

Development of a Dutch intervention for obese young children

E. van Hoek^{1,2}, L. I. Bouwman³, M. A. Koelen³, M. A. J. Lutt⁴, E. J. M. Feskens⁵, and A. J. Janse^{1,*}

¹Department of Paediatrics, Gelderse Vallei Hospital, PO Box 9025, Ede 6710 HN, The Netherlands, ²Department of Paediatrics, Radboudumc, Nijmegen, The Netherlands, ³Department of Social Sciences, Health and Society, Wageningen University, Wageningen, The Netherlands, ⁴Department of Medical Psychology, Gelderse Vallei Hospital, Ede, The Netherlands, and ⁵Division of Human Nutrition, Wageningen University, Wageningen, The Netherlands

*Corresponding author. E-mail: jansea1@zgv.nl

Summary

The objective of this article is to provide insight in the five-step development process of the best evidence, best practice intervention for obese young children 'AanTafel!'. A set of requirements for intervention development was developed to guide the data inquiry: the use of theory, influencing factors, tailoring, multi-disciplinarity, duration/frequency and evaluation and monitoring. Step I retrieved evidence from clinical guidelines, followed by a systematic review with meta-analysis (Step II) and an extended literature review (Step III). Evidence was consistent with regard to parent-focus, targeting family level, including diet, physical activity and behaviour change techniques and tailoring to age. However, no evidence or inconsistent evidence emerged from the theory-basis, group-versus-individual sessions, face-to-face contact versus Internet-mediated contact, which disciplines to involve and how to involve them, as well as intervention duration and intensity. Hence, practice-based insights from parental interviews (Step IV) and involved therapists were added and subsequently integrated to the intervention 'AanTafel!' (Step V). 'AanTafel!' is a multi-component, multi-disciplinary, family-based, parent-focused, age-specific intervention, which is tailored to individual children and families with a duration of 1 year, and using a combination of individual and group sessions as well as a Web-based learning module. Changes in scientific working principles with regard to data collection, reporting and translation to guidelines are required. Practice and science may benefit from close collaboration in designing, implementing and evaluating interventions.

Key words: childhood obesity, intervention, development process, pooling and patching

INTRODUCTION

In 2009, the Department of Paediatrics of the Gelderse Vallei Hospital (ZGV, Ede, The Netherlands) was confronted with a growing number of young obese children.

ZGV provides an intervention for obese children aged 8–12. However, no intervention was available for young children aged 3–8. Therefore, the ZGV professionals involved in obesity intervention decided to develop an

intervention, resulting in ‘AanTafel!’ (Dutch for ‘to the table’, synonymous with sharing a meal).

This intervention was piloted in 2010 and up till now five groups with 34 children with their parents have participated. All participating children were referred for obesity intervention by their general practitioner, youth health-care physician or paediatrician. Preliminary results show a clinically relevant decrease of body mass index (BMI) z-score of 0.5 on short- and long-term with a follow-up 2 years after the intervention.

The prevalence of childhood obesity is increasing worldwide (Ng *et al.*, 2014). Obesity in children has severe somatic effects, such as hyperlipidaemia, hypertension, insulin resistance, diabetes mellitus and liver disease even at a young age (Mossberg, 1989; Berenson *et al.*, 1998; Dietz, 1998; Viner *et al.*, 2005). This increases the risk of cardiovascular diseases later in life, and several studies found a higher mortality in those who had been obese in childhood (Mossberg, 1989; Gunnell *et al.*, 1998; Bjorge *et al.*, 2008; Franks *et al.*, 2010). In addition to the somatic effects, the psycho-social effects of obesity in childhood are serious. Obese children more frequently suffer from negative discrimination, social stigmata, bullying, depression, a lower self-image and a lower Health-Related Quality of Life (HRQoL) as compared with normal-weight children (Dietz, 1998; Janssen *et al.*, 2004; Young-Hyman *et al.*, 2006; Tsiros *et al.*, 2009).

