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‘Croque&bouge’: A feasible and acceptable programme for obesity prevention in preschoolers at risk and their parents

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Sophie Bucher Della Torre, Fiona Dudley-Martin and Maaike Kruseman

Abstract

Objectives: To conceptualize and pilot test a programme of three workshops aiming to prevent the development of overweight in susceptible preschool children.

Methods: Three workshops were conducted, targeting both parents and children. The curriculum for parents included discussions on feeding responsibilities, healthy eating, taste development, neophobia and physical activity recommendations. Children participated in various play activities with fruits and vegetables and read stories about hunger and satiety feelings. Recruitment was organized through paediatricians and child-care centres. Evaluation of the programme focused on feasibility, adequacy for children’s age, parents’ perception of impact and, for children, change of the ability to recognize and willingness to taste fruits and vegetables.

Results: A total of 21 children and one of their parents participated in the programme. The programme was found to be feasible and adequate for the targeted community. Parents reported perceiving a positive impact of the intervention; however, this finding was not statistically significant. The major difficulty was identifying and recruiting families and engaging the parents in a discussion about weight.

Conclusions: This short programme aiming to improve parents’ ability to offer healthy environment and promote healthy eating behaviour was feasible and acceptable for families with young children. When developing and implementing such programmes, close collaboration with paediatricians and other health providers should be sought in order to identify and reach children at risk of obesity and their family.

Keywords

Paediatric obesity, prevention and control, child, preschool, health promotion, food habits, feeding behaviour, health knowledge, attitude, practice, taste perception

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Introduction

Children and adolescent obesity is recognized worldwide as a public health problem. Recently, evidence has suggested that childhood obesity is plateauing.[1] The Centres for Disease Control and Prevention announced small but significant declines in obesity among low-income preschoolers examined between 2008 and 2011 in 19 of 43 American states/territories. Still, obesity rates among 2- to 5-year-olds stay high with one child in eight being obese.[2] In Europe, between 12% and 33% of 4-year-old children suffer from excess weight (overweight or obesity).[3]

From a physiological point of view, the early years are critical for obesity development and early action may therefore be crucial. Body mass index (BMI) normally decreases after 1 year of age before marking a rebound, known as adiposity rebound, at around 6 years of age. Early adiposity rebound, occurring as young as 3 years of

Nutrition and Dietetics Department, School of Health Professions – Geneva (HEdS-GE), University of Applied Sciences Western Switzerland (HES-SO), Carouge, Switzerland

Corresponding author:
Sophie Bucher Della Torre, Nutrition and Dietetics Department, School of Health Professions – Geneva (HEdS-GE), University of Applied Sciences Western Switzerland (HES-SO), Rue des Caroubiers 25, CH – 1227 Carouge, Switzerland.
Email: sophie.bucher@hesge.ch

age, is recognized as a marker of increased risk of obesity development.[4–6] Cell differentiation peaks in early life and makes it a critical and vulnerable period for obesity development. Over-nutrition during that specific time is hypothesized to adversely influence energy storage systems,[7,8] and rapid growth in infancy has been associated with later obesity,[9–11] hypertension,[12,13] cardiovascular diseases[14,15] and type 2 diabetes.[16,17] Experts highlight the need for evidence-based interventions aimed at the prevention of preschool obesity.[18–20] However, a review of 55 studies showed that only 8 of these studies specifically targeted young children.[21]

Effective prevention programmes should include parents as well as children.[22] Parental feeding practices have a great impact on a child's eating habits, and practices such as food restriction, pressure to eat or use of food as a reward have been identified as unhealthy and counterproductive.[23,24] Parental educative styles can influence obesity development, with authoritarian, permissive and neglectful styles being associated with an odds ratio for obesity development of 4.88, 2.84 and 2.67, respectively, when compared with authoritative style parents.[25] Increasing fruits and vegetables (F&V) consumption has been recognized as an effective way to reduce energy density which helps to decrease energy intake[26] which in turn fights excess weight.[27,28]

Although familial risk factors have been identified, they have rarely been used as explicit inclusion criteria for intervention programmes: maternal diabetes, important maternal weight gain during pregnancy, baby's low birth weight or rapid growth and parental excess weight. Nutritional risk factors include not breastfeeding, early introduction of solid food, consumption of energy-dense foods, sugar-sweetened beverages, or inappropriate portion sizes.[29–32] As these factors are not easily detected, identification and reach of still healthy weight children and their parents is challenging and may explain the absence of these vulnerable populations in a majority of studies. They would benefit, however, from a prevention programme that is suited to their needs.

