How science thinks and practice acts: bridging the gap in weight management interventions for adolescents

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Background. Adolescent obesity calls for evidence-based treatment approaches given its long-term physical and psychosocial consequences. However, research shows there are many problems in the translation of scientific evidence into practice.

Objective. The aim of this study was to develop science- and practice-based recommendations for the planning of future adolescent weight management interventions.

Methods. We performed (i) literature reviews on intervention studies targeting treatment of obesity in adolescents and Dutch clinical guidelines for obesity as well as practice-based documents and grey literature on treating obesity and delivering health programs for adolescents and (ii) semi-structured interviews with eight clinicians and four non-clinicians working in obesity treatment, management and prevention to explore perspectives on treating adolescent obesity and using evidence in practice.

Results. After merging the results from the literature reviews and interviews, four issues emerged: (i) little reporting on theoretical models used in intervention studies, Dutch clinical guidelines and semi-structured interviews; (ii) inconsistency on age-specific considerations for treating obesity in adolescents in intervention studies and Dutch clinical guidelines; (iii) inconsistency on addressing the social nature of obesity in intervention studies and Dutch clinical guidelines and (iv) how professional responsibility should be divided is unclear from intervention studies, Dutch clinical guidelines and semi-structured interviews.

Conclusions. Joined action of science and practice is required for future interventions. Future interventions should include topics relevant to the stage of adolescence and give greater focus to the complex social nature of obesity. Lastly, practitioners can generate more practice-based evidence by starting their own practice-based research.

Keywords. Adolescents, evidence, obesity, practice-based, PRECEDE-PROCEED.

Introduction

The seriousness of obesity grows substantially higher the longer into adolescence it persists. Obese adolescents are 62–98% more likely than their normal weight counterparts to become obese at 35 years of age.1 Obesity increases the risk of chronic diseases, but may also have psychosocial and economic consequences. In a longitudinal study tracking 10,039 young people between 16 and 24 years of age, those that were identified as overweight in adolescence had significantly lower household incomes and higher rates of poverty after a 7-year follow-up period (independent of socioeconomic status and scholastic aptitude score) compared to those that had been of a normal weight during adolescence.2 Integrated treatment approaches are necessary given the multiple determinants and long-term physical, psychosocial and economic consequences of obesity.3

An important first step in planning an intervention is to review evidence from best practice and theory.4 However, there are many known problems in the translation of evidence from research into practice. Research has shown that health professionals and policy makers typically fail to apply evidence from literature and clinical guidelines to health interventions.5–7 Change in practice is rarely easy, especially with complex problems such as obesity which require multilevel solutions and intersectoral collaboration.
One of the most widely used health programme planning theories in public health is the PRECEDE-PROCEED (P-P) model. The P-P model works on the foundation of an ecological approach to health. With the guidance of P-P, planners can develop an intervention that meets the specific needs of the target group, actively involves stakeholders from all levels and is evidence-based and practice-based.

By using the P-P model as the theoretical framework, the aim of this research was to create a set of science-based and practice-based recommendations for future weight management interventions in the adolescent age group. This was carried out in our research by: identifying components of effective weight management interventions for adolescents; mapping perspectives of concerned actors to applying evidence to practice and identifying requirements for bridging the gap between science and practice.

Methods

We used the P-P model as a framework to identify ‘best practice’ designs in weight management interventions for adolescents. This was carried out with a process known as, ‘Pooling and Patching,’ which involved an extensive review of evidence from both science and practice.

Firstly, a critical review of literature was conducted to examine evidence from intervention studies targeting treatment of obesity in adolescents and the Dutch CBO (Centraal Begeleidings Orgaan) guidelines for obesity. Next, evidence was further pooled and examined through an additional literature review of ‘practice-based’ documents which are publications targeted at specific professional groups (e.g. dieticians, GPs) that provide practice-based evidence and guidance for weight management practice. Furthermore, we reviewed ‘grey literature’ that dealt with delivering obesity interventions and effectively targeting health programmes for the specific needs of adolescents. Lastly, we gathered evidence from semi-structured interviews with concerned actors working in childhood and adolescent obesity treatment, management and prevention.