Research indicates that intervening at a young age is correlated with a reduction of BMI (Sabin *et al.*, 2007; Pott *et al.*, 2009; Reinehr *et al.*, 2010) and may delay adiposity rebound, the time point when BMI rises after reaching its lowest point, preventing later obesity (Williams and Goulding, 2009; Campbell *et al.*, 2011).

During the development process of ‘AanTafel!’, an extensive literature search was performed. A gap was found in the evidence required for the development of the intervention. This science–practice gap is known in the literature and is possibly partly due to the rigid protocols used to ensure internal validity in randomized controlled trials (RCTs). Review studies and the development of clinical guidelines result in evidence that is perceived as less relevant and less applicable to the real-life context of programme developers (Green *et al.*, 2009).

This article describes the process of the development of ‘AanTafel!’ through data inquiry and data integration. During this process, we derived scientific evidence from the literature and filled gaps with insights from the target group and with professional expertise and judgement. By providing insight in this process, we specify the request for more practice-based evidence in the area of childhood obesity, and ultimately, we aim to contribute to the development of evidence-based interventions.

THE DEVELOPMENT PROCESS

The authors compiled a set of requirements to guide the inquiry of evidence from the scientific literature. The requirements are based on the general recommendations on using theory, monitoring and evaluation and a clear understanding of the targeted behaviours and the context in which they occur, as emphasized in the literature on health programme development (Green and Kreuter, 2005). The international recommendations were used to specify childhood obesity intervention (tailoring to developmental stage, duration and intensity of intervention) (WHO, 2007). The set entails the following six requirements:

1. *Use of relevant theoretical models.* Programmes have to be based on appropriate theory and evidence [(Green and Kreuter, 2005), p. 197].
2. *Use of multi-level factors.* Various factors at multiple levels influence the development of childhood obesity (Davison and Birch, 2001). The reciprocal interaction between these factors and, hence between levels, demand multi-component efforts in everyday settings in which children grow up, learn and play, as well as efforts at community and policy level [(Green and Kreuter, 2005), p. 2].
3. *Intervention tailored to the specific needs and circumstances of the target group.* Targeting the programme to take into account age-related concerns, culture, circumstances and needs [(Green and Kreuter, 2005), p. 6]. Tailoring to the age of the child is important because of age-specific physical and psycho-social development (WHO, 2007).
4. *Collaboration and multi-disciplinary responsibility.* Collaboration and participation of all actors concerned and encouragement of shared responsibility on all levels (WHO, 2000) [(Green and Kreuter, 2005), p. 85].
5. *Sufficient duration and intensity.* Obesity should be treated as a chronic disease, which requires long-term follow-up and management. Interventions must recognize this need and provide support for life-long lifestyle changes needed for successful obesity management (WHO, 2000, 2007).
6. *Monitoring and programme evaluation.* Programme developers must evaluate all interventions to ensure reach, coverage, quality, impact and improvement [(Green and Kreuter, 2005), p. 243].

The development process involved five steps.

In Steps I–III, the scientific literature was reviewed based on the total set of requirements:

- Step I. A review of clinical guidelines and reports on childhood obesity interventions.

Step II. A systematic review with meta-analysis of effective childhood obesity interventions for children aged 3–8 (van Hoek *et al.*, 2014).

Step III. Review of evidence on effective childhood obesity interventions and the use of Internet without age specificity.

This inquiry is supplemented with practice-based information in Steps IV and V:

Step IV. Semi-structured interviews with parents on the waiting list for an intervention for their obese child.

Step V. The expertise and experience of the involved therapists was used to integrate the findings, fill gaps in the evidence and compile the ‘AanTafel!’ programme.

RESULTS: STEPS I–V

The scientific evidence and practice-based insights with regard to the requirements for theory, influencing factors, tailoring, multi-disciplinarity, duration/frequency and evaluation are described for each step (for an overview, see Table 1).

