Data were collected during the routine health assessment, in 10,767 children in the 6th grade (9–10 years) of primary school and to assess the prevalence of negative body image and weight loss behaviour among children in primary and secondary school.

Background: To assess the prevalence of negative body image and weight loss behaviour among children in primary and secondary school.

Methods: Data were collected during the routine health assessment, in 10,767 children in the 6th grade (9–10 years) of primary school and the 2nd grade (13–14 years) of secondary school in Utrecht, a province in The Netherlands. Weight loss behaviour and body image were measured by self-report. The prevalence of negative body image was determined by the Body Shape Questionnaire. Weight loss behaviour was determined by the Body Mass Index Questionnaire.

Results: The prevalence of negative body image was 28% in primary school and 22% in secondary school. The prevalence of weight loss behaviour was 7% in primary school and 5% in secondary school.

Conclusion: The prevalence of negative body image and weight loss behaviour is high among children in primary and secondary school. These findings highlight the need for interventions to promote a healthy body image and prevent weight loss behaviour among children.
assessed during an interview and weight and height were measured. Results: A total of 7.8% of the boys and 13.9% of the girls of primary school had a negative body image \((P < 0.001)\); 2.9% of the boys and 6.9% girls found themselves too fat, while having a normal body weight \((P < 0.001)\). Weight-loss behaviour is found in 3.7% of the boys and 7.0% of the girls \((P < 0.001)\). At secondary school, 15.8% of the boys and 32.5% of the girls found themselves too fat \((P < 0.001)\). A total of 8.6% of the boys and 27.5% of the girls found themselves too fat, while having a normal body weight \((P < 0.001)\); 4.7% of the boys and 12.9% of the girls with a normal weight showed weight loss behaviour \((P < 0.001)\). Conclusion: A negative body image and weight loss behaviour were already present in 9- to 10-year-old children and among children with a normal weight in The Netherlands. Among secondary school children (13–14 year), the prevalence of a negative body image and of weight loss behaviour was high, especially for girls. Diagnostic tools are needed for youth health-care workers to detect unnecessary weight loss behaviour.

Introduction

Overweight and obesity are one of the biggest threats for public health, both in adults and children. Fair enough, a lot of attention is paid towards this threat. However, hardly any attention is paid to weight loss behaviour in normal weight children and adolescents. Children who consider themselves as too fat (negative body image) are at high risk for unnecessary weight loss behaviour.\(^3\)\(^,\)\(^5\). Excessive weight loss behaviour increases the risk of developing eating disorders such as Anorexia Nervosa and Bulimia Nervosa and is related to depressions, substance abuse and suicide ideation and attempts.\(^3\)\(^,\)\(^5\) Furthermore, weight loss behaviour in growing children can result in nutritional deficiencies.\(^6\) The prevalence of Dutch schoolchildren with unnecessary weight loss behaviour is not known.

In The Netherlands the Youth Health Care (YHC) offers regular school health assessments to all children, performed by school physicians and nurses. During these assessments weight and height of the children are determined and attention is paid to prevention of overweight and obesity. However, no attention is paid to a negative body image and weight loss behaviour in children with a normal weight. This study is performed to assess the prevalence of a negative body image and weight loss behaviour among Dutch schoolchildren and the relation with their body weight. The research questions are: (i) what is the prevalence of a negative body image among children from the 6th grade of primary school and the 2nd grade of secondary school? (2) what is the prevalence of weight loss behaviour in children in the 6th grade of primary school and the 2nd grade of secondary school?

Methods

Study population

In the school year 2006–07, all pupils of the 6th grade of primary schools (9–10 years) and of the 2nd grade of secondary schools (13–14 years) in the Utrecht province, one of the 12 provinces of The Netherlands, were invited for the free of charge routine health assessment performed by school physicians or nurses of the regional public health service (municipal health organizations). Primary school pupils \([7122 (86\%)]\) and secondary school pupils \([6980 (82\%)]\) attended the health assessment. Cases with missing values on at least one of the study variables were excluded. Complete data were available for 5357 pupils of primary school and 5410 pupils of secondary school.

Measurements

Data were collected by school nurses and school physicians during the routine health assessment. Body image was measured by the question: ‘Are you satisfied with your weight?’ with three answering categories: ‘Yes’, ‘No I find myself too fat’, ‘No I find myself too thin’. Weight loss behaviour was measured by the question: ‘Did you try to lose weight in the past four weeks?’ ‘No/yes’. Children that answered ‘yes’ were asked which methods of weight loss behaviour were used: eating less and/or not eating sweets, following a special diet, increasing physical activity, using laxatives or slimming pills or vomiting. Height was measured with a microtoise and weight with digital and analogue scales according to a national protocol. The body mass index (BMI) was calculated and international sex- and age-specific cut-off points were used to determine whether a child had underweight, normal weight or overweight (including obesity).\(^7\)\(^,\)\(^9\)

Analyses

Differences by gender in body image and weight loss behaviour were analysed using cross-tabulations and \(\chi^2\) statistics. These analyses were performed separately per age group. Differences in body image and weight loss behaviour were examined for gender and age groups and per weight category (normal weight, overweight and underweight) using cross-tabulations and \(\chi^2\) statistics. To examine gender differences, the analyses were performed separately per age group. To examine differences between age groups, the analyses were performed separately for boys and girls. \(P \leq 0.05\) were considered as significant. All statistical analyses were performed using SPSS version 17.0.

