

Chapter 1

General introduction



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A big problem!

Overweight and obesity among children and adolescents in the Netherlands are increasing public health problems. The Fifth Dutch Growth Study (conducted 2008-2010), shows that 13% of Dutch children were overweight and 2-3% obese (see Figure 1) (1). The prevalence of overweight (including obesity) remains a large problem especially in certain ethnic subgroups. Only in children of Dutch origin the prevalence declined between 1999 and 2011 (2).

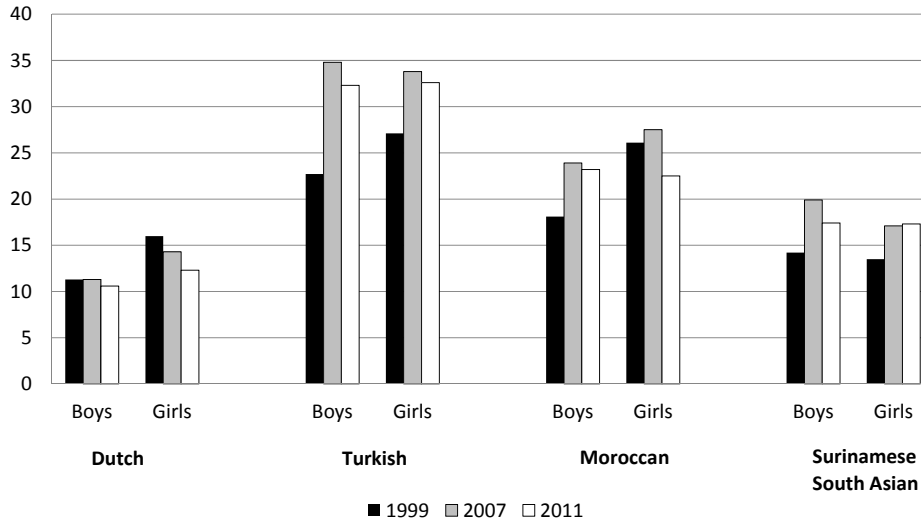


Figure 1: Prevalence of overweight (including obesity) in the Netherlands (1).

Causes of overweight and obesity in youth

Overweight and obesity (from now on obesity) is a multi-factorial disorder, a result of various interactions between personal, lifestyle, environmental and genetic factors (3,4). The epidemic of obesity is caused largely by an environment that promotes excessive and unhealthy food intake and sedentary behaviour and discourages physical activity (5). Unhealthy food intake includes sugar-containing beverages, increasing portion sizes for prepared foods and fast food service. In addition, the current environment plays a role in discouraging physical activity and promote sedentary behaviour. Nowadays there is an enormous increase in the number of hours children spend online, for example to play computer games or watching television. The rapid increase in obese adolescents suggests that environmental factors may play a greater role than genetic factors (6,7).

Consequences of obesity in youth

The high numbers of obesity in children and adolescents is worrisome because obesity causes physical and mental health problems as well as social problems. Obesity in childhood is associated with among others orthopaedic complications, asthma, insulin resistance and an increased risk of metabolic syndrome. This syndrome is a group of cardiovascular risk factors including increased waist circumference, hypertension, dyslipidaemia and impaired fasting glucose levels (8). Type 2 diabetes mellitus is increasingly being diagnosed in obese children (8-11). Children with obesity are likely to remain obese and are at increased risk to become obese adults compared to children of normal weight (12,13). Obesity in adulthood is associated with increased morbidity and mortality (14).

Behavioural and social-emotional functioning and quality of life

Obesity is a stigmatising and socially an unaccepted condition in childhood (10). Obesity is associated with lower quality of life (QoL), higher prevalence of psychopathology (10,15-19), negative psychosocial health (i.e. lack of self-esteem) and more frequent clinical treatment. Other more frequent psychosocial complaints in obese children and adolescents are externalizing problems (impulsivity and attention-deficit hyperactivity disorder) and internalizing behavioural problems (depression and anxiety) (20). These social, emotional, and behaviour problems can have a negative impact on energy balance-related behaviours (i.e. dietary intake and physical activity) (21,22) leading to an even further increase in weight.

Treatment of obese adolescents

In 2004, at the start of our pilot study, usual care of adolescent obesity in the Netherlands was referral to a dietician in the home care setting. For extreme obese children and adolescents, an intensive combined lifestyle inpatient intervention, focusing on nutrition, physical activity and behavior change of the participants and their parents, is available (23). Surgery is an option for extreme obese adolescents with multiple co-morbidities who have not responded to traditional behavioral and pharmacologic interventions but only in a research setting (24). Medical management in obese adolescents was and is still not recommended in the Netherlands.