This article describes the concept and feasibility of a prevention programme targeted at young children at risk of obesity and their families. Data from this pilot phase were analysed and are presented for descriptive purposes.

Methods

Programme curriculum

The Croque&bouge (Snack&Move) programme consisted of three workshops (duration of 2 h 30 each) run by two dieticians, following a structured session plan. Parents and children participated in distinct activities and accomplished a cooking and tasting task together at the end of each session. The objectives and content of the sessions for parents and children are detailed in Table 1. Based on the Health Belief Model,[33] the dietician working with the parent group proposed solutions to perceived barriers to action, aimed to increase perceived benefit of action and self-efficacy. Cues to action prompted participants to engage in health promoting behaviours. Parents discussed topics such as feeding responsibilities related to parenting style,[34,35] healthy eating for children (including food groups and references for portion sizes), taste development, neophobia and physical activity recommendations. Parents also performed blind tasting and sensory description exercises. In order to increase exposure and familiarity, children played games with F&V specially created for this programme: card games, memory, dominos, 'happy families games', and so on. They listened to stories about feelings of hunger and satiety and accomplished tasks to improve F&V recognition.

Recruitment methods

Parent–child dyads were recruited through paediatricians, through child-care centres, by flyers in the community and through the local media. Eligibility criteria were healthy normal weight preschooler with at least one of the following risk factors: (1) one or two overweight or obese parent(s), (2) mother with diabetes or having suffered gestational diabetes, (3) problematic eating or physical activity habits and (4) parent expressing worries for his child's weight.

A communication plan based on the social marketing theory[36] included a personalized letter to 120 paediatricians, visits to 4 and phone calls to 8 paediatricians in the neighbourhood, emails with flyers and posters sent to all partners in the community, visits to 8 child-care centres from the area, articles in five local newspapers, and contact with parents' associations and local community centres. A total of more than 2000 flyers were distributed.

Evaluation

The intervention evaluation was based on parent and staff assessments of the process as well as the intervention effects as assessed through parent and child measures.

Process evaluation. The process evaluation was based on (1) attendance data, (2) a self-administered anonymous questionnaire for the parents, developed specifically for this study, and (3) a structured staff discussion in which the programme's process and content was rated.

In the questionnaire, respondents rated 14 statements on a Likert scale and gave their opinion to 15 open-ended questions. Items included parents' perceived adequacy of content for children's age (e.g. 'Were the children's activities age-appropriate?') and perceived changes in

children's knowledge (e.g. 'Have you noticed an improved knowledge about F&V in your child?'), interest (e.g. 'Have you noticed an increase in curiosity/interest in F&V in your child?') and willingness to taste (e.g. 'Have you noticed an increase in willingness to taste F&V in your child?').

Parents' overall satisfaction with the programme was also assessed using a visual analogue scale.

Table 1. Goals **for** parents and children developed in the programme.

