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Health-E-PALS: promoting Healthy Eating and Physical Activity in Lebanese school children - Intervention development

Lebanon is a small middle-income country in the Middle-East situated on the Mediterranean coast. Over the last three decades, Lebanon has experienced a nutrition transition resulting in a shift towards a diet high in energy-dense food and sedentary lifestyle. The results from a national population based study in Lebanon showed high prevalence rates of overweight and obesity similar with those observed in developed countries, both in adults and children (Sibai et al., 2003). Recently, a study on the secular trends in the prevalence of overweight and obesity in Lebanon over a 12 year period found an alarming increase in obesity prevalence in the Lebanese population, especially in children (Nasreddine et al., 2012a). Multicomponent interventions, policies and nutritional strategies to promote weight control and physical activity nation-wide were recommended to curb the childhood obesity crisis in Lebanon (Sibai et al., 2003; Hwalla et al., 2005; Nasreddine et al., 2012b).

School-based interventions to promote healthy eating and encourage physical activity are lacking in Lebanon. A reassessment of the Lebanese Integrated Health Curriculum is warranted, as well as the need to adopt a comprehensive school health programme (WHO, 2005). In an attempt to address this gap, a theory and evidence-based multi-component school intervention was developed that focused on promoting healthy eating and physical activity to prevent weight gain in school-aged children. The intervention was pilot tested

using a mixed method study design involving both quantitative and qualitative research methodologies (Habib-Mourad, 2013). Eight schools were purposively selected from two different communities in Beirut (capital of Lebanon) and were randomly assigned to either the intervention or control group. Anthropometric measurements were taken, and questionnaires on determinants of behavioural change, eating and physical activity habits were completed by the students in both groups (N=374) at baseline and post intervention. Focus group interviews were conducted in intervention schools at the end of the study.

The study was granted ethical approval by the Institutional Review Board of the American University of Beirut. The present paper describes the development of the intervention and its components.

Intervention development

The school-based multicomponent intervention was named in Arabic 'Kanz al Soha'; which translates to health treasure. 'Health-E-PALS' was deduced as the acronym for: Intervention to promote *Healthy* Eating and *Physical* Activity in Lebanese School children.

The intervention focused on the promotion of healthy food choices and active living rather than the achievement of an ideal body weight. By selecting this focus the intervention aimed to lessen the chance of stigmatization of overweight children and of contributing to eating disorders (Swinburn & Egger, 2002).

Target behaviours

When aiming at preventing unnecessary weight gain studies showed that strategies focusing on: changes in dietary behaviours; leading to decrease in energy intake; changes in physical activity and sedentary behaviours that would increase energy expenditure; were key factors in the onset of obesity (WHO, 2003).

The specific behaviours that make up the energy balance equation have been referred to as the energy balance-related behaviours (Kremers et al., 2006). Diet and physical activity patterns that can be a factor in weight gain may differ among groups depending on age, culture, gender and socioeconomic status. The energy balance behaviours mostly related to excess weight gain in schoolchildren were: breakfast skipping; sweetened drinks consumption; energy dense snacks intake; sedentary and physical activities (Affenito et al., 2005; Bachman et al., 2006; Malik et al., 2006; Sallis et al., 2000). Based on the above evidence-based literature, the 'Health-E-PALS' intervention targeted the following obesity related behaviours in 9-11 year old children:

1. Increase consumption of fruits and vegetables
2. Favour healthy snacks over high energy dense snacks and drinks
3. Importance of having daily healthy breakfast
4. Increasing moderate physical activity
5. Decreasing sedentary behaviour

Theoretical underpinning

The theoretical underpinning of this programme is instruction with a behavioural focus; and goes beyond the acquisition of knowledge. The 'Health-E-PALS' intervention was based on the constructs of the Social Cognitive Theory (Bandura, 1986) which uses a multi-level approach involving individual behaviour change and environment modifications to support individual changes. Personal factors influencing individual behaviour include knowledge, skills and self-efficacy; environmental factors include reinforcement, modelling and availability.