Findings from the literature review and semi-structured interviews (‘pooling’) were then brought together (‘patching’) to identify components to be addressed in planning of effective weight management interventions in adolescents and to identify requirements for bridging the gap between evidence and practice.

The evaluation of evidence in the literature reviews, development of the topic list for the semi-structured interviews and the analysis of interview content were based on seven key requirements for creating effective health interventions and treating obesity, derived from the P-P model and recommendations from the World Health Organization (WHO). These are: (i) use of relevant theoretical models; (ii) use of multi-level components and socially targeted settings; (iii) use of components/approaches relevant for intervention target group; (iv) incorporating peer-support and family involvement in intervention; (v) collaboration and multi-disciplinary responsibility; (vi) long-term interventions and (vii) monitoring and program evaluation.

Literature reviews

The inclusion criteria for the literature review were (i) articles published between January 1990 and August 2010; (ii) for the intervention studies involved adolescents 12–18 years; randomized controlled trials, one group pre-test/post-test designs and quasi experimental designs; focused on secondary prevention of obesity through weight loss or prevention of weight re-gain and involved multi-component interventions (nutrition, physical activity and behaviour change) and (iii) for the practice-based documents and grey literature: expert committee reports, practice-based recommendations, position statements and conference papers about childhood and adolescent obesity prevention and management and/or recommendations on targeting health programs for adolescents.

The exclusion criteria for the intervention studies in the literature search were (i) mean age of subjects 11 years of age or less; (ii) studies using pharmacotherapy as a method of treatment; (iii) studies using bariatric surgery as a method of treatment and (iv) single component interventions (i.e. only dietary change, only physical activity).

We searched for relevant literature using OVID, Pubmed, PSYCHInfo and Google Scholar search engines. The following keywords and combinations of keywords were used for the searches (obesity, obese, overweight, body fat, fat, excess body weight); (treat-ment, intervention, management, weight loss, pro-gram, multi-component); (teenager, adolescent, youth, young people) and (effective, effectiveness, successful, evidence-based, best practice). Reference lists of articles identified from the literature search were reviewed for additional articles that may have been missed in the initial search.

A total of 176 intervention studies, systematic reviews, practice-based documents and grey literature were initially identified. From the initially identified literature, most of the intervention studies had participants with a mean age of less than 11 years, focused on single component interventions or focused mainly or exclusively on primary prevention of obesity, so these were excluded from the review. In the end, a total of 32 documents were reviewed that met all of the inclusion and exclusion criteria outlined above. These documents included: 11 intervention studies, 8 systematic reviews, the Dutch CBO guidelines for obesity and 12 practice-based and grey literature documents. The selection process for papers is shown in Fig. 1.
Semi-structured interviews

The semi-structured interviews were guided by a topic list that was developed using the seven key requirements for creating effective health interventions and treating obesity. Furthermore, topics were added to explore interview participants’ attitudes towards treating and managing obesity in adolescents and their opinions on using scientific evidence in practice. These topics were covered to help understand the principles that participants attach to decisions and behaviours relating to their work in obesity.

In Table 1, the key topics covered in the interviews are shown. Firstly, the participants were asked about their attitudes towards obesity and it they felt it was possible to treat with the current tools and knowledge available. Secondly, respondents were specifically asked whether they thought obesity was caused by an isolated problem within the individual or by external social/environmental problems. Thereafter, participants were asked about their opinions towards the scientific evidence and guidelines for obesity in the 12–18 years age group. Next, they were asked whether they felt there were specific practical considerations for obesity interventions in the 12–18 years age group, such as age-specific considerations, family involvement, whether to use group versus individual treatment sessions, appropriate setting, applying specific health or behaviour theory in interventions and need for program evaluation. Lastly, respondents were asked whether they foresaw any opportunities/barriers for future programs for obesity and their opinions on the division of professional involvement and responsibility for treating obesity.

Interviews were conducted between September and November 2010. A total of 22 individuals were invited to interview and 12 agreed to participate. Participants included clinicians (CL) working in the identification, treatment and management of obesity (one GP, three paediatricians, three dieticians, one psychologist) as well as non-clinicians (NC) from community (n = 2), public health (n = 1) and research organizations (n = 1) in the Netherlands. The interviews were conducted by the first author who is a registered dietician with experience in paediatric weight management.

