

Supplementary Online Content

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eTable. Exclusion criteria

eAppendix. Description of interventions

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable. Exclusion criteria

- Severe psychiatric disorder (eg, schizophrenia, severe autism)
- Intellectual disability (IQ <75 or similar level of schooling),
- Obesity caused by endocrine disorders (hypothyroidism, Cushing syndrome, primary hyperinsulinemia, pseudohypoparathyroidism, acquired [structural] hypothalamic damage)
- Use of medication that could cause significant weight gain or weight loss
- Participation in a concomitant weight management program

eAppendix. Description of interventions

Intensive, combined lifestyle interventions, such as the treatment programs in this study, focus on nutrition, physical activity, and behavioral change in the participants and their parents. Experts from many disciplines are involved, such as pediatricians, dieticians, psychologists, social workers, nurses, exercise therapists, and Cesar exercise therapists (a specific type of exercise therapy in the Netherlands that is mainly focused on posture, balance, and coordination).

Both interventions in this study focused on knowledge, skills, and the implementation thereof in the home and everyday life. The same topics were covered during the educational sessions in both treatment programs. Behavioral educational training was given in groups. Additionally, individual meetings with psychologist, dietician, or social worker were organized as needed.

Both treatment programs were divided into 3 phases¹:

- 1) Assessment/knowledge acquisition phase (week 1-6)
- 2) Knowledge and skills building phase (week 7-18)
- 3) Implementation phase (week 19-26)

During the first phase, extensive physical and psychosocial examinations were carried out. Through these examinations and individual visits to the dietician, psychologist, and pediatrician (both with and without their caregivers), specific problems for each child were determined, and then addressed in the second and third phases. The behavioral educational training ended at the start of the third phase. The focus of the third phase was on putting the acquired knowledge into action.

In the second phase of the program, each participant received an individual food requirement schedule (based on the Schofield formula for a normal weight, according to height and age).² For reference to help their decision-making over food intake, their caretakers also received a copy of this schedule.

The central focus of the treatment programs was not on achieving the maximum weight loss possible but on behavioral changes necessary to reduce weight. Techniques used in the behavior modification are cognitive behavioral therapy, behavior change- and problem solving techniques (5-steps of problems solving), coping-skills training, modeling of behavior (e.g. in role play), and motivational interviewing).³

In the “5 steps of problem solving” technique, the first step is to define the problem, and learn how to describe it. The second step is to search for all possible solutions for the defined problem. Step three is to make an inventory of the possible consequences for each possible solution that was described in the second step. The fourth step is to choose the preferred solution, and step five is to implement and evaluate this solution. If the problem is not solved, one can go back to an earlier step. By doing this procedure, the children learn to formulate their own personal change management, and to set realistic goals.

The parents were encouraged to provide a healthy lifestyle in the household (eg, healthy food, active lifestyle, sports-club membership). Many parents of the participants were overweight or (severely) obese, themselves. When they expressed the wish to lose weight and become more physically active, themselves, they were supported in doing so, but the main focus remained on their roles as educator, caregiver, provider, and role model for their child.

Inpatient treatment program

Patients randomized to the inpatient treatment program were hospitalized for 26 weeks. They stayed in units, with a maximum of 10 patients in each group. The groups were composed according to age (primary school or secondary school age). In the inpatient treatment groups, children with severe obesity were treated together with children with asthma or diabetes type 1. A child-life specialist acted as a group coach for each treatment group.

The children were at home for the weekends with homework assignments on nutrition and physical exercise. School was an integrated part of the program. During the first phase of the program, the participants received schooling within the hospital, except for primary school children. Primary school children went to local schools where teachers could monitor their dietary habits. During the second and third phase, secondary school children visited schools in the vicinity of the hospital. They carried lunch packets, which they made for themselves in the hospital, as school luncheons are not provided for in Dutch schools. On weekdays, food was provided by the

hospital. This restricted the available quantity and choices, especially in the first phase, when they were not allowed outside the hospital grounds. Also, being in hospital to attend a weight loss program will, by itself, probably restrict individual food intake. However, there was no other (external) swaying of individual food intake during the first phase (weeks 1-6) of the program. During the second and third phases, children were coached on the variety and quantity of food to eat. In these phases of the program, participants attended local schools, and were allowed town visits. This gave them unrestricted opportunities to get food, snacks, soft drinks, and sweets, in addition to the food provided by the hospital.

The physical education program consisted of an exercise schedule for four days per week (30-60 min each, mean duration of exercise sessions were 45 min), and nutrition/behavior modification once per week (60 min each). During the third phase of the program, the participants had the opportunity to attend sports activities outside the hospital, once a week. The chosen frequency of exercise was inspired by the possibility of implementing this frequency in everyday life at home.

In week 22, the participants in the inpatient group returned to their families for a maximal duration of one week. The purpose of this visit was to practice all their skills at home during the course of a normal week, including going to school, to experience the problems they encounter in their home environment. These problems were discussed upon return to the hospital, and applicable solutions were formulated before discharge.

Ambulatory treatment program

Patients and their caregivers, who were randomized to the ambulatory program, attended the program for 12 visits of 3.5 to 5.25 h (mean 4 h) each, including breaks and lunch, at increasing time-intervals over a six-month period. Treatment groups consisted of a maximum of eight patients in each group. The groups were composed according to age (primary school or secondary school age). A child-life specialist acted as a group coach for each treatment group.

The children were weighed at the start of each visit. After weighing, the children exercised for one hour (swimming or gymnastics, as planned by the therapists). Children and parents were also encouraged to exercise at home for three additional times per week, and to reduce sedentary behaviors. After the physical exercise, the children attended a one-hour educational program. In parallel sessions, the caretakers were given detailed instructions on nutrition and nutritional behavior. The classes emphasized the importance of the parents' role in inducing changes in health-related behaviors. The parents also received exercise counseling. The content of the nutrition classes and behavioral modification classes for the children and parents/caretakers were exactly identical to those given during the inpatient treatment program.

The visits further included private meetings with psychologists, dieticians, and social workers. During these treatment sessions, lunch was provided by the hospital without caloric or portion control. Healthy choices were offered with unrestricted choice as to volume of intake. Children and caregivers were also given homework assignments.

In the ambulatory treatment program, the commencement of the third phase is obviously less precisely defined. Children and parents showed great diversity in acquiring knowledge and skills. Hence, some families succeeded earlier in the program at putting positive behavioral change into action, while others needed more time.

References

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