe. The ENERGY (European Energy balance Research to prevent excessive weight Gain among Youth) project. Public Health Nutr 2015;18:2183–90.
18. Quick V, Nansel TR, Liu D, et al. Body size perception and weight control in youth: 9-year international trends from 24 countries. Int J Obes 2014;38:988–94.
19. Robinson E. Overweight but unseen: a review of the underestimation of weight status and a visual normalization theory. Obes Rev 2017;18:1200–9.
20. Padgett J, Biro FM. Different shapes in different cultures: body dissatisfaction, overweight, and obesity in African-American and
caucasian females. J Pediatr Adolesc Gynecol 2003;16:349–54.
21. Simeon DT, Rattan RD, Panchoo K, et al. Body image of adolescents in a multi-ethnic Caribbean population. Eur J Clin Nutr 2003;57:157–62.
22. Vander Wal JS, Mitchell ER. Psychological complications of pediatric obesity. Pediatr Clin North Am 2011;58:1393–401.
23. Harriger JA, Thompson JK. Psychological consequences of obesity: weight bias and body image in overweight and obese youth. Int Rev Psychiatry 2012;24:247–53.
24. Hayward J, Millar L, Petersen S, et al. When ignorance is bliss: weight perception, body mass index and quality of life in adolescents. Int J Obes 2014;38:1328–34.