Nutrition-related prevention of overweight and obesity in childhood and adolescence

Strategies, goals, and implementation

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Abstract

The aim of this study was to identify current international recommendations for nutrition-related prevention strategies for overweight and obesity in childhood and adolescence and to analyse the extent to which these recommendations are integrated into German good practice projects.

Therefore, after identifying relevant Cochrane reviews, an additional systematic primary literature search was conducted in PubMed. A third search for specific health projects was carried out the national database of the German cooperation network Equity in Health *(Gesundheitliche Chancengleichheit)*.

Two literature reviews, seven primary studies and five health project descriptions were included in this study. The analysed good practice projects rely mainly on the principle of knowledge dissemination using various teaching formats and materials. Our research and subsequent analysis showed that international recommendations are largely integrated into German good practice health projects. Nutrition-related prevention strategies should be based on early, theory-based and long-term interventions. Greater use of structural prevention and intervention multipliers is recommended.

Keywords: nutrition-related prevention strategies, overweight, obesity, childhood, adolescence

Introduction

Overweight and obesity are multifactorial conditions with severe co-morbidities [1]. Their short and long term effects range from psychological distress and stigmatisation to high blood pressure, joint damage and Type II Diabetes [2]. Overweight and obesity develop as a result of the interaction between genetic disposition and various environmental influences, such as the interplay of energy-dense nutrition and low physical activity [3]. According to a nationally representative German survey on child and adolescent health conducted by the Robert Koch Institute *(Kinder- und Jugendgesundheitssurvey, KiGGS)*, 15% of all children and adolescents in Germany have a body mass index (BMI) above the 90th age and gender-specific percentile and are thus considered overweight. With a BMI above the 97th age and gender-specific percentile, a total of 6.3% of German youth are obese [4]. In absolute numbers, 1.9 million 3 to 17 year-olds in Germany are overweight [4]. The nutrition study EsKiMo was conducted as an additional component of the KiGGS follow-up survey in 2006, in order to identify eating habits among 6 to 17 year-olds [5]. This study found that children and adolescents do not eat enough fruit, vegetables and high-fibre foods [5]. The amount of high-energy and high-protein foods, meat products, and sweets consumed by young people exceeded the recommendations of the German Research Institute for Child Nutrition *(Forschungsinstitut für Kinderernährung, FKE)* used in the study [5].

Unhealthy eating habits such as those observed in children and adolescents in the EsKiMo study promote the development of overweight and obesity and pose a health risk that extents into adulthood [6, 7]. In the first ten years of life, eating habits develop and become established mainly through the influence of the family, which takes on the function of primary nutritional socialisation dur-

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Fig. 1: **The 12 good practice criteria of the cooperation network Equity in Health 2018**
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ing childhood [8]. Ideally, at this stage children should learn to eat slowly and without haste and how to be aware of satiety cues [8]. Starting with the age of eight, socialisation in school and peer influence become more significant [9].

Even though currently complex interventions targeting nutrition, exercise and other relevant behavioural patterns have proven to be the most effective in the therapy and prevention of obesity [10, 11], prevention measures with a sole focus on nutrition or exercise have also been shown to generate positive effects, including the reduction of BMI or BMI z-score [11]. Current data from Germany (EsKiMo study) emphasize the need for nutrition-related measures for the prevention of overweight and obesity among children and adolescents. Specific prevention projects should not only rely on evidence-based recommendations in their design, but they should also systematically evaluate the practical implementation of such recommendations [12]. The most comprehensive overview of local initiatives for prevention and health promotion in Germany is provided by the database of the cooperation network Equity in Health *(Gesundheitliche Chancengleichheit)* established by the Federal Centre for Health Education *(Bundeszentrale für gesundheitliche Aufklärung, BZgA)* → www.gesundheitliche-chancengleichheit.de/. Ever since 2004, the 12 good practice criteria of the cooperation network have been applied to the analysis and evaluation of health and prevention projects and the extent to which these criteria are met is reported for all projects included in the database (◆ Figure 1).

Although the interdisciplinary good practice criteria of the BZgA cover aspects such as the conceptional anchoring of prevention and the

Filters activated	Clinical Study, Comparative Study, Controlled Clinical Trial, Randomized Controlled Trial, Publication date from 03.08.15–09.05.2017, Humans, Child: birth–18 years		
Category	**search ref.**	**search terms**	**number of hits**
umbrella topic	#1	prevention OR „health promotion“	2,774
type	#2	programmes OR intervention	2,435
target group	#3	child* OR youth OR adolescent* OR teenager* OR „young person“ NOT baby* OR infant*	11,764
health problem	#4	overweight OR obesity	789
area of intervention	#5	nutrition OR food OR nourishment	1,692
total	**#1 und #2 und #3 und #4 und #5**		**64**

Tab. 1: **Search strategy in the PubMed database;** number of hits on 09.05.2017 [own presentation]

need for long-term effects, the extent to which good practice projects take evidence-based recommendations for nutrition-related prevention of overweight and obesity in childhood and adolescence into account is not explicitly stated. Therefore, this study aims to identify current international recommendations for nutrition-related prevention strategies for overweight and obesity in childhood and adolescence and to analyse the extent to which these recommendations are integrated into German good practice projects. The results of this analysis may serve as a recommendation basis for the (further) development of nutrition-related prevention projects for children and adolescents in the future.

