



Article

Implementation process and acceptance of a setting based prevention programme to promote healthy lifestyle in preschool children

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Abstract

Objective: Evaluation of the implementation process of a kindergarten-based intervention ('TigerKids') to promote a healthy lifestyle.

Design: Questionnaire survey among kindergarten teachers about programme implementation and acceptance.

Setting: Kindergartens in Bavaria, Germany.

Methods: Two hundred and fifteen kindergartens were included; 96.3 % returned informative questionnaires. 'TigerKids' is a multi-approach behavioural intervention programme to increase physical activity level and to promote healthy eating in preschool children. Project elements and materials are designed for kindergarten teachers, children, and their parents. The main outcome measures of the study are implementation, acceptance, and estimated effectiveness of the intervention programme.

Results: The elements for promoting healthy lifestyle were implemented regularly in the participating kindergartens: 94.2 % used the drinking station daily, 75.8 % prepared the magic fruit plate daily, and 63.3 % carried out the activity programme at least two times per week. The educators reported that the children ate more fruits and vegetables, drank more non-sugared beverages, and were more active. The designed materials and elements for the children, the educators, and the parents were also evaluated positively by the kindergarten teachers.

Conclusion: The 'TigerKids' programme is a suitable instrument for health promotion in the kindergarten setting.

Keywords

Child day care centres, children, health promotion, obesity, prevention

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Introduction

Prevalence and severity of childhood obesity have dramatically increased worldwide in recent years, with serious consequences for health and well-being of the affected individuals, as well for healthcare systems and societies, due to the high arising costs.¹⁻⁴ Currently the available concepts to treat childhood obesity are less than satisfactory. The therapy of obesity is complex and time-consuming, and further induces high costs.⁵

In addition to genetic causes, changes in lifestyle, including an increased consumption of high energy-dense foods and beverages and a marked decline in physical activity, are major reasons for this development.^{1,2,6-8} Data of school entrance surveys in Bavaria and other German federal states show that 7–14% of children at the age of 5–7 years are already overweight, and 3–6% are obese.⁹⁻¹¹ The association of early adiposity rebound and obesity in later years indicates that early childhood is a critical period for obesity development.^{2,4,12,13} Excess body weight at preschool age is associated with a higher likelihood of overweight in later childhood as well as adolescence and adulthood.^{2,13,14}

Preschool age is a key time for the development of lifelong persisting dietary and physical activity attitudes and behaviours.¹⁵⁻¹⁷ Efforts to prevent overweight, including encouragement of physical activity and healthy eating, should therefore begin in early childhood, as in that age children's eating habits can still be influenced easily by parents and environmental changes.^{4,14,16} In Germany, most young children attend preschool education (> 90%);¹⁸ thus kindergartens provide population-based opportunities for the prevention of overweight and obesity. In the kindergarten setting, those children can also be reached that have a higher risk for obesity, for example children in lower socioeconomic groups or children with migration background. In addition, child care settings offer an opportunity to reach and motivate parents to support healthy eating and encourage regular exercise at home.

The development of successful prevention strategies at an early age is of major importance. However, at present only very limited data on the effectiveness and implementation of obesity prevention programmes at preschool age are available. The majority of the interventions was developed and evaluated in primary school settings.^{3,4,8,19,20} For this reason 'TigerKids', a multi-approach behavioural intervention programme for the prevention of obesity at early childhood, was developed. This intervention strategy has a strong focus on the kindergarten setting with the primary objectives to increase the physical activity level in the daily routine and to enhance the health-promoting habits of food and drink consumption in preschool children. In the present study detailed data on the process of implementation of the 'TigerKids' intervention in kindergartens as well as feasibility and acceptance of the designed elements for promoting a healthy lifestyle are reported.

Methods

Intervention programme

'TigerKids' is a behavioural intervention programme for the kindergarten setting, based on the social learning theory called moderate constructivism²¹ that was developed and evaluated in a cluster-randomized phase II study.²² From 2004–2006 the programme was tested in 64 kindergartens in four different Bavarian regions. Significant intervention effects on enhanced fruit and vegetable intake and on reduced consumption of high caloric beverages were observed. Further,

a trend of borderline significance towards a lower prevalence of overweight and obesity in the intervention group was found.