Interviews were held either face to face or over the telephone and lasted between 24 to 60 minutes. All interviews were recorded with a hand held digital recorder and fully transcribed. Data was analysed with the aid of Atlas.ti, a software package for organizing qualitative data. We analysed the text using an accepted method of textual analysis called content analysis which involved a process of selecting and coding text fragments according to the seven key requirements for creating effective health interventions and treating obesity as well as the research questions: ‘What components need to be addressed in the

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Key topics in semi-structured interviews</th>
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<tr>
<td>Topic 1: Attitudes towards obesity</td>
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<td>Topic 2: Obesity: an isolated problem or an external problem?</td>
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<td>Topic 3: Opinions towards scientific evidence</td>
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<td>Topic 4: Practical considerations for obesity interventions in the 12–18 years age group</td>
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<td>Topic 5: Opportunities/barriers for future programs for obesity</td>
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<td>Topic 6: Professional involvement and responsibility for treating obesity</td>
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Search results N=176

144 papers excluded

Papers included in literature review N=32

- Intervention studies n=11
- Systematic reviews n=8
- Dutch CBO guidelines for obesity n=1
- Practice-based and grey literature documents n=12
planning of effective weight management interventions in adolescents? and ‘What are concerned actors perspectives, barriers and attitudes to applying evidence to practice?’

Content analysis allows the researcher to organize and make meaning and valid inferences of textual data through a blend of interpretive techniques and quantitative methods. This is accomplished by establishing a set of codes to classify words or fragments from the textual data and then counting the number of instances that the data falls into these categorical codes. After reviewing the patterns and relationships of these codes in the text, it is possible to make inferences about, ‘the sender(s) of the message, the message itself, or the audience of the message’. In order to ensure validity of findings, it is important that the coding and categorizing procedure be consistent in that different people should code the same text similarly. This was ensured by a separate researcher independently reviewing the data and the resulting themes, subthemes and categories were agreed together. However, as with all qualitative research, no claims are made for sample representativeness. Nonetheless, the qualitative data from this study can be considered a grounded indication of a research phenomenon that deserves further exploration and investigation and may inform future studies carried out within larger sample sizes.

Results

Results of literature reviews

The findings from the literature reviews are summarized together under the headings of the seven key requirements for creating effective health interventions and treating obesity.

Use of theoretical models. Five of the 11 intervention studies discussed the theoretical model used in their interventions: solution focused model and social cognitive theory. Six of the eight systematic reviews cited that many studies did not use theory or did not give enough argumentation on why specific conceptual/theoretic frameworks were used. The Dutch CBO guidelines for obesity gave no recommendations on theory.

In the practice-based documents and grey literature, two papers recommended using socially oriented theories such as Social Cognitive Theory and Social Marketing Theory when working with adolescents. However, another paper cited that clinicians (except for behavioural therapist/psychologists) may not be properly trained on the use, application and benefit of theory.

Multi-level components and socially targeted settings. In the 11 intervention studies, most focused on individual-level components: cognitive behaviour therapy coping skills training, satiety training and motivational interviewing. Systematic reviews recommended further research on interventions involving: psycho-social components; built environment, community, media components; policy and environmental components and ecological models. Systematic reviews did not discuss socially targeted settings. The Dutch CBO guidelines for obesity did not discuss multi-level components and settings.

Use of age-specific approaches. The application of age-specific approaches was used in one intervention study. Three studies put children from primary school and pre-adolescents (8–11 years) together with adolescents (12–18 years). Furthermore, the systematic reviews and the Dutch CBO guidelines for obesity gave no specific guidance to clinicians on how to modify approach specifically for the adolescent age group.

Much of the practice-based documents and grey literature recommended age-specific approaches are essential because cognitive levels vary greatly between the stages of adolescence. Early adolescence is characterized by concrete thinking (the here and now), while middle to late adolescence is characterized by abstract thinking (‘if I do x, then y may happen’).

Incorporating peer-support and family involvement. In terms of peer-support, 6 of the 11 intervention studies used group treatment sessions. Use of group versus individual treatment was not discussed in the systematic reviews or the Dutch CBO guidelines for obesity. In terms of family involvement, there was no consistent evidence in the intervention studies. Five studies choose for either total parental involvement or partial parental involvement. Some systematic reviews recommended including parents whilst two reviews concluded their evidence was inconsistent on parental involvement. The Dutch CBO guidelines recommended a total family approach to the treatment of obesity.