'Health-E-PALS' had three coordinated intervention components that addressed specific behaviour determinants: nutrition knowledge; awareness; skills and self-efficacy; personal factors. Modelling and availability covered the

environmental factors. The components were devised to work together to address behavioural and environmental factors related to students dietary and physical activity behaviours.

Consistent with the Social Cognitive Theory, the components were based on the expectation that children will make healthier choices when introduced in a social setting that includes family and peers and uses active learning strategies. According to Bandura (Bandura, 1986, 2004), in order for an individual to perform a specific behaviour, he should know what to do and how it should be done; this is referred to as behavioural capability or knowledge; skills training helps in increasing mastery learning. Strategies that increase self-efficacy include self-monitoring and reinforcement, such as rewards and praise.

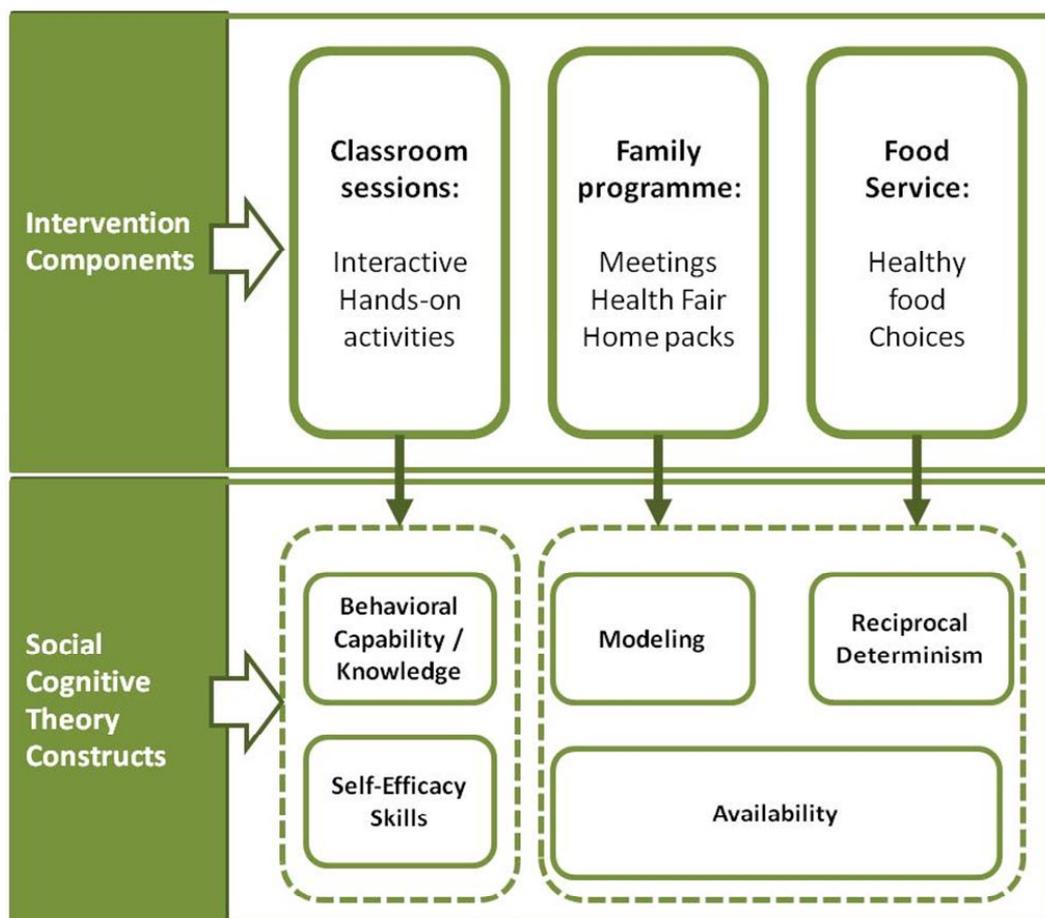
Role modelling refers to observational learning, where one learns by observing others actions, especially credible others, in this case the parents and teachers. Availability and accessibility of healthy food choices were also considered. Consequently, the intervention had three components:

- 1 Culturally appropriate classroom sessions designed to promote healthy eating and physical activity. This component was designed to cover the personal and psychosocial determinants as outlined by the Social Cognitive Theory.
- 2 A family programme which introduces the intervention to families and assists them in creating a supportive environment at home for healthy lifestyle behaviours. This component covered the environmental factors at home: modelling and availability.
- 3 A food service intervention targeting the school shop and the lunch boxes sent by the family. This component covered availability of food in the students' school environment.