An outpatient treatment program aimed at attaining a healthy lifestyle was not available at that time. For this reason, the departments of paediatric endocrinology, nutrition and dietetics, medical psychology and public and occupational health of the VU University Medical Center in Amsterdam, developed a multidisciplinary intervention program (Go4it) for obese adolescents.

The development of Go4it

Along with a paediatrician, a psychologist, a nurse and a dietician we reviewed the existing programs and selected the most promising elements for Go4it. There were several treatment programs in the Netherlands targeting obese adolescents, but these were not described, and their effectiveness was unknown. We decided to base our program Go4it on the programs of Braet et al. (25), Epstein et al. (26) and the materials of the Dutch Obesity Intervention in Teenagers (DOiT) (25,27). The intervention of Braet et al. is a 10-months multicomponent inpatient treatment program. Focussing on attaining a healthy lifestyle by increasing physical activity and a healthy diet within a cognitive-behavioural framework, for obese adolescents in Belgium. Epstein et al. performed four group interventions in overweight and obese children, aged 6-12 years and their parents (26). These interventions existed of weekly treatment meetings for 8-12 weeks, and monthly meetings continuing for 6-12 months from the beginning of the program. Elements of these group interventions were the Traffic Light Diet to help reduce caloric intake and improve nutrient density, food diaries and behaviour modification techniques.

The 'DOiT' intervention is a school-based overweight prevention program for the pre-vocational educational level and developed and evaluated according to the Intervention Mapping protocol (27). DOiT was effective in improving hip- and waist circumference and sum of skinfolds in adolescents (mean age 12.7 years) (28,29).

We intended to develop an intervention that would be relatively easy to implement in the child health care and primary health care setting. Easy to implement implies at least low implementation costs, ready to use materials and no training sessions for dieticians. It also affected choices in the design of the intervention, which had to be evidence or at least theory-based and effective but also practical and affordable. These requirements have resulted in an outpatient program of limited duration (i.e. 3 months). Go4it included no exercise program, but participants were encouraged to seek and participate in existing training programs in their neighbourhood. A pilot study (period 2004-2005) showed promising effects of the Go4it program (30). During this pilot, we noticed the lack of knowledge of healthy food choices among adolescents and their parents. For this reason, we adjusted the Go4it treatment program paying more attention to healthy eating and including a second parent session.

Multidisciplinary group treatment Go4it

Go4it is a low intensity, multidisciplinary group treatment. In 7 sessions, with an interval of 2-3 weeks, the adolescents were educated on a healthy diet, physical activity, sedentary behaviour, energy balance and how to improve their lifestyle regarding a healthy weight and maintenance of energy balance (see Figure 3 for additional information). The first sessions focused on increasing awareness of their current lifestyle and the risk of overweight. Besides dietary and activity

journals, step counters (pedometers) were used to promote awareness of their actual physical activity behaviour. Next the adolescents had to set goals with respect to diet, physical activity and sedentary behaviour. Additionally cognitive behavioural therapy characteristics were used, e.g. learning to cope with difficult situations (parties, holidays) and bullying. Go4it includes homework tasks, and the education is interactive. After the 7 sessions, 4 booster group sessions were scheduled (after 6, 14, 26, and 36 weeks) in order to encourage participants to continue improving their lifestyle and discuss potential problems or questions. Besides these sessions for adolescents also 2 sessions for parents were organised. The parent sessions included education concerning the health risks of overweight, healthy dietary behaviour and how to attain an active lifestyle. Go4it was carried out in an outpatient clinic involving a dietician, paediatrician/endocrinologist and psychologist. The paediatrician was involved for a health check and to rule out other causes of obesity and was involved in the first parent session. During this session the paediatrician explained the health risks of overweight to the parents. However, in the child health care and primary health care setting the first parent session can also be carried out by a general practitioner. The psychologist was only called into consultation if necessary e.g. depression or extreme low self-esteem of an adolescent. Special materials were developed for this program; an information book, a workbook, and a dietary and activity diary (Figure 2) In addition, particular worksheets for every session were developed.



Figure 2: The materials developed for Go4it.

