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Programs for promoting a healthy lifestyle in the context of school health: a scoping review

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ABSTRACT

Introduction: The adoption of healthy lifestyles (HLs) in children is encouraged at school, but health education is mainly oriented towards children, neglecting the family. **Objective:** To map and examine school programs to promote HLs in children (3-10 years old) that address 3 or more topics. **Method:** A Scoping Review from 1992-2020 with the Joanna Briggs Institute methodology and using the Rayyan QCRI platform. **Results:** Out of 4,952 articles, 19 HL promotion programs from 13 countries were selected, with the following themes: healthy eating, physical activity and parental education, but also interventions on screen dependence, sleep and hygiene.**Discussion:** Although most of the programs found are efficient, there is no consensus on techniques for monitoring the dimensions of HLs, nor holistic interventions to promote Hls. **Conclusion:** Programs that involve parents become more efficient. The scientific evidence found can improve health interventions.

Descriptors: Life Style; Child; School; Health Education.

INTRODUCTION

Healthy lifestyle is a concept that the World Health Organization[1] has defined as a way of life aimed at reducing illness and early death, covering physical, mental and social well-being. The adoption of a healthy lifestyle influences not only the subject who adopts it, but also the way of life of the family members, especially children. From an early age, children's lifestyle is influenced by their family and community, with a direct impact on their health and well-being. In order to promote a healthy lifestyle for children and their families, several international guidelines were defined on which the National School Health Program (*Programa Nacional de Saúde Escolar*, PNSE)[2] was based. This advocates holistic intervention in 11 lifestyle dimensions: mental health and socio-emotional skills, education for affections and sexuality, healthy eating and physical activity, body hygiene and oral health, health sleep and rest habits, postural education and prevention of the consumption of tobacco, alcoholic beverages and other psychoactive substances, as well as non-chemical addictive behaviors. However, most school health education programs focus on one or two dimensions. The most effective healthy lifestyle promotion interventions are holistic projects to promote global well-being, based on the development of individual, social and emotional skills that facilitate interpersonal relationships and empower the educational community for health management[3].

In Portugal, as part of the reorganization of the health services, Community Care Units (CCUs) were created, whose mission includes the implementation of the PNSE. The clinical practice in this area highlights gaps in the projects: in general, they do not reflect scientific

reasoning, advocate a multiplicity of interventions without result indicators, and focus almost exclusively on the training of children[3]. The mapping of scientific evidence on interventions in the school context to promote healthy lifestyles in children will make it possible to establish recommendations for school health teams, in order to improve the projects. It is verified that most of the programs/projects implemented in schools are not holistic, as they operate in only one or two dimensions of lifestyles. In the formulation of the PCC (Population, Concept and Context), children from 3 to 10 years of age were defined as the study population, the concept refers to a healthy lifestyle, and the context corresponds to school health. In this sense, the following research question was elaborated: "What school health programs have been implemented to promote healthy lifestyles in the children?", which guided this scoping review. Its objective is to map in the scientific literature and examine programs to promote healthy lifestyles in children (3 to 10 years old) in the context of school health that address 3 or more dimensions (PNSE). For the target population, the age group from 3 to 10 years old was chosen, which covers preschool and 1st cycle, levels of schooling in which children have little autonomy and their parents are the main responsible for their lifestyle.

SYSTEMATIC REVIEW METHOD

This scoping review followed the Institute Joanna Briggs (JBI) methodology[4] with the following structure: identification of the research question, search for relevant studies, selection of studies, data mapping, compilation, summary and reporting of the results. A preliminary survey conducted in MEDLINE, CINAHL, LILACS, SCOPUS, WEB OF SCIENCE revealed that there is no scoping review (published or to be carried out) on projects to promote healthy lifestyles in the school context in children from 3 to 10 years old. In the database search in

COCHRANE and PROSPERO no other reviews were identified with proposals similar to the themes of this review. This study focuses on the characterization of school health programs that have been implemented to promote healthy lifestyles in children, on the analysis of the dimensions of the lifestyles (focus of intervention), as well as on the effects of the interventions.