Methodology

As a means of obtaining a systematic overview of the current international evidence-based recommendations in the field of health promotion and prevention of overweight and obesity in children and adolescents, two reviews from the Cochrane database were used.

In order to close the data gap between the publication date of the latest review (03.08.2015) and the time of this analysis, a systematic primary literature search was conducted on 09.05.2017 in the PubMed database. The search strategies used and the corresponding number of hits are shown in ◆ Table 1.

The primary literature search yielded a total of 64 hits, of which 40 were excluded following a title screening and 10 after reading the abstracts because they did not meet the (thematic or methodological) inclusion criteria. Another seven articles were excluded after reviewing the full text, since their outcomes were not relevant to our analysis (n = 2) and the underlying studies did not use a control group (n = 1) or randomisation (n = 4). Seven studies were included in the final analysis (◆ Figure 2) and their contents and recommendations were used as the basis for the evaluation of German good practice projects.

In order to establish the extent to which the results of international studies on the efficacy of nutrition interventions were integrated into local projects, we searched the database of the cooperation network Equity in Health on 30.05.2017 to identify currently ongoing health projects on the topic of "healthy eating". Of the 30 nutrition-related health projects that met good practice criteria, projects that focused on the age group of 1 to 18 year-olds, aimed primarily at preventing overweight and/or obesity, and included nutrition-related interventions as the main project component were selected for inclusion in this study. Projects designed for adults (age 18 years or older) were excluded. Due to the specific focus on nutrition-related interventions, projects with combined interventions (e.g. nutrition and exercise) were also excluded. The searches described above resulted in the inclusion of two reviews, seven primary studies and five health-related project reports that were analysed to generate the results presented below.

Results

International recommendations for nutrition-related interventions

The underlying principle of current international recommendations is the topic-based dissemination of knowledge through education sessions and information material [14, 15]. Throughout their recommendations, the authors of the international studies emphasised the need for a solid integration of topics such as "healthy eating," "body image" and "exercise" into the school curriculum [14, 16]. Members of the teaching community are primarily considered as potential multipliers in this respect. Furthermore, environmental changes are needed to create incentives for higher levels of physical activity. In this context, the need to adapt school meals to include age-appropriate snacks is mentioned [17]. Apart from the inclusion

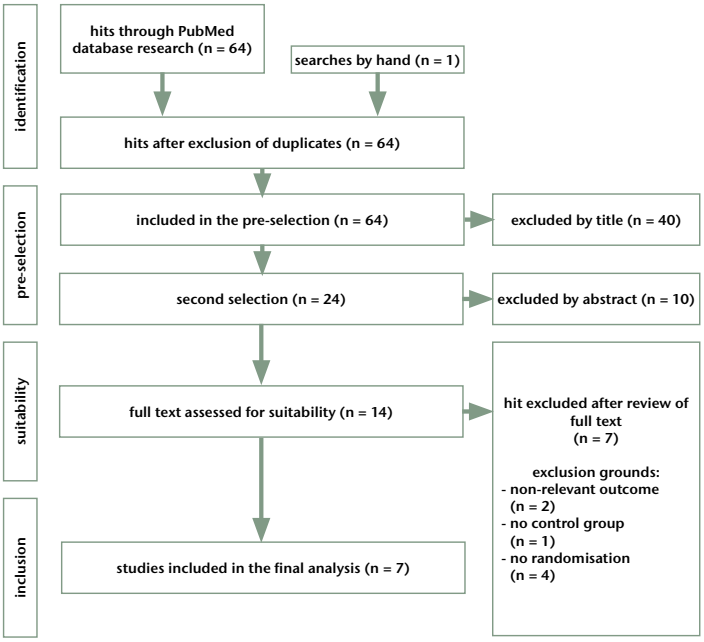

Fig. 2: **Flow diagram for study selection based on "PRISMA flow diagram"** [13]

of teaching staff, parental involvement and support are also considered to be an important component of prevention efforts in pre-school, school and childcare facility settings [7, 14, 17–19]. Moreover, working together with other professional groups is seen as a potential way to promote the successful integration of interventions [20]. In the case of adolescents, Luszczynska et al. [21] recommend the development and testing of a combined intervention including components of an education-based approach, planning, and self-efficacy interventions. In conclusion, the studies generally recommend using long-term, customized interventions, as well as increasing the appeal of the projects to their target group(s) [7, 17, 18].