Step I. Review of clinical guidelines and reports

The Dutch (CBO, 2008; van Binsbergen *et al.*, 2010), the British (NICE, 2006) and the US American guidelines (Barlow, 2007; Spear *et al.*, 2007), as well as the WHO reports at European (WHO, 2007) and global level (WHO, 2000), were reviewed.

Theory

No recommendations were found with regard to using theory in obesity intervention or the theories used to set the recommendations.

Influencing factors

All documents emphasize the need to intervene at family level and recommend the involvement of parents (WHO, 2000, 2007; NICE, 2006; Barlow, 2007; Spear *et al.*, 2007; CBO, 2008; van Binsbergen *et al.*, 2010). However, this is mentioned without specific reference to the preferred setting for the provision of such intervention. Group intervention, which partly mimics the influence of peers, is advised for pre-school children in the European Region WHO report (WHO, 2007), without further specification. According to the US guideline, group intervention has therapeutic benefit and may be more cost-effective (Barlow, 2007). Consistent emphasis is put on using a multi-component approach including diet and physical activity, and most guidelines also recommend behavioural

modification techniques for some or all families (WHO, 2000, 2007; NICE, 2006; Barlow, 2007; Spear *et al.*, 2007; CBO, 2008; van Binsbergen *et al.*, 2010).

Tailoring

Age-specific recommendations are found for setting weight goals and dietary changes. Regarding weight goals, the US guidelines recommend very gradual weight loss for children under 5 years of age (Spear *et al.*, 2007). For cognitive or physical development stages, no recommendations were found (WHO, 2000, 2007; NICE, 2006; Barlow, 2007; Spear *et al.*, 2007; CBO, 2008; van Binsbergen *et al.*, 2010).

Multi-disciplinarity

The involvement of a multi-disciplinary team (dietician, physiotherapist and an expert on psychological help and parenting skills) is recommended during the intensive stage of the intervention (Barlow, 2007), or in general (van Binsbergen *et al.*, 2010). The composition of the multi-disciplinary team, however, is not specified in all documents.

Duration/frequency

The guidelines provide different recommendations on duration and frequency of intervention, ranging from weekly to once per 3 months and from 3 months to 1 year with long-term follow-up to maintain healthy behaviour (NICE, 2006; Barlow, 2007; CBO, 2008; van Binsbergen *et al.*, 2010).

Evaluation

No recommendation for monitoring and evaluation of programmes was included.

Step II. Systematic review of obesity intervention for 3–8 years old

Step I did not provide evidence with regard to the use of theory, to tailoring to cognitive or physical development stages and to monitoring and programme evaluation. The evidence on multi-disciplinary collaboration and duration and intensity was inconsistent. Therefore, a systematic review with a meta-analysis of effective childhood obesity interventions for children aged 3–8 was performed by van Hoek *et al.* (van Hoek *et al.*, 2014). A total of 27 studies were included in this review, of which 11 were eligible for meta-analysis. Because of high heterogeneity, a subgroup analysis was performed.

Influencing factors and duration/intensity

The subgroup multi-component interventions (including behavioural change techniques in relation to diet and