Results

Complete data were available of 10 767 children, which is 76% of the total group that attended the routine health assessment. The mean age of the children of primary school was 9.5 years (SD = 0.6) and 13.6 years (SD = 0.6) at secondary school.

At primary school 7.8% of the boys and 13.9% of the girls \((P < 0.001)\) (table 1) and at secondary school 15.8% of the boys and 32.5% of the girls found themselves too fat \((P < 0.001)\). 7.0% of the girls and 3.7% of the boys at primary school tried to lose weight in the past 4 weeks \((P < 0.001)\). At secondary school, these percentages were 18.1% and 9.4%, respectively, \((P < 0.001)\). Most children tried to lose weight by eating less and/or eating fewer sweets (girls more often than boys). At secondary school boys more often than girls increased physical activity as a method of losing weight. Methods like vomiting, using laxatives or slimming pills were used by 3.0% of the boys and girls of primary school and by 1.1% of the boys and 1.3% of the girls of secondary school (not significant (ns), or \(P = 1.000\)). There were no significant differences in ways of weight loss behaviour by age group.

Table 2 shows that at primary school, 2.9% of the boys and 6.9% of the girls with a normal weight found themselves too fat \((P < 0.001)\) and at secondary school 8.6% of the boys and 27.5% of the girls \((P < 0.001)\). Weight loss behaviour, among normal weight children at primary school was reported by 1.9% of the girls and 0.8% of the boys \((P < 0.01)\). At secondary school, these percentages were 12.9% and 4.7%, respectively \((P < 0.001)\). Weight loss behaviour and a negative body image were both related to BMI.

Discussion

A negative body image and weight loss behaviour among children were already present at primary school and among children with a normal weight. At secondary school, the prevalences of a negative body weight and weight loss behaviour were much higher when compared with primary school. Girls had a negative body image more often than boys and showed weight loss behaviour.

In The Netherlands as far as we know no studies exist about weight loss behaviour among primary school children. Studies from other countries already reported concerns about body fat and weight loss behaviour among primary school children.\(^3\)\(^,\)\(^10\)\(^,\)\(^11\) A review study from 2001 reported estimates of weight loss behaviour in 9–10 year olds ranging from 20%
to 55% in girls and 31–39% in boys.\textsuperscript{12} It was found that both a desire to lose weight and weight loss behaviour attempts increase with age.\textsuperscript{3,10,12} We also found a higher prevalence of weight loss behaviour among the children of secondary school, compared with the children of primary school.

The prevalence of a negative body image and weight loss behaviour of the children of secondary school, we found are in line with other studies in which the prevalence of a negative body image ranged from 34% to 48% for girls and 19% to 27% for boys.\textsuperscript{4,5,12} Estimates of weight loss behaviour in normal weight children may be a risk for developing eating disorders.\textsuperscript{12–14} As far as we know, this is the first study about weight loss behaviour in normal weight children.

In our study, most children reported a desire to lose weight and weight loss behaviour attempts increase with age. We also found negative body image is more prevalent among girls than boys. However, unnecessary weight loss behaviour among normal weight children could be reduced and children at risk for developing eating disorders could be determined before onset. The youth health-care professionals in The Netherlands already have a programme to prevent overweight and obesity in children. They can also play an important role in detection and prevention of unnecessary weight loss behaviour in children with a normal weight. This can be done by asking (normal weight) children during routine health assessments, what they think about their weight and weight loss behaviour in the past 4 weeks. Diagnostic tools are needed to detect unnecessary weight loss behaviour and early signs of eating disorders during the regular school health assessments.

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**Conflicts of interest:** None declared.

#### Key points

This article adds:
- Negative body images are already present in children from primary school.
- The results show that some of the children with a healthy weight perform weight loss behaviour.
- As far as we know, this is the first study about weight loss behaviour in normal weight children.
- The Youth Health Care system can play an important role to prevent unnecessary weight loss behaviour.
- There is a high need for developing diagnostic tools focused on detecting weight loss behaviours.
Introduction

Infections due to measles and rubella viruses are an important concern of public health in Italy, where the implementation of the National Plan of Measles and Congenital Rubella Elimination (NPMCRE) was carried out since 2003. Actions taken for the implementation of NPMCRE were of high quality both in terms of surveillance of suspected cases, prevention of new infections and monitoring of susceptibility in the regional population. Susceptibility thresholds for the elimination of measles in the European population were set by World Health Organization (WHO) at 15% in children between 0 and 4 years, 10% between 5 and 9 years and 5% in subjects >10 years; the susceptibility threshold for the elimination of congenital rubella is 5% in fertile-age women (15–49 years).

Historical changes in measles and rubella surveillance and recommendation for immunization in Italy are presented in figure 1. During the implementation of the NPMCRE, in order to monitor progress towards measles elimination and congenital rubella prevention, measles and rubella surveillance has been strengthened, including laboratory investigation of all suspected measles and rubella cases, with a particular attention to rubella cases in pregnant women. Starting from 1 January 2005, a special surveillance of rubella infections in pregnancy and congenital rubella syndrome (CRS) was re-introduced at national level.

In Tuscany (Central Italy) historical changes in vaccination strategies replicated the Italian national steps. During the 1970s and the 1980s the two recommended vaccines were often administered by private paediatricians and records are not available. According to the ICONA surveys (national vaccination coverage surveys based on the cluster sampling method as recommended by...