Through these three components, 'Health-E-PALS' attempted to increase students' knowledge and efficacy about food choices and physical activity, and modify the school and family environment in order to provide more opportunities for exercise and healthy eating.

Figure 1 (see page 5) outlines the intervention components based on the Social Cognitive Theory constructs or determinants.

Figure 1: Intervention components, behavioural, personal and environmental constructs



Intervention components

The following section provides further details on the intervention components.

Component 1: Classroom sessions

Educational material

Sessions' topics and activities were developed based on the five energy related behaviours targeted in the intervention.

The goal of the 'Health-E-PALS' intervention sessions was to provide appropriate nutrition education in a simple and fun layout. Delivery strategies reported to be effective in nutrition education include hands-on activities, and interactive learning that gives opportunities to participate in discussions and food activities (Birkett et al., 2004; Holston et al., 2004; Edward and Evers, 2001). Consequently, activities such as games, hands on activities and food preparation were used to make the learning fun and interactive and the themes easy to remember and relate to. The 45 minute sessions were delivered each week for 12 weeks.

All materials were developed to suit Lebanese traditions and cultures, and featured traditional

foods in most games, visual aids and recipes. Languages used on educational items were Arabic and English. However, only Arabic materials were used with students, except for some posters and food cards that were bilingual.

The educational component was designed to be integrative and interdisciplinary to facilitate implementation and minimize excess burden on existing school curriculum. Nutrition sessions were integrated into various classroom subjects during the regular school day. For example, students used the measuring centres session to practice fractions in Maths, and breakfast planning in writing topics in English or Arabic subjects. Table 1 (page 6) summarizes the topics, objectives, activities of the classroom sessions with the determinants targeted and the class in which they were integrated.

Each session consisted of two sections; 10 to 15 minutes of discussion, information and interaction about the topic of the week followed by 30 minutes of activity: game and/or food preparation. In order to make the sessions

Table 1: Educational sessions' topics, objectives and tools with the matching theory determinant and class integration

	Title of the lesson	Objectives of the lessons	Activity / Tool	Determinant	Class session
1	Introduction to Food groups	Classify one day food intake into food groups. Classify foods according to different food groups.	Game : Food cards	Knowledge	Science
2	Food Groups and Nutrients	Know the nutritional characteristics of each food group.	Food counter: Visual tool that helps students see what they ate	Knowledge	Science
3	What is a portion	Know the serving size of foods in different food groups.	Measuring centres: Real experience with food Food diary booklet	Knowledge	Math
4	Fruits and vegetables: the rainbow colours	Eat more fruits and vegetables Try new types of fruits and vegetables	Build a character with fruits and vegetables, tasting is a must	Self-efficacy and skills	Arts
5 & 6	Physical activity	Identify sedentary activities and try to minimize them. Increase regular Physical activities especially walking.	Pedometer workshop Activity booklet	Self-efficacy and skills	Sports
7	Importance of breakfast	The role and importance of breakfast Find ways to facilitate breakfast intake	Plan and prepare a healthy breakfast (breakfast is yummy)	Self-efficacy and skills	Language
8	Healthy snacks	Differentiate between healthy snacks and non-stop-nibbling. Prepare healthy snacks at home	Plan and prepare a healthy snack	Skills / Role modelling	Language
9	Where do fats and sugars hide	Identify high fat, high sugar containing foods	Game board: Treasure game	Knowledge	Math
10	Clean teeth, good teeth	Identify caries causing foods Brush teeth the correct way	Tooth brushing workshop	Self-efficacy and skills	Science
11	Water is the best	To explain why water is the best fluid. Encourage water intake instead of other sweet drinks	Water tasting workshop	Knowledge and skills	Social Studies
12	Value of food	Compare foods according to their nutrients and energy content.	Game: The traffic lights	Knowledge and skills	Civic Education