Table 1: Overview of the data inquiry and data integration steps

Retrieved scientific (Steps I–III) and practice (Steps IV and V) based insights	Data inquiry				Data integration to ‘AanTafel!’
	Step I. Clinical guidelines and WHO reports	Step II. Systematic review	Step III. Scientific literature not age-specific	Step IV. Interviews with parents	Step V. Professional judgement
1. Theory	No evidence	Not available due to limited number of studies	No evidence	Not applicable	No specific theory
2. Influencing factors	<i>Consistent:</i> family level; parents involved; group sessions; diet and physical activity <i>Inconsistent:</i> behaviour change techniques	<i>Consistent:</i> multi-component including behaviour change techniques for diet and physical activity	<i>Consistent:</i> family level; at least one parent involved. Multi-component: diet, physical activity, behaviour modification techniques <i>Inconclusive:</i> sleeping behaviour <i>Inconsistent:</i> group or individual sessions	Diet and physical activity	Family level Parent focused: participation of at least one parent Group and individual sessions Behaviour modification techniques on parenting, diet, physical activity and sleeping pattern
3. Tailoring	<i>Consistent:</i> age-specific weight goals and dietary intake	Not available due to limited number of studies	No evidence	Child and family (housing, weight of parents, work-, eating- and physical activity patterns)	Age: physical-motoric, social-emotional, cognitive development stage of the child Family setting and preferences
4. Multi-disciplinarity	<i>Consistent:</i> multi-disciplinary	Not available due to limited number of studies	<i>Consistent:</i> multi-disciplinary <i>Inconsistent:</i> which disciplines to involve	Not applicable	Multi-disciplinary: paediatrician, child psychologist, paediatric dietician, child physiotherapist Multi-disciplinary presence at sessions Regular team meetings

5. Duration/intensity	<i>Inconsistent:</i> range from weekly to once/3 months to 1 year with long-term follow-up	<i>Consistent:</i> moderate to high intensity	<i>Inconsistent:</i> frequency of contact; substitution face-to-face with Internet-mediated contact	High access to and likeability of Internet-mediated contact	➔	<p>1 year: 4 months high intensity (eight sessions) and 8 months low intensity (six sessions)</p> <p>20 contact hours; 14 sessions (12 group, two individuals; nine parents only)</p> <p>Web-based learning module (13 chapters)</p>
6. Evaluation	No evidence	Not available due to limited number of studies	<i>Consistent:</i> weight, somatic, psycho-social and health behaviour indicators	Weight, somatic, psycho-social and behavioural indicators	<p>Reach</p> <p>Acceptability</p> <p>BMI z-score, cardiovascular risk-profile, HRQoL, dietary intake, physical activity level</p>	

physical activity) of moderate to high intensity (>26 h face-to-face contact) showed the largest change in BMI z-score, which was clinically relevant (van Hoek *et al.*, 2014). However, no evidence was found regarding the optimal duration of the intervention.

Theory, tailoring, multi-disciplinarity

Further analysis regarding theory, group or individual sessions, tailoring to age and multi-disciplinary team composition was not possible due to limited numbers of papers and limited descriptions of interventions. The subgroup with the largest change in BMI z-score included only two interventions (Kleber *et al.*, 2009; Stark *et al.*, 2011). Both studies were group interventions and were tailored to age by focusing on parents rather than on children and on targeting behaviours unique for the pre-school years, e.g. food neophobia and tantrumming for food (Kleber *et al.*, 2009; Stark *et al.*, 2011).

Step III. Review of obesity interventions without age specificity

Step II did not provide additional evidence on theory, on tailoring to cognitive or physical development stages, on multi-disciplinary collaboration or on duration and monitoring. Therefore, scientific literature was reviewed using an extended age-range. Specific attention was paid to the use of Internet-mediated communication for reasons of its potentially lower frequency of more expensive face-to-face contact and its user-friendly character with regard to flexibility in location and time.

Theory

No evidence was found for the use of a specific theory in an obesity intervention.

Influencing factors

The *Cochrane review* of childhood obesity interventions of Oude Luttikhuis *et al.* (Oude Luttikhuis *et al.*, 2009) recommends targeting the family level, with at least one parent involved. The involvement of parents contributes to a decrease in their child's overweight, particularly for children younger than 12 (Golan *et al.*, 1998, 2006; Golan and Crow, 2004). RCTs are inconclusive regarding the use of group or individual intervention (Kalavainen *et al.*, 2007, 2011; Garipagaoglu *et al.*, 2009). Combined behavioural lifestyle interventions can result in a clinically relevant reduction of overweight (Oude Luttikhuis *et al.*, 2009). In addition to the components of diet and physical activity, a link between sleep and overweight is reported (Nielsen *et al.*, 2011).