'TigerKids' is a project of the Child Health Foundation, Munich, which is implemented in cooperation with the health insurance AOK in about 4,000 kindergartens in Germany. The intervention programme was developed at the Dr. von Hauner Children's Hospital, Ludwig-Maximilians-University of Munich, in close collaboration with the Bavarian Health and Food Safety Authority, the Institute for Social Paediatrics and Adolescent Medicine, Munich, the State Institute of Early Childhood Research, Munich and the Research Centre for Physical Education and Sports of Children and Adolescents (FoSS), Karlsruhe Institute of Technology (KIT).

The 'TigerKids' behavioural intervention programme was developed with the aims to modify children's physical activity level as well as food and beverage choices. The primary objectives are, in detail:

- regular physical activity (at least one hour per day);
- regular fruit and vegetable consumption;
- regular intake of water and non-sugared beverages such as water with little juice or unsweetened herb or fruit tea;
- healthy kindergarten breakfast.

A secondary aim is to reduce excessive sedentary behaviours such as television watching and other electronic media consumption. A setting-based approach was chosen because almost all children from all socioeconomic groups in the German population attend a kindergarten and can therefore be reached. In addition, a setting-based approach limits the costs per participating subject at a very low level.¹³

Elements and materials were designed for children, kindergarten teachers as well as parents to promote a healthy lifestyle in the kindergarten setting and at home (Figure 1). As the project is based on the theory of moderate constructivism, it was emphasized in the development that the manner in which children perceive and implement new learning is determined by their internal structure. This requires the offering of different ways of learning such as 'action-oriented learning', project lessons, and explorative learning.²¹

For the children in the kindergarten the following 'TigerKids' elements were developed:

1. Physical activity programme: this kindergarten-based element is designed to increase levels of physical activity and to improve children's fundamental motor skills. Sports scientists developed a 12-week activity programme specifically for the kindergarten setting. According to this programme, children should be physically active under supervision, preferably three times a week for one hour.
2. Tiger hand puppet: the tiger hand puppet guides the children through the programme. It represents an expert concerning activity, fun, and healthy nutrition in the kindergarten. The children identify the programme and the 'TigerKids' messages with this tiger hand puppet and, thus, learn a lot about healthy lifestyle in an age-appropriate way.
3. Magic fruit plate: at kindergarten the children cut seasonal fruits and vegetables daily, in order to increase the consumption of fruits and vegetables. The prepared food is presented attractively in the form of finger food on the so-called magic fruit plate and is available for the children at all times.



Figure 1. 'TigerKids' material box.

4. Drinking station: water, unsweetened tea, and water with a little juice are offered to all children at the drinking station at anytime during the day in the kindergarten. Drinking stations are located in group rooms as well as in outside areas.
5. Smart train: this is an already established element for nutrition education in childhood. Following the course of a story, the children fill the seven carriages of a wooden train with food items and beverages, which are part of a healthy nutrition.
6. Tiger race: during the so-called 'tiger weeks', the tiger hand puppet enters into a dialogue with the children about their kindergarten breakfast brought from home and explains what a healthy breakfast is. This way the tiger motivates children and their parents to adopt healthy eating habits.

The parents are actively involved in the 'TigerKids' project. They receive information material with messages on health-related behaviour in the form of two newsletters and four 'TippCards' per kindergarten year. The 'TippCards' give information about, for example, activities to encourage regular exercise and reduce sedentary time at home or recommendations to encourage fruit and vegetable consumption. These messages are formulated in a simple and uncomplicated way, so that all parents can be reached, independent of their educational level. In contrast, the newsletters give more detailed and substantial information concerning childhood obesity and its influencing factors. Furthermore, in each day care centre, information meetings are regularly held where interested parents are introduced to the prevention project.

For the kindergarten teachers a manual with detailed information material and modules, ready for use in the kindergarten setting were developed by the Child Health Foundation and their project partners. An internet platform with supporting additional information about the project was

established for kindergarten teachers and parents (www.tigerkids.de).²³ At the start of the 'TigerKids' project, all educators of the participating kindergarten take part in a two-day professional training course conducted by project staff members of the health insurance AOK. During this training, the kindergarten teachers are introduced to the concept, goals, and practical application of the 'TigerKids' programme in the kindergarten setting. In the second year a further 'TigerKids' workshop for kindergarten teachers is organized by AOK personnel in order to motivate them and offer the opportunity for building networks and exchanging experiences.