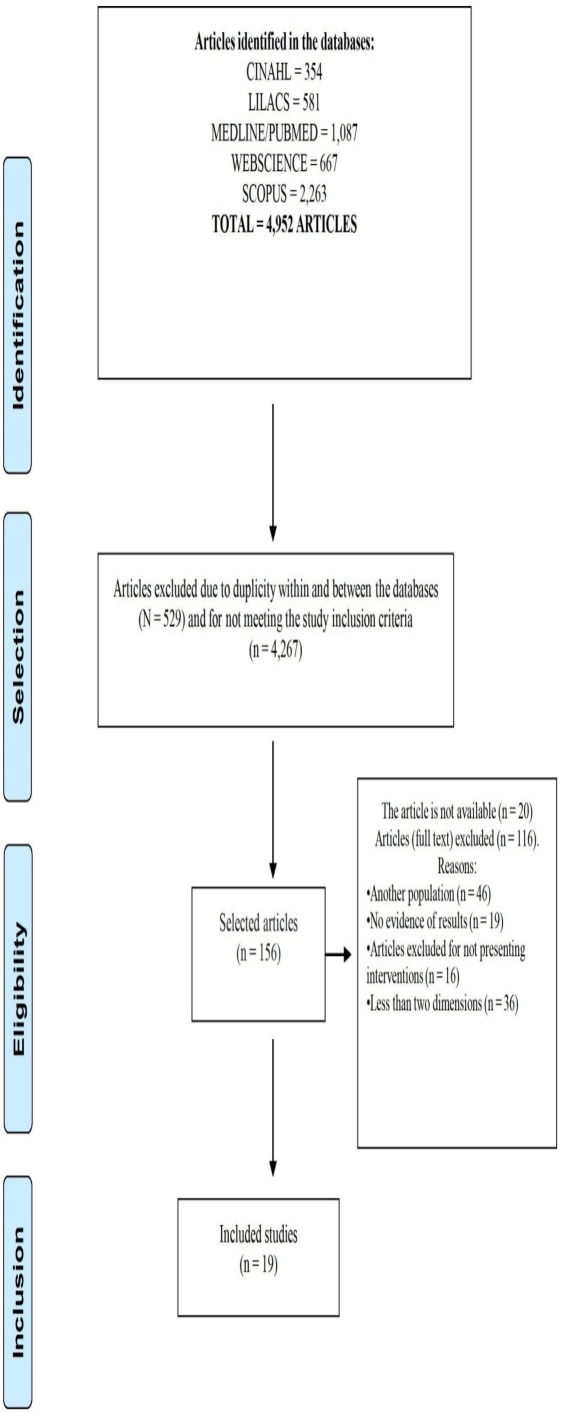
INCLUSION CRITERIA

The study population included all those that describe programs or strategies to promote healthy lifestyles for children aged 3 to 10 years old and the studies excluded were those aimed at children aged 0 to 2 years old, adolescents and adults. Community-based studies that covered the entire school were included. In reference to the concept, healthy lifestyles, all programs, strategies and interventions to promote healthy lifestyles in children were considered, excluding all that addressed only one or two dimensions. Regarding the context, studies carried out in schools were included, excluding those that, even when recruiting children from school, took place in other spaces. Regarding the type of study, all those that showed some intervention were included, that is, experimental studies: randomized controlled clinical trials, non-randomized controlled clinical trials or other quasi-experimental studies, such as before/after studies or studies related to the reliability, validity and accuracy of available instruments or tools, cohort studies, case studies, and experience reports. Studies published after 1992 were selected, the year in which the *European Network of Health Promoting Schools* was created to improve the school environment and facilitate healthy practices in the general community[5]. Those that did not offer free access were excluded.