Tailoring

In relation to obesity intervention, tailoring to cognitive and psycho-social developmental stages is not specifically mentioned.

Multi-disciplinarity

No consistent evidence was found in the literature on which disciplines should be involved.

Duration/frequency

Also no consistency was found in the optimal frequency of contact (Spear *et al.*, 2007) and as to whether and how to substitute face-to-face contact with Internet-mediated contact. Besides potential cost-reduction, the use of Internet may reduce participation barriers such as travel time, transportation difficulties and work-related issues and enhance adherence by allowing the participants a self-chosen time and location (Hampl *et al.*, 2011; Brennan *et al.*, 2012). Smith *et al.* (Smith *et al.*, 2013) reviewed the impact of health information technology (IT) targeted on parents or children on patient outcomes and care processes in obesity clinic-based intervention in children aged 2–18. They conclude that IT may improve access to interventions, but that its impact on weight loss and behaviour change is understudied and findings are inconsistent. Other reviews also conclude that Internet-mediated strategies could be a valuable addition to other strategies, although requirements for successful use in childhood obesity interventions are still unknown (An *et al.*, 2009; Webb *et al.*, 2010; Andersson *et al.*, 2011).

Evaluation

Regarding evaluation, the intervention aims to improve health and well-being of the obese child, and hence the effect on (i) overweight, (ii) somatic parameters, (iii) psycho-social parameters and (iv) health behaviour should be evaluated (Stern *et al.*, 1995; Green *et al.*, 2009; Reinehr, 2011).

Step IV. Interviews with parents

In addition to the scientific evidence, insights were derived from interviews with parents of an overweight child on the waiting list for intervention. The children were referred for obesity intervention by their general practitioner, youth health-care physician or paediatrician. Twelve randomly selected parents were asked to participate in semi-structured telephone interviews. Eleven parents (ten mothers, one father) consented and one parent could not be reached.

The interviews focused on the expectations and preferences with regard to the design and content of the intervention and the use of Internet-mediated elements. The interviews were audio-taped and fully transcribed. The text was analysed using content analysis, which involved

a process of selecting and coding text fragments (Silverman, 2001) based on the requirements relevant to this step: influencing factors, tailoring, duration/intensity and evaluation.

Influencing factors

Parents indicate strategies to change their child's diet and physical activity as essential components. With regard to diet, they prefer to learn how to apply dietary recommendations in the home situation, and parents prefer to learn how to support their child rather than gain basic knowledge on a healthy diet. Parents prefer support for stimulating their child to be physically active, and some regard this as more important than dietary support. Some parents request behavioural change techniques. One parent mentioned that she already went to a dietician with her child, but that this did not offer her any useful information. Some parents did not mention specific elements, but emphasized that whatever their child participates in should be fun, learning by playing.

Tailoring

Parents prefer an approach tailored to the characteristics of their child and family, such as housing conditions, weight status of the parents, working schedules and the family's eating and physical activity patterns. The approach should be positive, highlighting their child is OK and not (only) 'too fat'. One parent emphasized that this is especially relevant because of her child's young age (4 years).

Duration/intensity

All parents had access to Internet. All, except one parent, said that they like the use of Internet in the intervention, because it is time-saving (saving travel time, faster compared with reading information on paper), 'normal' (nowadays everything is on the Internet), choosing one's own moment. However, one parent also mentioned that it should be combined with face-to-face contact, because she needs external pressure to actually use the Internet.

Evaluation

Parents expressed concerns about the overweight itself (should decrease) as well as the somatic (e.g. diabetes), psycho-social (e.g. teasing) and behavioural consequences. Some parents emphasized that they want their child to be healthy and able to be as physically active as any other child.