The complete 'TigerKids' material, including manual, tiger hand puppet, and a large wooden train as well as newsletters and 'TippCards' for families were produced and distributed by the AOK publishing house (AOK-Verlag, Remagen, Germany). The costs of these materials were calculated to be approximately €200 per kindergarten with 50 children for three years. These costs are covered by the health insurance AOK.

The study protocol was reviewed by the Ethical Committee of Medical Department of the Ludwig-Maximilians-University Munich and no objections were raised.

Survey among kindergarten teachers

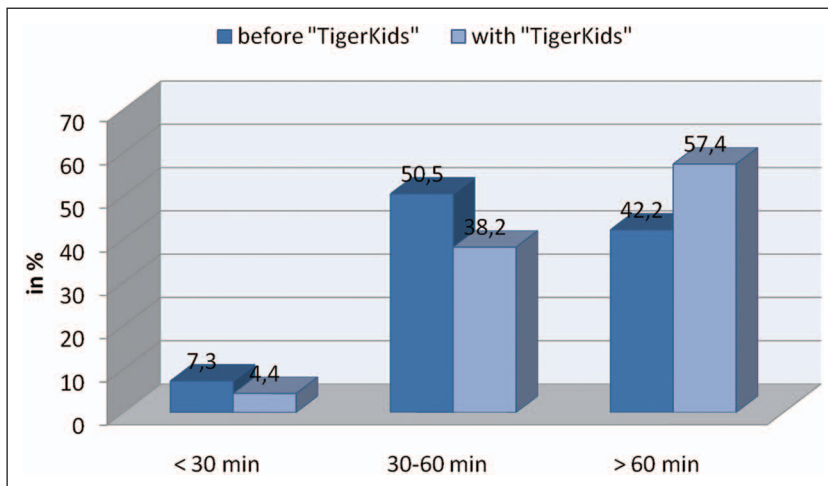
Some 215 kindergartens in Bavaria (Freising, Garmisch, Ingolstadt, Munich, Landshut, Amberg, Rosenheim, Bayreuth, Mittelfranken, Schweinfurth, Würzburg, Augsburg, Günzburg, Kempten, Coburg, and Hof) which had previously applied for 'TigerKids' were included in the study. In January 2009, one year after the start of the 'TigerKids' intervention, the teachers of the participating kindergartens were asked to fill out a questionnaire about the programme implementation in their day care centres. Of the kindergarten questionnaires, 96.3% ($n = 207$) were returned and informative. The questionnaire was split into three sections. The first part focused on the implementation of the developed 'TigerKids' elements in the daily routine of the kindergarten. It included questions on frequency and modality concerning the implementation of the physical activity programme, the magic fruit plate, the drinking station, the smart train, and the tiger race in the participating institutions. The second part gathered information on how the kindergarten teachers assessed the 'TigerKids' elements for healthy eating, the physical activity programme for the children, and the modules for parental involvement. The third section addressed observations of potential behavioural changes of the children made by the kindergarten teachers.

Results

Almost all kindergartens implemented the drinking station every day (Table 1). In this context 93.7% of the day care centres offered the children, as recommended, unsweetened, low-energy drinks, whereas 4.9% of the kindergartens served sweetened beverages such as sugared tea. Also the magic fruit plate, aimed to encourage fruit and vegetable consumption, was regularly prepared in the kindergartens (Table 1). The tiger race, an important element for motivating the children and their parents to bring a healthy breakfast to the kindergarten, was regularly carried out in 62.8% of the kindergartens. In 27.4% of the facilities the tiger race was not implemented (missing data: 9.8%). Of the interviewed day care centres, 91.3% worked at least one week per year with the smart train to communicate nutritional knowledge in a way that is appropriate for children. Only 1% did not employ this element (missing data: 7.7%). Within the scope of 'TigerKids' a 12-week physical activity programme was developed to promote physical activity in the kindergarten

Table 1. Implementation of the drinking station and the magic fruit plate in the kindergarten settings ($n = 207$).