The following descriptors were used: "Life Style" [Mesh]; "Child" [Mesh]; "Health Education" [Mesh], adding the Boolean operator "AND". The initial search was limited to the MEDLINE (via Pubmed) and CINAHL (via EBSCO,

SCOPUS, WEBSCIENCE and LILACS) databases, followed by an analysis of text words in the titles and abstracts and the index terms used to describe the article. Data was extracted using a "Data extraction instrument" table (Appendix I) as recommended by the JBI for scoping reviews[4]. Data extraction was conducted by ten independent reviewers by using the *Rayyan QCRI* platform[6]. PRISMA was applied[7] (Figure I) in the selection of the articles. In a first phase, the 4,952 articles resulting from the research were analyzed and 529 were removed due to duplication. After reading and analyzing the title and/or abstract by two to two reviewers, 4,267 articles that did not meet the inclusion criteria were removed. Disagreements between the reviewers were solved through discussion with the first and second authors. Of the remaining 156 articles, 20 were not available. Of the remaining 136, for the full text analysis, 116 articles were removed for the following reasons: Age (n=45); not having interventions (n=16); without evidence of results (n=19) and programs that address only 2 lifestyle dimensions (n=35). A total of 19 articles constituted the documentary corpus of the present scoping review.

Figure I. Strategy for the selection of articles according to PRISMA. Coimbra, 2020.



Source: the authors.

The synthesis of the 19 articles is shown in Table I, which gathers the following data: authors; year of publication; origin/country of origin (where the study

was conducted); objectives; methodology (design, sample, type and duration of the intervention, results, limitations). Subsequently, we proceed to the evaluation of the methodological quality and analysis of meta-aggregation for synthesis, looking for similarities and divergences.

Table I. Synthesis of 19 scientific articles on programs to promote healthy lifestyles in children (3 to 10 years old) in the context of school health that address 3 or more dimensions.

Code	Objectives	Interventions and duration	Participants	Results	Method	Limitations
2013 **AR$_{1.}$** Argentina	To assess the impact of the intervention on food.	"Cantinas Saludables" ("Healthy Cafeterias") program. Four workshops were held on healthy eating, physical exercise and healthy body, 40min each, once a month. 3 of the workshops for children aged 9 to 11 and 1 for parents. The menus were reviewed and changed. Control group: no intervention. Duration: 6 months.	EG: 4 schools (216 children) CG: 2 schools (171 children) 369 (91%) were reassessed at T2 after 6 months	Girls were more likely to improve their diet. The program was able to increase the intake of healthy foods, but failed to significantly reduce the intake of less healthy foods or anthropometric changes.	Randomized study and control group (RCT)	The 6-month period will not reflect the anthropometric changes. The recording of the food consumed by the children was done in a demanding way (photos of the food), but there may be some mismatches. Daily energy intake in kcal/day was not calculated.
2013 **CO$_{1.}$** Colombia	To assess the impact of the intervention on children's knowledge, attitudes, active lifestyle, nutritional status and Body Mass Index (BMI); to assess the attitudes and habits of parents and teachers.	Educational and playful intervention for children aged 3 to 5 years old: Sesame Workshop Healthy Habits storybooks, posters, videos, games and songs. "Healthy family day" workshop and weekly health information. The control group maintained the usual school content. Duration: 5 months	7 schools, 1,216 children, 928 parents and 120 teachers EG: 622 children CG: 594 children	The children in the intervention group showed a 10.9% increase in the weighted score, compared to the control group (5.3%). Among the parents, the equivalent statistics were 8.9% and 3.1%, respectively; and for teachers, 9.4% and 2.5. After 1 year of intervention, the children still showed a significant increase in the score.	Randomized study and control group (RCT)	Little participation of teachers in the initial planning; low number of teachers evaluated.