Step V. Integration based on professional judgement

The last step entailed the integration of findings from Steps I to IV to compile the intervention 'AanTafel!'. Data

integration was performed by the team of therapists involved: a paediatrician, child psychologist, paediatric dietician and a child physiotherapist. All team members are experienced in the diagnosis and treatment of overweight children in the clinical setting. For each requirement, the best available evidence was combined with the knowledge and expertise available within the team on obesity intervention for other age groups (Hospital Gelderse Vallei provides an obesity intervention for 8- to 12-year-old children) and the local setting. In addition, the team consulted their network of researchers from Wageningen University (WU) with expertise in nutrition, physical activity, health behaviour change and health promotion. The co-operation between the WU and the ZGV takes place within the Nutrition Alliance Gelderse Vallei aimed at obtaining a better connection between research and practice. No systematic procedure was followed during this step. This is characteristic for practice, where decisions arise from a flow of daily actions (regular and *ad hoc* meetings) rather than from a pre-defined procedure. Budget constraints played a role in weighing the findings as well.

Theory

No specific theory but rather a mixture of theoretical insights from the team members and consulted scientists has been applied.

Influencing factors

'AanTafel!' is a parent-focused intervention and targets the family level. At least one parent has to be involved. It is a multi-component programme and includes behavioural change techniques with regard to dietary intake and physical activity and for a small part to sleeping patterns (see also Table 2). Group sessions ($n = 12$) to provide peer support and individual sessions ($n = 2$) for family and child tailoring are combined to reduce costs.

Tailoring

The team included tailoring to the motoric, social-emotional and cognitive development stage of the child, despite the lack of evidence retrieved. In contrast to the literature on obesity, the so-called 'developmental and parenting tasks' are commonly known principles in child development (Havighurst, 1948). It emphasizes the themes in childhood and tailors parenting skills to the developmental stage of the child. In relation to obesity, it follows that different learning processes require consideration per developmental stage. From the age of three, children first learn by modelling, they become more sociable and learn parents' values. Afterwards (school age), they

Table 2: Key themes in 'AanTafel!'

Theme	'AanTafel!'
Behavioural change techniques and parenting	Self-monitoring (parents awareness of current lifestyle) Group discussion on current lifestyle Individual goal-setting ^a Discussion of plan goal-getting and problem-facing Parent as role model Parenting skills Praising and rewarding Build self-esteem of the child
Dietary patterns	Dietarian goals based on dietary record (self-monitoring and evaluation) Education based on healthy eating advice Target is small reduction in energy intake Healthy food choices (e.g. instruction through supermarket visit) Healthy (low fat and calorie) snacking Limit sweetened beverage Eat breakfast Eat at the table as a family
Physical activity patterns	Physical activity goals based on physical activity diary (self-monitoring) Target: increase physical activity (≥ 1 h/day at least moderate intensive), reduce sedentary behaviour Increase exercise in daily life (walking/cycling) Encourage general activity and active play Encourage participation in sports or other active recreation Four meetings in which parents and children are physically active together to stimulate parents to be active with their child and learn what kind of activity their child likes Learn active games: inside home with every household present materials
Sleep patterns	Information on normal sleep patterns Assignment to monitor the sleep pattern of their child If there are clues for sleep disturbances, these will be further evaluated and therapy will be offered

^aThe therapists support the parents to formulate goals that are effective for weight control, are realistic and fit the individual families.

learn about social relationships with other children and they develop a feeling of self-worth. Their autonomy develops gradually. In relation to eating, age influences the child's understanding of health and the (dis)liking of healthy eating behaviours such as eating fruit and vegetables (Zeinstra *et al.*, 2007). These findings point at differences in learning processes, which should be considered in an intervention. Therefore, 'AanTafel!' differs from the obesity intervention for children aged 8–12, the main difference being that this programme for older children is not only parent, but also child focused.

Central to 'AanTafel!' is the tailoring to age and the family situation. For instance, parents learn age-appropriate parenting skills in relation to diet (e.g. praise/reward tailored to social-emotional development), physical activity (e.g. activities tailored to motoric development) and sleep. Goal-setting per family is used to further tailor the intervention to each family. Part of the group sessions (9 out of 14) are for parents only. The

children actively participate in the physical activity group sessions and the individual sessions. Behavioural change techniques and parenting techniques are offered, such as goal-setting and modelling (Table 2).