Session	Participants	Session name	Intervention objectives	Intervention targets
1	Parents	Healthy eating on a budget	• Offer a healthy food environment • Offer structured and regular eating occasions • Offer appropriate portion sizes while giving children a sense of responsibility for the quantities of food consumed • Prevent restrictive practices • Prevent over-feeding	• Healthy and balanced meals and snacks planning • Problem-solving on financial obstacles to healthy eating • Age-appropriate portion sizes • Identification of restrictive or pressure to eat practices and generation of alternatives practices
2	Parents	Taste development in children	• Encourage taste education • Prevent use of pressure to eat or use of reward	• Normal taste development in children • Awareness to the parents' own sensorial perceptions • Problem-solving on ways to overcome food neophobia and increase exposure to fruits and vegetables • Parental strategies for dealing with picky eaters
3	Parents	Physical activity and sedentary activities	• Being active with the whole family • Limit screen time and increase activities without screen	• Develop role model • Overcoming obstacles to physical activities for all family members • Quantification of screen time and generation of alternative activities
1-2-3	Children alone	Exposure to fruits and vegetables and physical activities through play and games	• Develop sensory analysis • Increase variety of food consumed • Increase consumption of fruits and vegetables • Increase awareness of feelings of hunger and satiety • Experience pleasure to be physically active • Develop coordination skills related to physical activity	• Increase exposure to fruits and vegetables through play and games specially created (memory, lotto, domino, blind touching, etc.) • Discover new foods • Child awareness of feeling of hunger or satiety through book stories • Learn to taste food in group exercises, using peer modelling • Group fun physical activities through games and play
1-2-3	Parents and children	Cooking recipe together	• Develop cooking skills of children • Increase variety of food consumed • Increase consumption of fruits and vegetables	• Children realize a cooking recipe with the help of their parents ('hedgehog'-pear, fruit and veggies brochettes, vegetables dips) • Increase exposure to fruits and vegetable • Child and parent taste-testing

Impact trends evaluation. To evaluate impact on children, two identical standardized evaluation sessions were held, one at baseline and one at 4–6 months post-intervention. First, each child was asked to name correctly 20 displayed F&V. Then, the child was offered the possibility to taste any of eight F&V (fennel, yellow bell pepper, asparagus, pear, orange, dry apple, applesauce and carrot juice). The number of F&V tasted was counted. Each child was individually invited into the testing room. A dietician, who remained neutral during the whole session, conducted the evaluation: no help, praise or encouragements were given.

Parents completed validated questionnaires evaluating their feeding style (Child Feeding Questionnaire (CFQ)),[37] child eating behaviour (Children's Eating Behaviour Questionnaire (CEBQ)),[38] child physical activity and general information (parents' weight and height, education level, number of siblings).

To assess changes in the quality of food offered, parents were asked to keep a 3-day qualitative paper food record. Finally, children received a pedometer and parents were asked to record their total daily steps for 3 days.

Statistical analysis

For the process evaluation, evaluation was based on frequencies. The intention of this study was not to test the effect of the intervention on behaviours or BMI, which would require a larger randomized trial. Therefore, data are provided for

Table 2. Baseline and follow-up evaluation of knowledge of F&V, willingness to taste F&V and subscales of the Child Feeding Questionnaire and the CEBQ (median, IR).

	N	Before	After	*p*
Fruits known (9 proposed)	9	7.0 (5.0)	6.0 (3.5)	0.27
Vegetables known (11 proposed)	9	3.0 (4.0)	4.0 (6.0)	0.54
F&V known (20 proposed)	9	10.0 (9.5)	11.0 (9.0)	0.14
F&V tasted (8 proposed)	9	2.0 (4.0)	2.0 (3.5)	0.67
Feeding part 1 (perceived responsibility)	8	4.3 (0.9)	4.0 (0.8)	0.67
Feeding part 2 (perceived parent weight)	8	3.3 (0.9)	3.4 (0.7)	0.10
Feeding part 3 (concern about child weight)	8	1.2 (1.6)	1.0 (1.3)	1.0
Feeding part 4 (restriction)	8	3.1 (0.7)	3.4 (1.3)	0.16
Feeding part 5 (pressure to eat)	8	1.6 (1.3)	2.9 (1.4)	0.03
Feeding part 6 (monitoring)	8	4.2 (0.9)	4.7 (1.0)	0.59
CEBQ part 1 (satiety responsiveness/slowness in eating)	8	1.94 (0.5)	2.0 (0.6)	0.94
CEBQ part 2 (fussiness)	8	2.0 (0.6)	1.9 (0.4)	0.09
CEBQ part 3 (food responsiveness)	8	0.8 (1.4)	1.2 (0.9)	0.32
CEBQ part 4 (enjoyment of food)	8	2.6 (0.6)	2.6 (0.6)	0.46
CEBQ part 5 (desire to drink)	8	1.0 (0.6)	1.0 (0.8)	0.04
CEBQ part 6 (emotional undereating)	8	2.6 (1.4)	2.0 (1.5)	0.35
CEBQ part 7 (emotional overeating)	7	1.0 (0.5)	1.0 (1.0)	0.14

IR: inter-quartile range; CEBQ: Children's Eating Behaviour Questionnaire; F&V: fruits and vegetables.

descriptive purposes (median and inter-quartile range (IR)) and compared on a before–after basis. Because of the small sample size, we used non-parametric paired Wilcoxon tests.