2014 **CHN$_{1.}$** China	To assess the feasibility and effectiveness of intervention on knowledge, active lifestyle in 10-year-old children.	Educational intervention for children aged 10, with 4 components: school curriculum (physical education and healthy food education), support for the school environment, family involvement and fun programs/events. Control group without intervention. Duration: 3 years.	1,182 children EG: 4 schools (638 children) CG: 4 schools (544 children)	Children in the experimental group consumed less fried foods, sodas, but more meat and reported less time spent in front of the screens compared to the control group who did not know which lifestyle factors or behaviors were harmful to health. There was no difference in the time of physical activity between the groups.	Randomized study and control group (RCT)	No reference
2013 **ES$_{1.}$** Spain	To assess the effectiveness of the intervention on knowledge and active lifestyle in preschool children.	Program for the promotion of healthy living habits in children aged 3 years old and their parents: 20 hours of intervention for each component of the program (food, physical exercise and human body); 10 hours of intervention for the activity of promotion and expression of emotions. Duration: 1 academic year.	1,957 children, 1,801 parents, 138 teachers EG: 12 schools (1,142 children) CG: 12 schools (920 children)	After an academic year, the results indicate that the SI! (YES!) Program increased the children's KAH scores. This program proved to be an effective and viable strategy to increase knowledge and improve attitudes and active lifestyles in children.	Randomized study and control group (RCT)	The parents only received information that may have been insufficient to affect their own behavior. Teachers were initially trained in the SI! Program but it was difficult to have their participation throughout the school year.
2018 **ES$_{2}$** Spain	To assess a health education program based on the development of social and emotional competence in children.	CRECES programs with children aged 6 to 11, on emotional awareness with 4 components: food, hygiene, physical exercise and sleep; 8 sessions (40-50 minutes), twice a week after school. Duration: 7 months.	1,770 children from 48 schools EG: 19 CG: 18	Positive effects on emotional perception and resilience were found in the intervention group of children. Children and families showed high acceptability of the program and a wide range of barriers and facilitators were identified during the implementation process.	Randomized study and control group (RCT)	Small sample; the possibility of contamination in the control group. Validity of the PERCEPVAL v 2.0 test, the development of which is still in process.
2017	To assess the effects of the intervention to promote healthy	2 motivational interview sessions on adopting a healthy lifestyle	425 children, 1,801 parents, 138 teachers	In the intervention group 48.4% of the children had	Randomized study and control group	No reference

IT$_1$. Italy	behaviors in preschool children.	with 22 parents of 3-year-old children (20 minutes each). After 1 to 2 months, another was performed. Intervention in teachers: 10 hours of training where they were encouraged to promote physical activity. Students and teachers participated in 1 hour sessions a day. Duration: 2 years.	EG: 8 schools (190 children) CG: 8 schools (226 children) 140 children at T2	low-risk CHBS compared to 28.0% of the children in the control group (≥ 4 servings of vegetables and fruits per day; ≥ 2 hours/day of active play; ≤ 1 hour/day watching television and 0 drinking sugary drinks). Without influencing the results of the increase in BMI.	(RCT)	
2017 **IT$_2$.** Italy	To assess the effects of the intervention on the eating habits and knowledge of the children, teachers and parents.	"Kidmed" was implemented for children from 7 to 11 years old, divided into 3 intervention phases: 1. construction of a book for students, their families and teachers with content to promote healthy habits and physical exercise; 2. presentation of the book to teachers and 2-hour training; presentation of the book to families, encouraging parents to do their homework with their children; 3. visits to farms and sports clubs. Duration: 4 months.	170 children and their parents, 20 teachers EG: 11 classes, 5 schools (140 children at T1)	As a result of the educational intervention: increased children's adherence to the Mediterranean Diet, changes in healthy habits, greater awareness of parents about their educational responsibilities in relation to food choices, as well as physical activity, and a new school-family alliance.	Study without a control group, with repeated and paired measurements	The inclusion of teachers, children and parents caused delays and limited data collection. The study failed to assess the impact on the physical habits, well-being and quality of life. Anthropometric data were only assesses at T0. The teachers' comments reveal little involvement of some parents and limited adherence by some families to play an active role in the children's motivation.
2016 **SWE$_1$** Sweden	To assess the effectiveness of a support program for parents in promoting eating habits and active lifestyles in 6-year-old children.	Health information program for parents and motivational interviews with parents; classroom activities with 6-year-olds. Duration: 6 months	378 children and their parents 31 classes and 13 schools GE: 185 children GC: 193 children	Parents' eating and physical activity patterns significantly influence the consumption of fruits / vegetables, processed food and the level of sedentary behavior of their preschoolers. The children in the control group	Randomized study and control group (RCT)	The parents' questionnaire, including diet, was not validated for the specific target group. High number of missing answers in the questionnaire in relation to food intake and time spent in front of the screens.