Multi-disciplinarity

No evidence was found on which disciplines to involve. In line with the existing childhood obesity intervention at the hospital, the multi-disciplinary team consists of a paediatrician, child psychologist, paediatric dietician and child physiotherapist. This combination of expertise covers the factors influencing childhood obesity that are indicated in the previous steps. No evidence was found on the specific input of the various disciplines. The team matched their individual (disciplinary) knowledge with the factors addressed in the sessions, resulting in partly multi-disciplinary sessions. Regular team meetings intent to safeguard the exchange of information about the participants between sessions.

Duration/intensity

The literature did not provide conclusive evidence with regard to duration. Based on previous experience with interventions, ‘AanTafel!’ has a total duration of 1 year, starting with four high-intensity months (eight sessions), followed by eight low-intensity months (six sessions). The first part aims to increase awareness and to set goals for diet and physical activity; the second part aims to prevent relapses and to sustain the acquired behaviour in the family setting. The programme entails a total of 20 contact hours divided into 14 sessions, of which 12 are group sessions (1.5 h) and 2 are individual sessions (1 h). The Web-based learning module provides 13 chapters with information, short movie-clips and homework assignments, which participants have to complete before the next session. The team decided to include this module to reduce the number of high-cost individual sessions without reducing the amount of tailored feedback.

Evaluation

Although the previous steps did not report on process evaluation, indicators to assess reach (attendance, drop-out, log-ins and completed assignments of Web-based learning modules) and acceptability (interviews with parents and therapists) are included in the programme to provide insights for future improvement. In line with the evidence, outcome indicators include BMI *z*-score, cardiovascular risk-profile, HRQoL score, nutritional intake and level of physical activity.

DISCUSSION

In this study, evidence was not available, was not specific or inconsistent with regard to the requirements of the use of theory, involvement and collaboration between therapists from multiple disciplines, duration, intensity and monitoring and evaluation of interventions. In the area of childhood and adolescent obesity intervention, the US Expert Committee on obesity also concluded in their most recent (2007) report that, since their previous 1998 review, gaps in evidence-based recommendations remain (Barlow, 2007). Hence, the Committee developed their recommendations on the available evidence as well as on expert opinion (Barlow, 2007). The preferences of parents are important to gain insight in which strategy best involves them, and to be able to optimally tailor to the target group. Therefore, we performed interviews with parents of obese young children. The most important findings are that parents prefer to address the problem at a family level, receive learning strategies for changing their child’s diet and physical activity and that an intervention is tailored to their child and family situation. Furthermore,

the target group was positive on the use of Internet-mediated elements. The information from Steps I–IV was integrated into the programme by professionals of different disciplines. As described above, the recommendations derived from science did not totally cover the needs in practice. Similar to findings in the literature, no explicit theory was used to develop ‘AanTafel!’. However, the multi-disciplinary team used their background of theoretical models, resulting in the multi-disciplinary approach, behavioural change techniques such as role modelling, and tailoring them to the family and child development stages. In the process of integrating evidence, practical issues and circumstances also play a role, such as the budgetary limitations in our case. Budgetary limitations are common in most settings and force decisions reducing the intensity of interventions.

The effective programmes were moderate to high intensive (face-to-face contact of at least 26 h) (van Hoek *et al.*, 2014), but ‘AanTafel!’ includes only 20 h of face-to-face contact in 1 year. The evaluation of the Web-based learning module will have to show if it is an effective substitute, keeping in mind the lower costs of Internet-mediated tools as well.