The practice-based documents and grey literature discussed that group treatment with fellow peers could be more cost effective than individual treatment. One article also cited that evidence is inconsistent regarding the type of parental involvement in adolescent weight management.
Collaboration and multi-disciplinary responsibility. In 4 of the 11 studies, the intervention was delivered by a multi-disciplinary team consisting of a combination of: dietitian, exercise physiologist, social worker, nurse practitioner,29 paediatrician, psychologist, nutritionist,36 and psychologist and nutritionist.14,16 The systematic reviews did not discuss the topic of shared professional involvement. The Dutch CBO guidelines for obesity do not specifically recommend which professionals should be involved in treating obesity.23

In the practice-based documents and grey literature, Spear et al.38 recommended that a comprehensive obesity program should be delivered by a multidisciplinary team with shared treatment roles.38 Two papers recommended that clinicians receive special training on manage adolescent health issues.39,40 One paper recommended that specialized youth social workers and mental health professionals be part of the multidisciplinary treatment team in adolescent health interventions.40

Long-term intervention. Only 3 of the 11 intervention program chose for a longer term program length of 1–2 years.12,14,15 One systematic review by Kelly and Melnyk18 concluded that there was insufficient evidence that length of time or program intensity predicted statistical significance of programs.18 The Dutch CBO guidelines for obesity recommend that duration of interventions should be at least for 1 year.23

In 3 of the 12 practice-based documents and grey literature, obesity was described as a chronic disease that requires intense long-term treatment and life-long support.32,38,41 These documents suggested, after initial intensive treatment, that follow-up should occur at regular intervals for an indefinite period in order to review goals and prevent relapse.

Monitoring and program evaluation. Program evaluations were reported in only half of the intervention studies.12–14,33,42 Three of the 11 systematic reviews cited that there was a lack of information from process evaluations described in the studies.17,18,43 The Dutch CBO guidelines for obesity did not discuss the need for process evaluation in interventions.23

Process evaluations were discussed in two of the practice-based documents and grey literature.24,44 Oakley et al. discussed that information from a study’s process evaluation can help the clinician distinguish between interventions that are inherently flawed (failure of intervention theory) and those which have merely been delivered poorly.44

Results of semi-structured interviews
During the interviews, participants did not offer one single perspective on treating obesity and opinions on evidence-based practice. Instead, they all gave their perspectives based on three different themes:

‘Evidence of effectiveness’, ‘Perspectives on responsibility’ and ‘Science to practice’. The major findings from these three emerging themes expressed by clinicians (CL) and non-clinicians (NC) in the semi-structured interviews are summarized in Table 2.

Theme 1: evidence of effectiveness. Almost all CL and NC felt that it would be ineffective to have the same program across the whole adolescent age range due to differing cognitive levels, social concerns and maturity levels. Participants recommended varying approach by modifying content and style of communication according to stage of adolescent. This belief is illustrated Extract 1.

Extract 1.
NC4: An 18 year old is totally different from a 12 year old, physically and mentally; it would be very interesting if you could develop a program for a 12 year-old which is also effective for an 18 year-old.

Almost all of the CL felt that interventions should be delivered in social settings like community centres and sports halls. About half of participants felt that avoiding one-way communication with adolescents was necessary.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Major findings</th>
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<tr>
<td>Theme 1: Evidence of effectiveness</td>
<td>• All participants said interventions must modify approach according to stage of adolescence, involve the parents, use socially oriented settings, recognize growing independence of teens • Almost all participants mentioned SE barriers to success</td>
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<tr>
<td>Determinants of obesity</td>
<td>• NC listed mostly individual-level determinants • CL listed mostly SE determinants</td>
</tr>
<tr>
<td>Responsibility for treating obesity</td>
<td>• CL said a single professional should take lead in treatment • CL felt responsible for individual-level determinants • CL felt SE determinants were uncontrollable and out of their hands</td>
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<tr>
<td>Theme 3: Science to practice</td>
<td>Using evidence in practice</td>
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<td>• Almost all participants felt the quantity of evidence was lacking on how to treat adolescent obesity • Almost all felt that evidence needs to be more practice-based</td>
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<tr>
<td>• Using theoretical framework and conducting program evaluation • Most CL agreed that theory-based interventions and conducting evaluations are essential • About half of the CL confused on the meaning of theory</td>
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These participants felt that it would be counterproductive and ineffective to tell the teenager what to do. This idea is illustrated in Extract 2.