				showed a significant increase in the consumption of junk food and sedentary behavior from T1 to T2. Teachers		
2014 **US$_1$** **United States of America**	To assess the effectiveness of an active lifestyle modeling program for parents and teachers.	HC2 program on food and physical activity for children aged 2 to 5 years old, their parents and teachers. It includes a phase of role modeling for parents and teachers (food and physical activity), in 6 sessions, monthly. Classroom training for students was done weekly. Obesity prevention intervention group; Control group: 3 monthly injury prevention sessions. Duration: 5 months.	1,211 children, 1,080 parents and 22 teachers EG: 12 nurseries CG: 16 nurseries	The parents' eating and physical activity patterns significantly influence the consumption of fruits/vegetables, processed food and the level of sedentary behavior of their preschoolers. The children in the control group showed a significant increase in the consumption of junk food and sedentary behavior from T1 to T2. The teachers did not significantly influence preschool children regarding nutrition or physical activity patterns.	Randomized study and control group (RCT)	Low literacy level of the population; differences in the number of times the intervention curriculum was implemented during the year. Possible biases in answers to dietary data due to the possible need for social approval.
2019 **US$_2$** **United States of**	To assess the impact of caring for gardens in promoting the consumption of fruit and vegetables by children aged 3-5 years old.	The SAGE program is implemented twice a week in 1-hour sessions. For children: 12 sessions that included songs, games and interactive garden maintenance activities. Weekly newsletters for parents, with program activities in the classroom, homemade activities and recipes,	Cross-assessment cluster study. Children (N = 89) Child care and	The Sustainability via Active Garden Education (SAGE) program presents the first results of the pilot test: children significantly increased physical activity during SAGE classes compared to normal classes, but also consumed more calories in the absence of hunger in the	Randomized study and control group (RCT)	As for the limitations, there was an inability to determine the effectiveness of the results related to nutrition and parents, probably due to the small sample size. Few parents returned the survey measures that were sent home with their children.

America		information from community resources. Duration: 1 year.	education centers (N = 6) in 2 US cities.	post vs. pre-intervention tests. The parents' reports did not show changes in the consumption of fruits and		
2018 **US$_3$** United States of America	To assess the impact of a healthy habits program on knowledge about active lifestyle and sleep routines.	Program for children of 5 and 6 years old with 8 weekly classes (45-60min): from the garden to the table, bedtime routines, size of food portions, energy expenditure, sugar content of drinks. Newsletters for parents with strategies to integrate them at the family level. Duration: 1 school year.	EG: 36 children CG: 21 children	There was an increase in agricultural knowledge, about sugar in beverages, and about bedtime routines. The only significant change was observed for the knowledge about bedtime routine, which was higher by nearly 15% in the intervention school.	Study without randomization, with repeated paired measures	Each school had only a small part of the families to consent to the evaluation, which resulted in a small and demographically limited sample size. Another component that can impact the measurement is the child's fitness level.
2019 **US$_4$** United States of America	To assess the effect of the Head Start program on active lifestyle and diet.	CMH program for children from 3 to 5 years old about healthy eating and physical activity through interactive and fun experiences in the classroom. Duration: 12 weeks.	434 children EG: 341 children CG: 93 children 303 at T1	Significant improvement in fruit and vegetable consumption. Parents in the intervention group reported that their children involved much less post-intervention screen time than was reported by the parents in the control group.	Study without randomization, with repeated paired measures	No reference
2018 **BR$_1$** Brazil	To assess the impact of an intervention across the city ("Vida de Saúde" ["Life of Health"]) promoting the active lifestyle of young individuals.	Program for children from 6 to 17 years old with 5 components: 1. Reduced sedentary lifestyle (5min active per class); 2. Placed campaign posters throughout the school; 3. Encourage physical activity during lunch breaks and free time (access to	3,592 children 18 schools 3,214 at T1	Physical activity has not changed although the physically inactive subgroup has increased levels of physical activity. Television and video game time during the week decreased, while computer time increased. Overweight and obese participants	Study without a control group, with repeated and paired measurements	Without control group