Content of the health projects

After reviewing the descriptions of potentially relevant good practice projects, five projects were included in the study, in line with the selection criteria. Detailed information on the selected projects is provided in ◆ Table 2 [22–26]. The five health projects present a heterogeneous picture in terms of the good practice criteria they meet. According to their online description, each project meets three different criteria. The criteria met by the selected projects include an integrated action concept (networking), participation, low-threshold methodology, settings approach, integrating intermediaries (multiplier concept), empowerment, innovation, and sustainability.

Comparison of international recommendations with the content of German good practice health projects

Waters et al. [14] and Kocken et al. [17] recommend a stronger use of environmental design measures within the framework of structural prevention. Environmental design is implemented in the projects *"Kinder gestalten ihren Naschgarten"* [22] ("Children design their snack garden" – hereinafter *"Naschgarten"*) and *"Lernen durch Genießen – Gesunde Ernährung aus Sehpferdchens Küche"* [25] ("Learning through enjoyment – healthy eating from seehorse's kitchen" – hereinafter *"Sehpferdchens Küche"*). The *"Naschgarten"* (snack garden) is designed as a health-promoting and activating environment with no access restrictions [22]. In the children's daycare centre *"Sehpferdchen"* (seehorse), the food on offer was changed and a newly established "kitchen lab" enables children to experience healthy eating [25].

In line with international recommendations, all five health promotion projects integrate parents. *"Lebenslust – Leibeslust"* [23] ("Healthy attitude to life – healthy body image") is designed for parents and other professional groups and trains them as intervention multipliers. *"Gesund essen mit Freude"* [26] ("Healthy eating with pleasure") aims to reach children in the home setting by working with mothers as the target group of the project. Kong et al. [16] recommend educating teaching staff as multipliers in the school setting. Of all the projects, only *"Naschgarten"* integrates the school setting [22]. Integration and collaboration with other professional groups, as encouraged by Kharofa et al. [20], is partly implemented in the project "Lebenslust – Leibeslust" by training school and pre-school teachers, as well as parents to be intervention multipliers [23].

The increased appeal of preventive interventions demanded internationally [7, 17, 18] is achieved in the analysed projects through the use of a playful methodology and a wide range of activities, such as projects, competitions, nature experiences, creative activities, conversation groups, information evenings, cooking classes, the provision of various materials (cookbooks, brochures), and the cultivation of fruit and vegetables. Also, as recommended by international studies, all five projects are designed and implemented on the long term. The most recent project has been running since 2007 [21] and all projects were still being continued at the time of the analysis (May 2017).

Discussion

Projects aimed at the effective prevention of overweight and obesity in childhood and adolescence should adhere to evidence-based recommendations and also meet practice-related quality criteria in their implementation. The goal of this analysis was therefore, on the one hand, to summarize the current best scientific evidence on

Project name	*"Kinder gestalten ihren Naschgarten"* [22]	*"Lebenslust–Leibeslust"* [23]
Project start	June 2007	2002
Location	Holzminden, Niedersachsen	Schleswig-Holstein
Setting	living environment, childcare centre, school	childcare centre, mother/child health resort, primary school
Project funders	*Landesvereinigung für Gesundheit, Akademie für Sozialmedizin Niedersachsen e. V.*	*Landesvereinigung für Gesundheitsförderung in Schleswig-Holstein e. V.*
Target group	children aged 3–12	children
Goals	- support child development - encourage children to eat healthy, exercise more and get actively involved in the design of their living environment through play - improve health equality - involve childcare centres and living environment more in prevention	- educate multipliers (also parents) - improve decision-making abilities - show alternative course of action in case of problematic eating situations - prevent the development of disordered eating behaviour - prevent overweight
Methodology/ Content	- *"Naschgarten"* = 8,000 m² premises - projects - competitions - creative workshop - experience of playing games in nature - growing fruit and vegetables	- 6 modules for intervention multipliers - offer and decision model - improve sensory perception, body awareness, social competences and self-management - train ability to make decisions - nutrition
Financing	city provides land, firm "Symrise"	TKK (health insurance fund for technicians)
Good practice criteria	integrated action concept (networking), participation, low-threshold methodology	settings approach, multiplier concept (integrating intermediaries), empowerment

Tab. 2: **Overview of the five health projects selected** [own presentation]

nutrition-related prevention strategies through a systematic literature review and, on the other hand, to assess the evidence base of what are considered to be high quality, nutrition-related projects for children and adolescents in Germany.