Extract 2.
CL1: Yes, yes. I think the responsibility must be at their level … when you say they have to do something … don’t eat too much, exercise more … I think they will say ‘goodbye’ and won’t want to do it.

Almost all participants perceived many barriers to programs being effective and having successful outcomes. Overall, both CL and NC cited a vast list of socio-ecological (SE) barriers to program success; more than double that of the individual barriers. These included: unsupportive home environment, obesity taking low priority on government agendas, ‘obesogenic’ environment. This opinion is illustrated in Extract 3.

Extract 3.
NC1: They are taken to school by their parents in the car, every day when they are, they live 5 or 10 minutes away by foot! (1 line omitted) That has automatically grown, a lifestyle fact that is not good for overweight.

Theme 2: perspectives on responsibility. CL listed more by SE than individual determinants for obesity. Although the NC cited some SE determinants, CL listed many more throughout the interviews. The SE determinants cited most often included: the obesogenic environment, the food industry and food availability, social norms and family lifestyle. In terms of general treatment of obesity, CL felt that their role was to focus on the individual determinants. CL most often believed that the SE determinants were uncontrollable and ‘out of their hands’. This idea is illustrated in Extract 4.

Extract 4.
CL8: You can discuss it and you can tell them well, try to do so, but you cannot influence it.

Theme 3: science to practice. CL and NC felt that the quantity of evidence was lacking on how to treat obesity in adolescents. CL and NC also felt that the current evidence is not practical enough. Several CL suggested that scientific journals should report more information on the methods and theories used in interventions. Furthermore, almost all participants wanted to see more evidence of effective obesity interventions delivered in general practice, in schools and in the community. This is illustrated in Extract 5.

Extract 5.
CL8: There is an enormous amount of research. But it is very, um, very difficult to compare these outcomes. (1 line omitted) But particular as well in the general practice when there is co-morbidity.

Lastly, most CL agreed that theory-based interventions were necessary components to delivering an effective intervention. However, when asked specific questions about which theories were most effective in obesity interventions, about half of CL gave vague and uncertain answers. This opinion is illustrated in Extract 6.

Extract 6.
CL1: The theoretical framework is not for every person … so you have to look individualised which theoretical framework you should use, I don’t think there is one theoretical framework.

Discussion

Major disparities were found between the evidence collected from the literature reviews and semi-structured interviews. These disparities were: the use of theoretical models; age-specific approaches for treating obesity in adolescents; addressing the social nature of obesity and responsibility for treating obesity. Table 3 provides an overview of these major gaps and disagreements between science and practice.

The first disparity in evidence between science and practice was the use of theoretical models in interventions. This revolved around two main issues. Firstly, the reporting of theory in the interventions studies was not sufficiently or clearly explained. Secondly was that practitioners we spoke to in our semi-structured interviews were uncertain about the meaning of theory. The second disparity between science and practice was regarding age-specific approaches for treating obesity in adolescents. While the interventions studies and Dutch clinical guidelines lacked evidence on this issue, the evidence from practice showed that specific approaches for the adolescent age group were required to increase effectiveness. The general lack of specific information on treating obesity in adolescents in the intervention studies and Dutch clinical guidelines may be due to a lack of interventions specifically performed in this age group. Stuart et al.21 and Tsiros et al.19 both cited that a meta-analysis on obesity interventions exclusively in the adolescent age range has never been performed to date.19,21

The third disparity in the evidence was regarding how interventions should address the social nature of obesity. This issue covered three main considerations: choice of group or individual treatment; level of family involvement in treatment and choice of intervention setting. The intervention studies and Dutch clinical guidelines lacked evidence on social approaches, whereas the practice-based documents, grey literature and participants in the semi-structured interviews agreed that social
approaches were a mandatory part of interventions
given the complex social determinants of obesity.