		exercise equipment); 4. Opening of the school's playgrounds and recreation for the local community. 5. Advice to parents regarding their children's physical activity.		decreased the BMI z score. This intervention was not able to change the proportion of physical inactivity and sedentary behavior in young people. However, physically inactive		
2020 **KR₁** **South Korea**	To assess the effectiveness of the Healthy Children, Healthy Families and Healthy Communities program in improving their active lifestyle behaviors.	Program for children aged 8 to 12 and their parents. Children: 6 healthy eating sessions; 6 sessions of healthy activities. Parents: 1 group session; 2 home visits; 3 telephone counseling sessions; 12 text messages. Community: Partnership with university and youth centers; Organization of the educational curriculum; Education of center directors and cooks; Policy changes at the centers; Collaborative activities with researchers, parents and directors; Duration: 12 weeks.	EG: 4 centers (49 children and 27 parents) CG: 4 centers (55 children and 32 parents)	Compared with the control group, the intervention group showed significant improvements in the total compound scores of healthy lifestyle behaviors - including 60 minutes of moderate physical activity - but not in the obesity status among the children. In addition, the intervention group showed significant improvements in parental behaviors.	Randomized study and control group (RCT)	The children's healthy lifestyle behaviors were self-reported. The participants were not parent-child dyads due to the characteristics of socioeconomically vulnerable families. This may have led to an underestimation of the effects of the intervention. As the sample was from a vulnerable population, the results cannot be generalized to the general population.
IL₁ **Israel**	To assess the effectiveness of the intervention on health knowledge, health behavior and the prevalence of overweight and obesity in a	An educational program focused on eating habits and physical activity, divided into 4 parts, a topic was chosen: healthy breakfast, drinking water, physical activity	2 public and 2 religious schools EG: 200 children CG: 196 children	Overweight and obesity decreased significantly within the intervention group (from 25% to 17.9%, P = .04), without a significant change in the control	Study without randomization, with repeated paired measures	A convenience sample may have resulted in a biased selection, as well as in a threat to the internal validity of the study. The reliability and validity of the

	diverse population, according to religion and to gender.	and reading food labels. The teachers were encouraged to integrate the contents of healthy eating and physical activity during classes in different subjects for children aged 10 to 11 years		group (from 20.5% to 17.6%, P = .12). Religious children had twice the risk of being overweight or obese (Odds Ratio [OR] = 2.10; 95% Confidence Interval [CI], 1.15-3.73; P		Hebrew version of the health knowledge, attitudes and habits questionnaire are limited by the small sample size.
2019 **MX₁**	To assess the effect of the intervention on BMI, total cholesterol (TC, LDL, HDL, TG), glucose, Hb1Ac in three ethnic groups: mestizos, Seris and Yaquis. To compare the effect between two treatments, with and without school lunch, in the mestizo community.	The intervention with children from 4 to 12 years old that included: physical activity, health education, parental involvement and school meals. Physical education: moderate-vigorous activity, five days a week. Health education about food. Parental involvement: 3 workshops. School meals: breakfast, mid-morning snack and lunch at school. 2 interventions were applied. T1: physical activity, health education and parent involvement components. T2 physical activity, health education, parents involvement and school meals. Indigenous children received T1, and mixed-race children received T1 and	320 children and their parents EG: 157 boys	Improvements were observed in the BMI of children with excess weight or obesity and in triglycerides in the three ethnic groups. The mestizo ethnic group showed more significant improvements in Treatment 2. While the Seris showed improvements only in cardiovascular risk factors, the Yaquis also showed improvements in diabetes risk factors, although not in BMI.	Study without a control group, with repeated and paired measurements	No reference