The ‘science–practice gap’ is a well-known issue in health programme planning. It may partly be the result of disagreement between producers (scientists) and users (practitioners) of evidence, specifically on what is relevant evidence and how to obtain it (Kumanyika and Economos, 2011). To allow health professionals to work more evidence-based, more practice-based research is required. There is a need for more extensive reports on the theoretical base, structure and content of interventions targeting obese children. It is also of high importance to report on the external validity, such as recruitment and selection procedures of participants, intervention staff, delivery settings and the degree to which the intervention is modified (Green *et al.*, 2009). Furthermore, in publications on the evaluation of interventions, RCTs are often mentioned as gold standard to examine which (components of) the effect on overweight is provided, but information on the structure and content of the intervention and effect on other physical and psychological parameters is frequently missing (van Hoek *et al.*, 2014). A process evaluation as well as an outcome evaluation is important and are planned for ‘AanTafel!’. Results of such evaluations have to be published to allow for a comparison of different interventions (Stern *et al.*, 1995).

Interventions are effective; however, results of interventions in RCTs differ from clinical practice outside the RCT due to lack of documentation and a high drop-out rate (Britton *et al.*, 1999; Reinehr, 2011). Possibly, this can be explained by the difference in setting and

population (Britton *et al.*, 1999; Green *et al.*, 2009). In our opinion, not only RCTs but also practice-based research will help to unravel the factors for success in behavioural change.

Remarkably, 10 of the 11 interviewed parents were mothers. It is known that mothers and fathers have different parental influences on their children's weight status and lifestyle behaviour (Lloyd *et al.*, 2014), therefore this can be regarded as a limitation of this study. Perhaps, mothers were at home more often, and therefore easier to reach. Another limitation of this study is that the process of inter-professional judgement is based on the individual experience and knowledge of the professional, and is therefore not an objective process. However, as described above, this is an important step in integrating the findings and it makes use of information that professionals have gained through their own experience, but also through the experiences of other professionals in their networks (Green and Glasgow, 2006).

In this article, we provide information on the basis and content of our programme for other health practitioners who want to develop or improve an intervention for obese young children. In case of lack of specificity of guidelines, deriving different types of evidence is needed to develop a new best evidence intervention. For obese young children in a clinical setting, the result of this process is an intervention with the following key characteristics: multi-component, multi-disciplinary, family-based with focus on the parents, age-specific, tailored to individual children and families, duration 1 year and using a combination of individual and group sessions with a Web-based learning module. Because of the importance of tailoring the intervention to different target groups, this advice cannot be transferred to other target groups, e.g. other age groups or non-obese children (i.e. of overweight); for other target groups, the process of deriving and integrating evidence has to be repeated.

CONCLUSION

We have integrated evidence from science and practice for the development of an intervention for obese young children. Requirements for effective interventions were set. The clinical guidelines provided not enough specific information on the requirements, and on several requirements the information from different guidelines was conflicting, missing or vague. The method of integrating evidence from clinical guidelines, additional literature review, target group interviews and professional input was a helpful method to complete the requirements. The obtained information was integrated in the final step of the development process. The characteristics of the resulting intervention

are described in this article. With Internet-mediated elements we hope to maintain effectiveness, despite a lower intensity than advised in the literature. A process evaluation and outcome evaluation are essential to provide more information on key characteristics for effective intervention and have been planned. We recommend changes in scientific working principles on programme development. First, with regard to the inclusion of target-group and therapists' perspectives, it is essential in practice to align with context-specific circumstances at the family homes as well as in the clinical setting. Second, data reporting and thus clinical guidelines should be more sensitive to the specificity required in practice with regard to how to involve both the target group and therapists, how to combine different strategies such as face-to-face and Internet-mediated contact, group and individual sessions and how to decide on the optimal duration and intensity of contact.

Implications for practice

The process of integrating evidence from science and practice is a useful method to overcome the gaps in clinical guidelines. Both practice and science may benefit from close collaboration. If practitioners voice their concerns, scientists may become more sensitive to report not only outcomes but also the theoretical base, structure and content of the intervention and thus help make the evidence more relevant and applicable to practice.

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