The fourth disparity in the evidence was over responsibility for treating obesity in adolescents. The intervention studies and Dutch clinical guidelines were inconsistent regarding which professionals are involved in treating obesity. The practice-based documents and grey literature recommended using more ‘non-traditional professionals’ in the treatment of obesity such as youth social workers to help deal with complex issues. However, in our semi-structured interviews, the clinicians saw their responsibility as fixed on the individual-level problems and that the SE level problems were ‘uncontrollable’ and ‘out of our hands’. The approach of coordinated action, in which actors from all disciplines are involved, may be useful for overcoming such feelings.

This was the first research that we know of that has specifically examined concerned actors’ attitudes and beliefs in delivering evidence-based practice in the treatment and management of obesity in Dutch adolescents. The findings from the concerned actor interviews should be interpreted in context due to the limited number of participants and the fact that all were of Dutch origin. However, we believe that our findings have opened the door to pertinent issues that should be taken into consideration for future adolescent obesity interventions and research. More research is needed among a larger group of concerned actors with specific focus on how issues such as theoretical models; age-specific approaches; addressing the social nature of obesity and responsibility for treating obesity are dealt with within adolescent weight management.

**Recommendations**

We propose that the disparities we identified between science and practice in our study are caused by two larger issues. The first concerns the translation of scientific evidence and recommendations to practice. The second concerns barriers related to the complex nature of addressing obesity. In order to solve these two issues, we suggest that changes in both science and practice are necessary.

Scientific journals have been criticized for not giving enough space to the description of components, theory
and design in interventions.\textsuperscript{45} We recommend that scientific journals provide more information and guidance on theoretical approaches. This can give more attention to the need for theory-based interventions and can help guide clinicians in their practice. Furthermore, clinicians should advocate for more practice-based research by writing their concerns to the editorial teams of scientific journals, research institutes and clinical guideline committees.

However, practitioners should not wait for science to catch up to their needs. Now is the time for them to step up to the plate and test these ideas in their own practice-based research. The concept of practice-based research is not a new one and there are a wealth of established practice-based networks (PBRN) that clinicians can tap into for advice and support. For example, in the Netherlands, there have been such established networks up and running for the past 25 years, as well as in the USA, Canada, UK and Australia.\textsuperscript{46–48} One of these practice-based research networks out of the USA, Agency for Healthcare Research and Quality PBRN, is sponsored by the US Department of Health and Human Services. Through the PBRN network, practitioners can give knowledge and information about practice-based research, search for practice-based literature and share experiences with other practitioners.

In order for science and practice to better deal with the complex nature of obesity, we have several recommendations. First is that science and practice work together to tailor obesity interventions to the specific needs of adolescents. One idea from participants in our semi-structured interviews was providing cooking classes to older stage adolescents that are moving out of home for the first time. Such an approach may help encourage the development of self-management skills in teens. Furthermore, age-specific approaches can be delivered with the help of pedagogues or youth social workers.

The next recommendation is that science and practice should better address the social nature of obesity rather than just focusing on fixed individual-level approaches. Continuing to focus on just the individual-level determinants will offer only temporary solutions. It has been suggested that interventions can better account for the complex social nature of obesity in adolescents through social network approaches (involving family, friends, school and communities in interventions).\textsuperscript{49} In this way, treatment and interventions should enable and support various lifestyle changes to be ‘the practically, as well as the socially easy choice’.\textsuperscript{50}

Our final recommendation is that both science and practice work better on creating interventions with shared responsibility across all professional levels. Science should engage better with practitioners and local planners in the research planning process and give sufficient attention to shared participatory approaches.\textsuperscript{51} Practice should stop looking at responsibility as a black and white issue and advocate for more SE changes at the government level. If practitioners do not voice their concerns, government will not know that these are serious issues. This type of shared, interdisciplinary, multi-system working, for instance, through coordinated action is what we should be striving for, to not just offer symptomatic solutions for obesity, but also to deal with the external and complex influences that shape it.\textsuperscript{7}

By using such recommendations, science and practice can support adolescents in attaining better health through the delivery of science-, practice- and theory-based solutions for the treatment and management of obesity. Furthermore, future successes of these interventions may be improved through multi-level approaches that encourage shared professional involvement and responsibility.

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Declaration

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References