Ethics

The Geneva Cantonal Ethics Committee on Research Involving Humans approved the programme. Parents signed informed consent forms and children gave oral consent.

Results

Participants

A total of 21 children from 19 families registered for a 3-session workshop. The final sample included 18 children (from 15 families) aged 3–6 (mean 3.4, standard deviation (*SD*) 0.6) years participated (11 girls and 7 boys). Six children had both parents with BMI within norms, six children had one parent suffering from overweight or obesity and for five children both parents were overweight or obese. Information was missing for the parents of one child.

Self-reported motivation of the families to participate in the programme is related to (1) family tendency to gain weight, (2) children with eating difficulties (particularly high neophobia and food hyper selectivity), and (3) interest for the topic.

Process evaluation

Of the 18 child–parent dyads, 11 participated in all three sessions, 5 children in two sessions and 2 children in only one session.

Out of 15 families, 11 completed the satisfaction evaluation at the end of the three sessions. All respondents were satisfied or very satisfied with the programme and all rated the activities as very adequate for children of this young age. All noticed 'some improvement' or a 'great improvement' in their children's knowledge about F&V. Nine parents reported their children's higher interest about F&V and six parents found that their children tasted new foods more easily.

Programme staff thought that the programme structure and all activities were suitable and age appropriate.

Impact trends evaluation

A total of 16 children completed the baseline knowledge evaluation and willingness to taste F&V and 9 children came back 4–6 months after the end of the programme for the second evaluation. Detailed results of the evaluation are shown in Table 2. The knowledge task showed that the median (IR) number of F&V known by the children was 10.0 (9.5) before the programme and 11.0 (9.0) after the programme (not statistically significant, $p = 0.14$). At the individual level, seven children improved their knowledge; one had the same score before and after the programme and one decreased his score. The median (IR) number of tasted F&V did not change before and after the programme: 2.0 (4.0) versus 2.0 (3.5). At the individual level, six children tasted more F&V after the programme, one had the same score and two tasted less F&V during the post-programme evaluation than at baseline.

Baseline and follow-up questionnaires (CFQ and CEBQ) were available for eight children. The subscale analysis showed no significant change before and after the programme, except for part 5 of each questionnaire. In the CFQ,

the 'pressure to eat' item increased from a median score of 1.6 (IR 1.3) to 2.9 (IR 1.4) ($p=0.03$). In the CEBQ, the 'desire to drink' item significantly decreased ($p=0.04$). The analysis of the part 2 of CFQ (small increase in 'perceived parent weigh') and part 2 of CEBQ (small decrease in 'fussiness') showed p values $\leqslant 0.1$. When analysed at the question item level, the following items of the questionnaires improved: 'My child likes to taste new foods', 'My child refuses new foods when presented for the first time' and 'My child decides he doesn't like a food even before having tasted it'. After the programme, more parents indicated putting sweet and fatty food items away from their child and more parents observed that their child reached satiety before having finished his plate. The intervention did not increase parents' anxiety about their child eating too much when alone or about their child developing excess weight. All parents reported that their child liked eating and was interested in food.

Only four parents returned the baseline food record and other parents expressed that the workload was too heavy. Therefore, the food record was abandoned.

The use of pedometers with young children turned out to be very challenging, as children tended to touch it, take it off or lose it. After the first round of the programme, the use of pedometers was also abandoned.

Recruitment and communication

Despite large diffusion of information about the programme, recruitment was challenging. A total of 15 interested families were unable to participate, mainly due to organizational difficulties with work or with children's activities. Paediatricians and child-care providers expressed their difficulties to identify children 'at risk', compared to already overweight children. Moreover, they expressed difficulty and even embarrassment when addressing weight problems with overweight or obese parents.

Discussion

The primary aim of this project was to conceptualize a prevention programme targeting at young children at risk of obesity and their family and to test its feasibility. Second, we analysed data collected during the pilot phase.