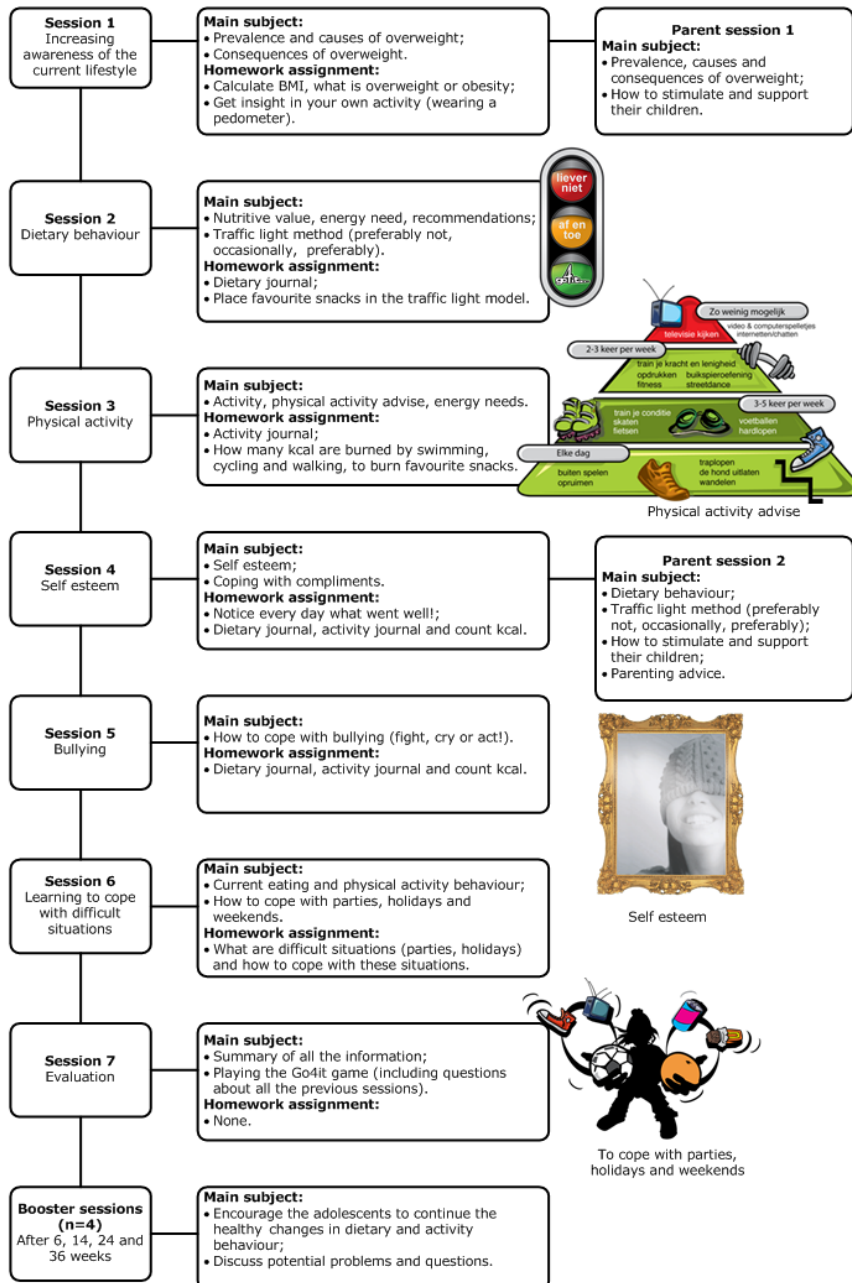


Figure 3: Flowchart of Go4it

Energy requirements and body composition

A prolonged imbalance between energy intake (diet) and energy expenditure (physical activity, sedentary behaviour) is the primary cause of the overweight problem. To get more insight into the energy needs of obese adolescents resting energy expenditure (REE) is assessed by indirect calorimetry (31). Next to REE, accurate estimation of fat-free mass (FFM) and fat mass (FM) is necessary to understand the effect of obesity on body composition but also for establishing reachable goals for weight-loss programs. Chapter 6 and 7 of this thesis focus on the accuracy of estimating REE and FFM in overweight and obese adolescents.

Aim and outline of this thesis

The main objective of this thesis is to describe the effectiveness of the multidisciplinary group treatment 'Go4it' in obese adolescents.

Chapter 2 describes the design of the randomised controlled trial evaluating Go4it. **Chapter 3** describes the prevalence of behavioural problems and social-emotional functioning in adolescents referred to the VU University Medical Center outpatient obesity clinic. **Chapter 4** describes the long-term effects of the Go4it multidisciplinary group treatment for obese adolescents on anthropometry, body composition, and metabolic indicators. In **chapter 5** the long-term effect of the Go4it multidisciplinary group treatment on Health Related quality of life is presented. **Chapter 6** compares resting energy expenditure predictive equations with measured values by indirect calorimetry. **Chapter 7** describes the comparison and validation of the fat-free mass predictive equation by bioelectrical impedance analysis with dual-energy x-ray absorptiometry measurements. The final chapter – **chapter 8** – summarizes the main findings of this thesis and critically discusses theoretical, practical, and methodological issues derived from this thesis.

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