	Drinking station	Magic fruit plate
Daily	195 (94.2 %)	157 (75.8 %)
2–4 ×/week	7 (3.4 %)	22 (10.6 %)
1 ×/week	—	18 (8.7 %)
Not at all	1 (0.5 %)	6 (2.9 %)
Missing data	4 (1.9 %)	4 (2.0 %)

**Figure 2.** Daily physical activity of the children in the kindergarten settings before and with 'TigerKids' ($n = 207$).

setting. In 22.2% of the participating 'TigerKids' facilities children were physically active three times per week, as envisaged by this programme. In 41.1% of the day care centres the activity programme was carried out twice per week and in 34.8% once per week. Merely 1.0% did not use this module (missing data: 0.9%). Figure 2 shows the time duration per day the children were physically active in the kindergarten before the day care centres started with the programme and since 'TigerKids' was implemented. Before the kindergarten took part in the 'TigerKids' programme the majority of the children (50.5%) was physically active 30–60 minutes per day, whereas with 'TigerKids' 57.4% of the children moved at least 60 minutes daily.

Table 2 presents how the kindergarten educators evaluated the developed 'TigerKids' elements for the promotion of a healthy lifestyle. Except for the tiger race, all nutrition modules for children, such as the drinking station, the magic fruit plate, and the smart train, were assessed as 'very good' by the majority. Especially popular was the tiger hand puppet, which was rated as 'very good' by more than 72% of the day care centres (Table 2). The physical activity programme and the manual for the teachers were also well accepted. Parents were targeted by newsletters, 'TippCards', and information meetings. Table 2 shows that the majority of the educators assessed the developed elements for parental involvement as 'good' or 'very good'.

Table 3 shows the change of eating behaviour and physical activity level subjectively observed by the teachers since participation start in the 'TigerKids' programme. Improvements were apparent

Table 2. Subjective assessment of the 'TigerKids' elements by the kindergarten teachers ($n = 207$).

	Very good	Good	Satisfactory	Poor	Missing
Drinking station	160 (77.3 %)	42 (20.3 %)	2 (1.0 %)	1 (0.5 %)	2 (0.9 %)
Magic fruit plate	166 (80.2 %)	23 (11.1 %)	10 (4.8 %)	4 (1.9 %)	4 (2.0 %)
Smart train	117 (56.5 %)	72 (34.8 %)	15 (7.2 %)	1 (0.5 %)	2 (1.0 %)
Tiger race	23 (11.1 %)	51 (24.6 %)	53 (25.6 %)	71 (34.3 %)	9 (4.4 %)
Tiger hand puppet	151 (72.9 %)	45 (21.7 %)	5 (2.4 %)	1 (0.5 %)	5 (2.5 %)
Physical activity programme	77 (37.2 %)	95 (45.9 %)	27 (13.0 %)	4 (1.9 %)	4 (2.0 %)
'TigerKids' manual for educators	108 (52.2 %)	87 (42.0 %)	10 (4.8 %)	—	2 (1.0 %)
Information meeting for parents	46 (22.2 %)	100 (48.3 %)	45 (21.7 %)	9 (4.4 %)	7 (3.4 %)
'TippCards' for parents	24 (11.6 %)	86 (41.5 %)	66 (31.9 %)	25 (12.1 %)	6 (2.9 %)
Newsletters for parents	36 (17.4 %)	114 (55.1 %)	42 (20.3 %)	8 (3.8 %)	7 (3.4 %)

Table 3. Effects on children's dietary and physical activity behaviours observed by the kindergarten teachers one year after starting the 'TigerKids' programme ($n = 207$).

	Yes	No	I don't know	Already implemented	Missing
Children drink more non-sugared drinks	132 (63.8 %)	41 (19.8 %)	16 (7.7 %)	15 (7.2 %)	3 (1.5 %)
Children eat more fruits and vegetables	191 (92.3 %)	7 (3.4 %)	—	8 (3.9 %)	1 (0.4 %)
Children are more active	103 (49.8 %)	61 (29.5 %)	23 (11.1 %)	14 (6.8 %)	6 (2.8 %)

in healthy eating: the majority of the teachers reported that the children drank more non-sugared beverages and ate more fruits and vegetables. Regarding the physical activity behaviour, nearly 50% of the educators reported that the children became more physically active since the kindergarten adopted the 'TigerKids' programme.