Table 2: 'Health-E-PALS' educational Kit

- Classroom posters (10)
- Take Home pamphlets (12 for each student)
- Food diary booklet (one for each student)
- Physical activity booklet (one for each student)
- Set of 60 food cards
- Board game: Treasure game
- Traffic lights signs
- Food counter box (one for each student)
- Pedometers (one for each student)

interesting and attractive to students, a set of visual aids have been developed. The teaching aids consisted of posters, pamphlets, activity booklets, card and board games (Table 2 above). One of the researchers (C.H.M) implemented the sessions with the help of a research assistant. Teachers were participating in all phases of the sessions each during his class

hour. At the end of the intervention, the teachers received extensive two days training with the complete educational kit and teachers' manual, to be able to implement the sessions later on.

Material testing

Educational material were pilot-tested on a group of seven to ten children aged 9-11 years who were related to the researcher and her colleagues. The children gathered few times during the summer vacation, prior to the beginning of the academic year. They were exposed to the educational material and tried all the activities included in the educational sessions.

Following the piloting several food illustrations were changed as well as some nutrition terms that were modified to wordings

more accessible to children. The board and card games were re-adjusted to fit within a 30 minutes time frame. Snacks and recipes ingredients were altered to suit children's taste preferences.

For more details on material content refer to <http://etheses.dur.ac.uk/7322/>

Component 2: Family programme

The goal of the family involvement component was to introduce the programme to families and to assist them in creating a supportive environment at home for healthy lifestyle behaviours. The family intervention component consisted of the following activities:

- *Parents meetings:* Parents were asked to attend meetings where the different components of the project were provided along with information and guidance on the importance of healthy diet and physical activity. A healthy breakfast followed the meeting
- *School events:* These consisted of health fairs involving interactive forums using the educational sessions' themes covered in class. The health fairs took place at schools at the end of the programme; parents were invited to participate in games prepared and presented by their children
- *Take home pamphlets:* The intervention included sending a summary of the major points covered during the educational session home with the students as take home action packs after each session. Samples of food prepared in class were also sent home with the students. The goal of the take home pamphlets was to try to address non-compliance/ poor attendance of parents' school meetings.

Component 3: Food service

Foods and drinks offered to students in the sampled Lebanese school shops include convenience foods such as chips, candy bars, sweetened drinks as well as ready prepared sandwiches, traditional Lebanese pastries, croissants and donuts. Fresh juices, fruits and vegetables are not available. Recommendations concerning the healthy list of snacks and drinks that should be available to children in the shop were provided to shop administrators. Posters encouraging healthy food choices were posted at the points of sales whenever possible.

Lebanese children in primary schools also bring with them food from home to school, which consists of sandwiches and convenience foods. Students were encouraged to enhance the quality of their lunch box so as to include at least one fruit or vegetable portion and not more than one high energy dense snack.

Results and Conclusion

This paper has concisely described the effective development of the 'Health-E-PALS' intervention and its components. Results from the cluster randomised controlled trial showed that knowledge and self-efficacy scores doubled for the intervention group but not for the control. Students in the intervention group also reported purchasing and consuming less chips and sweetened drinks compared with controls (86% & 88% less respectively $p < 0.001$). Results from the focus group discussions conducted at the end of the intervention, showed that the programme was generally well accepted by students, teachers and their parents. It was viewed as novel due to its culturally sensitive and innovative components. The students learned to change their eating habits in a pleasurable way, and were successful in trying new healthy foods and preparing recipes. The programme was well integrated within the school curriculum and was well accepted by teachers and school principals. Finally, parents acknowledged the fact that the programme positively affected the family food environment. All agreed that longer duration interventions and sustainability of the programme will be required. More details about the pilot testing of the intervention, its research methodologies as well as results of its efficacy can be found elsewhere (Habib-Mourad, 2013).

The 'Health-E-PALS' intervention is currently rolled out in Lebanon and other countries in the region as "Nestlé Healthy Kids –Ajyal Salima" programme in collaboration with health and education authorities in order to prevent the ramping childhood obesity epidemic in the area.

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