Mexico		T2. Duration: 12 weeks.	CG: 163 girls			
2018 **UK$_1$** United Kingdom	To assess the intervention in active lifestyle changes.	Weekly intervention for children aged 8 to 9 years old for 10 weeks (90min each) on healthy eating and physical activity with parental involvement and behavior change techniques. Duration: 6 months.	379 boys 391 girls	There was a significant reduction of 0.8512 kg/m2 (P = 0.0182) in the Body Mass Index between pre- and post-intervention. No changes in the Body Mass Index from the post-intervention to the 6-month follow-up (P = 0.5446). The psychosocial variables did not change significantly.	Study without a control group, with repeated and paired measurements	A limitation of the present study is the lack of completeness of the data and the rate of wear out. The second limitation was the lack of physical activity assessment.
2019 **NL$_1$** Netherlands	To assess the effects of the Healthy Primary School of the Future (HPSF) program on children's eating behavior and physical activity.	HPSF program for children aged 4 to 12 and their parents with structured physical activity sessions and a healthy lunch. The differences between the two versions of the HPSF were the implementation of a healthy lunch and the length of the lunch break. Both groups involved teachers and parents. During the lunch break, the children participated in physical activity sessions several times a week. Duration: 4 years.	1,676 children EG1: 2 schools (focus: nutrition and AF) 537 children EG2: 2 partial (focus: AF) 478 children CG: 4 schools, 661 children.	They demonstrated significant favorable effects for complete HPSF versus control schools for, among others, school water consumption, vegetable and dairy food intake, sedentary time and mild PA. Almost no significant favorable effects were found for partial HPSF compared to control schools. We conclude that complete HPSF is effective in promoting children's health behaviors at T1 and T2 compared to control schools. Focusing on nutrition and PA components seems to be more effective in promoting healthy behaviors than focusing exclusively on PA.	Study without a control group, with repeated and paired measurements	It was not possible (to group) to randomize schools; with regard to the evaluation of behaviors among the parents; the use of questionnaires in general has its limitations because they are subjective measures, which can lead to socially desirable responses.

2019 **EU1** **Germany, Belgium, Bulgaria, Spain, Greece and Poland**	To assess adherence to the recommendations to increase Physical Activity (PA) and reduce excessive screen time (ST) and consumption of unhealthy food and drinks in preschool children.	ToyBox intervention with children aged 3 to 6 years old on healthy eating, water consumption and active lifestyle. Duration: 1 year.	309 kindergarten children and 7,056 6-year-olds 5,529 continued at T1	Half of the sample (50.4%) did not meet the recommendations for physical activity (PA) or screen time (ST) in any of the periods, these being the control. In opposition, only 0.6% of the sample met the recommendations for physical activity and ST at T0 and T1. The children who met the recommendations at T0 and T1 consumed significantly less milk-based desserts and snacks compared to those who did not meet any of the recommendations at any point in time. Those who met both recommendations at T0 and only one at T1 had a significantly lower consumption of soft drinks and snacks and higher consumption of fruits and vegetables compared to the reference group. The children who met one of the recommendations at T0 and T1 had a significantly lower consumption of soft drinks, sweets, desserts and snacks, and a higher consumption of fruits and vegetables. Those children who did not adhere to the recommendations at T0 and performed one of them at T1 had a lower	Randomized study and control group (RCT)	No reference

				consumption of soft drinks, juices, sweets, desserts and savory snacks compared		

Source: the authors.

RESULTS

The studies included were carried out between 2013 and 2020, 8 were implemented on the American continent: 1 in Argentina[8], 1 in Colombia[9], 1 in Brazil[10], 1 in Mexico[11] and 4 in the United States of America[12][13][14][15]. 7 programs were found in Europe: 2 in Spain[16][17], 2 in Italy[18][19], 1 in the United Kingdom[20], 1 in Sweden[21], 1 in the Netherlands[22]. A study was found that was applied in 6 European countries[23] (Belgium, Bulgaria, Germany, Greece, Poland and Spain). 3 articles were included from Asia: 1 from Israel[24], 1 from China[25] and 1 from South Korea[26]. We did not obtain any publication from Portugal. Each study was coded with the initials of its country to ease its analysis.

Of the 19 studies, 11 (57.9%) were found with randomization and control group (RCT), 5 (26.3%) without randomization and with before-and-after measurements, and 3 (15.8%) quasi-experimental, without a control group and with repeated and paired measurements. Only 14 (73.7%) studies had 2 measurements, but 6 (31.6%) evaluated the effect within 3 to 6 months, 9 (47.4%) within 9 to 12 months, and 21.1% within 2 to 4 years. As for the target population of the selected articles, 1 (5.3%) was not a community-based program (US_3), that is, directed and implemented in all the children in a class or in all the classes of a school.