Discussion

The results show that the kindergarten-based intervention programme 'TigerKids' is a feasible and well-accepted instrument for health promotion in the kindergarten setting. The developed elements for healthy nutrition and physical activity were implemented on a regular basis in most of the participating day care centres. The kindergarten teachers judged the materials and elements for promoting a healthy lifestyle very positively. Furthermore, the educators reported improvements in several fields: since the 'TigerKids' programme was implemented, the children eat more fruits and vegetables, drink more non-sugared beverages, and are more physically active.

Setting-based interventions combining diet and physical activity may help to prevent childhood obesity. There is good evidence that obesity is related to a high energy intake with the diet as well as a sedentary lifestyle. Therefore intervention strategies should intensively focus on modifying both nutrition and physical activity behaviour.^{7,8,19,24,25-27} For this reason, the main focus of the 'TigerKids' intervention is on healthy eating and increasing levels of physical activity in the setting kindergarten and at home. With regard to healthy nutrition, increasing fruit and vegetable intake

and reducing consumption of sweetened drinks is important.^{7,19,28} Fruits and vegetables are low-energy foods which can displace energy-dense foods, such as salty snacks and sweets, from the diet. Improved accessibility to fruits and vegetables at school is effective in increasing children's intake of fruits and vegetables.²⁹ Therefore, by means of the magic fruit plate, the repeated and regular consumption of fruits and vegetables was included in the 'TigerKids' programme in order to increase children's preferences for these foods. The data show that this nutrition element is well accepted by educators as well as children and that the children ate more fruits and vegetables since the magic fruit plate was implemented on a regular basis in the kindergarten setting. Reducing the intake of sugar-sweetened and high-energy drinks, both in child care settings and at home, seems to be a successful obesity-prevention strategy. Several studies show that the high consumption of sweetened beverages and soft drinks contributes to the increased prevalence of overweight and obesity in childhood.^{28,30-33} For this reason the 'TigerKids' drinking station was developed, where unsweetened, low-energy beverages are always offered so that children can access it whenever feeling thirsty. With 93.7%, almost all kindergartens regularly implemented this 'TigerKids' element using unsweetened beverages, as recommended.

Many children spend a substantial amount of time in child care facilities. Thus it is of importance that a major part of their daily physical activity can be achieved in these settings.³⁴ Recommendations indicate that, for the maintenance of good health, for motor skill development, and for a healthy weight gain during growth, children should be physically active at least 60 minutes per day, preferably on all days of the week.^{16,17,32} The 'TigerKids' physical activity programme aims at making a contribution as the children should move supervised preferably three times a week for one hour. This physical activity programme was also well assessed by the educators and regularly implemented in the 'TigerKids' facilities. The amount of kindergartens where children are physically active more than 60 minutes per day has increased to 56.5% since participation in the 'TigerKids' programme started.

In a next step it will be helpful to also evaluate the 'TigerKids' elements for parental involvement. A high level of active parental involvement has been found to be an important determinant for the success of setting-based interventions.¹⁹ Parents serve as role models, and children will follow their activity behaviour and eating habits. In this way, parents have great potential to influence child health positively.^{6,7} Within the scope of the 'TigerKids' project we included the parents in several ways. They received informative material, and they were invited to take part in information meetings at their respective kindergarten. Additionally, an internet platform with supporting information concerning healthy lifestyles and obesity prevention has been established. Consequently, future research is needed to investigate the effects of the family component as part of the 'TigerKids' programme.

The results of this study are subject to several limitations. First, these results cannot be generalized as no control group was included. However, the results may be transferable and could be applied in the planning of future setting-based prevention programmes to promote healthy lifestyle in preschool children. Short-term outcome data of interventions are often biased in favour of the intervention, as behaviour changes reported in the short term are often not enduring in the longer term.³⁵ For this reason it will be interesting to investigate whether the different 'TigerKids' elements for a healthy lifestyle are implemented in the long run. The strength of the present study is that a large number of kindergartens was included, as 96.3% of the 215 contacted kindergartens participated successfully in this survey. This very good compliance is an indication of the high acceptability of the developed 'TigerKids' programme and the high motivation of the participating teachers.

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