On the positive side, it was noted that all five health projects comply with the international recommendations for greater parental integration. This was achieved in various ways. *"Gesund essen mit Freude"* uses mothers as its main target group and aims to empower them as advocates for healthy eating, in order to reach children in the home setting [26]. Additionally, parents are engaged primarily through targeted information [24, 25], projects [23] or cooking classes [27].

The recommendation of Kong et al. [16] to train teachers as intervention multipliers is taken up only in the project *"Lebenslust – Leibeslust"* [22], in the course of which not only school and preschool teachers, but also parents are trained as intervention multipliers [23]. This partly addresses the requirement for collaboration with other professional groups in the sense of a cooperation with other stakeholders (in this case parents) [20]. However, an explicit framework for collaboration between various professionals and stakeholders, including parents, pre-school and school teachers is not yet fully established in the projects.

Overall, the international requirement for environmental design [14, 15] is implemented in two health projects (*"Naschgarten"* and *"Sehpferdchens Küche"*). This combination of behavioural and structural prevention is lacking in the other three projects and should be used more in the future. The internationally recommended increased project appeal is difficult to assess, since specific feedback from stakeholders and project participants is not currently available.

The good practice criteria implemented in the analysed projects show above all that the setting approach, the principle of empowerment and low threshold working methods are at the forefront of the projects. In this sense, the analysed projects have a high relevance to everyday life, use outreach work in participants' living environments or promote the development of practical and theoretical competences. The results show that none of the five selected health projects met all the international recommendations identified through our literature review, but initial efforts in this sense became apparent, which is also reflected by

	"Das schmeckt gut!" [24]	*"Lernen durch Genießen – Gesunde Ernährung aus Sehpferdchens Küche"* [25]	*"Gesund essen mit Freude"* [26]
	December 2005	March 2003	September 2004
	Kiel, Schleswig-Holstein	Hamburg	Berlin
	childcare centre	childcare centre	primary school
	IntegrationsCenter Ost within AWO (*Arbeiterwohlfahrt*, workers' welfare) Kiel	childcare centre *"Sehpferdchen"*	*Gesundheit Berlin-Brandenburg e. V.*
	children, parents	children aged 1–5, parents	migrants (mothers) and their families
	- reduce health risks in socially disadvantaged urban districts and in migrant families	- support personal responsibility of parents - healthy eating - support the development of language, social, and conflict management skills	- disseminate practical and theoretical knowledge related to healthy eating - increase a sense of responsibility
	- inform parents - playful dissemination of knowledge - child-appropriate reflection of personal eating habits - parent-child afternoon sessions, information evenings, discussion groups, creative activities, games, books	- breakfast buffet - fruit platters - eating lunch at the table in a group - exploring tastes and food enjoyment in the "kitchen lab" - exercising - cooking classes - events for parents	- group discussions - knowledge dissemination - cooking classes - neighbourhood cooking classes
	working group *"Migration und Gesundheit"* formed by local govt. and AWO	childcare centre and working group *"Gesundes Heimfeld"*	BKK *Bundesverband* (health insurance fund)
	low-threshold methodology , empowerment, innovation and sustainability	low-threshold methodology, empowerment, settings approach	innovation and sustainability, settings approach, participation

the fact that each project met three out of twelve good practice criteria. This could be due, on the one hand, to the regional focus and the narrow scope of the projects. On the other hand, only projects with an exclusive focus on nutrition were selected. A comparative consideration of different or combined interventions for obesity prevention would increase the complexity of the results.

The wide focus in terms of the target group allows for a broad overview of the evidence and existing projects. A narrower focus on vulnerable groups, such as children and adolescents from socially disadvantaged families, could enable target group specific conclusions.

Conclusion

Successfully educating young people about health-promoting nutritional behaviour is an important factor in the prevention of overweight and obesity in children and adolescents. Apart from requiring a solid scientific foundation supported by research with a high level of internal validity (i.e. efficacy under study conditions), such prevention efforts rely on the practical and effective implementation of specific measures into the real lives of children and adolescents and their families. In combination with components pertaining to the fields of "exercise" and "psychosocial aspects", early, theory-based, behaviourally appropriate, and long-term nutrition interventions are called for. Above all, greater use can be made of the potential of environmental design in the context of structural prevention. To this end, appropriate measures could be taken both in the everyday living environments of the target group (e.g. healthy catering in schools and childcare centres) and at the health policy level (e.g. taxation of obesogenic foods), as recommended by the German Alliance of Non-Communicable Diseases *(Deutsche Allianz Nichtübertragbare Krankheiten, DANK)* [27].

In addition, more attention should be paid to training multipliers, in order to achieve a wider field of dissemination for successful interventions. Prevention measures should adhere to international recommendations and include parents, but also other important stakeholders such as teachers, to a greater extent. By meeting good practice criteria, the health projects of the cooperation network Equity in Health show promising approaches in this respect.

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Conflict of Interest
The authors declare no conflict of interest.

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