Regarding the content and format of the programme, parents were targeted as a change agent, as recommended in the literature.[39] While parents attended a workshop, children were exposed to healthy eating and an active lifestyle through games and entertaining activities. No direct prevention messages were delivered to the children. The programme's content was underpinned by several recent publications insisting on the importance of parents' role through the environment they offer and their feeding behaviour.[40–42] Likewise, experts have stressed the need to target preschool children.[30,43,44] In the literature, most interventions targeting young children take place in child-care centres or in primary care providers' offices.[30,44] However, initiatives in child-care centres do not usually reach parents and are less prone to be suited to the specificities of families. Follow-up by primary care providers can ensure this tailoring, but primary care providers are also known to lack time to implement prevention. The Croque&bouge programme was created to lessen the burden of patients' education on primary health providers, while offering a programme that is adequate and easy to implement.

This pilot study demonstrates that even when the setup of prevention interventions for young children and their families is tailor-made and the content suitable for the target group, recruitment of the families of at-risk children is difficult. In our study, two reasons can be identified. First, recruitment was based on direct communication with potential participants as well as identification of children at risk by paediatricians and child-care providers. Parents are known to be inadequate evaluators of their children's body size.[45–47] We targeted children without weight problem at this stage, further increasing the difficulty of convincing parents of the usefulness of participating in a prevention programme. Even health professionals expressed difficulty to identify in their consultation at-risk children and their families, and studies have revealed an under-diagnosis of obesity by paediatricians.[48,49]

A second reason was the fact that paediatricians, facing obese parents, found it difficult to discuss weight issues and avoided talking about the risk of obesity. Paediatricians are faced with the difficult task of identifying at-risk children, without stigmatizing their families. The existing literature shows that health-care providers may feel uncomfortable because of personal negative attitudes[50,51] or because they lack the skills to communicate about weight with patients.[52] Still, parents' preferred partner relating to their children's weight issues is the paediatrician.[53] It seems therefore crucial to provide specific and appropriate training for medical staff so as to improve the screening and prevention of weight problems. Trained physicians declare themselves as more competent,[54] and those who know the current guidelines report more efficient consultations than colleagues without training or information.[55]

In this pilot study, although it was not possible to show an effect of the intervention at the group level, parents' perceptions of the impact of the programme and individual trends were encouraging. These findings support further evaluation of the intervention through larger scale randomized controlled trials. The observed increase in 'the pressure to eat' declared by parents after the programme is disturbing. It seems to go against the programme's message and questions the potential negative side effects of prevention actions. Social desirability might have biased our results. A posteriori, we believe that an additional focus group or structured debrief would have provided more instructive information. However, potential negative side effects should be monitored in preventive actions, especially in sensitive issues like eating. The change in the subscale 'desire to drink' is more

difficult to interpret, as this topic was not specifically addressed in the programme. The present findings should in any case be interpreted with caution because of the small sample size and multiple hypothesis testing.

The strengths of the Croque&bouge programme include the development of a curriculum based on evidence, with appropriate activities that worked in practice, to the satisfaction of the providers and participants. The weaknesses are the small number of families participating, the difficulty of integrating the programme in the community and the absence of a control group.

Conclusion

The importance of obesity prevention is no more in question. Every child and family should benefit from prevention, for example, through primary care, child-care centres or school and community. More generally, these initiatives should take place in an environment that promotes healthy behaviour. However, some children are known to be at greater risk, and waiting for them to become overweight before taking action would be ethically unacceptable and a public health mistake.

This short programme aiming to improve parents' ability to offer a healthy environment and promote healthy behaviour appeared to be highly feasible and acceptable for families with young children. Our results show that well-designed activities targeting children and their parents could have the potential to increase exposure, knowledge and willingness to taste healthy foods among young children. A larger scale programme would be needed to assess the real impact on short- and longer term eating behaviour and weight status. In this pilot study, recruitment was found to be the greatest challenge. As health and education professionals are on front line to identify and refer families at risk, close collaboration and thoughtful training seem essential to improve access to children at risk of developing overweight.

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Declaration of conflicting interests

The authors declare that there is no conflict of interest.

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