The 19 programs found included the following lifestyle dimensions: healthy eating, physical exercise, parental education, sleep/rest, body hygiene, and non-chemical dependences. It was verified that 16 (84.2%) of the interventions focused on healthy eating, physical exercise and parental education and 11 (57.9%) exclusively on these (AR_1, CO_1, CN_1, ES_1, IT_2, US_1 , KR_1, US_2, IL_1, UK_1, MX_1). The IT_1 and EU_1 studies, in addition to the dimensions described above, also addressed screen dependences. The SW_1 program also addresses the area of sleep and rest. As for the NL_1 and US_4 programs, they include healthy

eating, physical exercise and non-chemical dependences. The ES_2 study presents the following areas of intervention: healthy eating, physical exercise, parental education, sleep/rest, and body hygiene. The BR_1 and US_3 programs focused on screen dependences, the first also included exercise and parental education while US_3, food and sleep/rest. As for the context, it is noteworthy that, of the 19 programs, 7 (36.8%) were implemented in preschool classes, in children aged 3 to 5 years old, and that the remaining 12 were applied in other schools, in children aged 6 or more. The SW_1, NL_1 and AR_1 studies were implemented in schools located in disadvantaged areas, with evidence of low socioeconomic status. The CN_1 study was carried out in urban schools. Among these 19 studies, no holistic programs were found, that is, that encompass all dimensions to promote healthy lifestyles.

DISCUSSION

This scoping review has as its main objective to map and examine programs to promote healthy lifestyles in children (3 to 10 years old) in the context of school health addressing more than 2 dimensions. In the database search, we found 4,952 articles but, of the 136 included for full-text analysis, only 19 programs met the criteria. Both in the excluded and included studies, a great focus on the energy balance dimension (food and physical exercise) was verified. The principles of health promoting schools advocate holistic interventions in at least 11 lifestyle dimensions. The studies analyzed made little reference to mental health and socio-emotional skills, education for affections and sexuality, and prevention of non-chemical addictive behaviors. Now, even energy balance is very much related to psychological well-being and self-control. In 2018, the mindfulness program for parents with stress (USA) [27] proposes a new approach to preventing obesity in young children, which has proven to be beneficial for

the parents' behavior and for the child's BMI. In the Home Styles program (USA)[28] of lifestyle changes (aimed at parents), important effects were observed in the participants of the experimental group, at the intra-personal, inter-personal and environmental levels. The parents of the experimental group improved their own level of physical activity. In addition, children from families in the experimental group increased their level of physical activity and reduced their screen time[28]. The parents' behavior influenced the children's behavior. The families are seen as influencing entities in people's well-being and health processes and these are governed by the relationships they establish with each other and the contexts in which they live[3].

On the other hand, the results obtained in the selected studies reveal that the majority apply health education programs that focus on knowledge acquisition. The 11 articles focused exclusively on the 3 dimensions obtained little consistent and similar results. The AR_1 program has managed to increase the intake of healthy foods, but was able to significantly reduce the intake of less healthy foods. In the CO_1 study, the children in the intervention group had a 10.9% increase in the weighted score, compared to the control group (5.3%), maintaining after 1 year of the intervention. In the CN_1 program, the students in the experimental group consumed less fried snacks, soft drinks, but more meat, and reported having spent less time in front of the screens. However, there was no difference in the time of physical activity between the two groups. Regarding the ES_1 program, it was verified that, after an academic year, the program proved to be an effective and viable strategy to increase knowledge and improve children's lifestyle habits, reported by the parents. In the IT_2 program, the results point to an increase in children's adherence to the Mediterranean Diet, changes in healthy habits and greater awareness of the

parents about their educational responsibilities in relation to food and physical activity. As for the SW1 study, it was verified that it is possible to exert an influence on the intake of unhealthy food and drinks and on the weight of obese children, providing individual parental support (motivational interview) in a school context. However, there were significant effects in relation to the consumption of unhealthy food and drinks; and there was no effect of the intervention on sedentary lifestyle or BMI. In the US_1 study, the parents' eating and physical activity patterns significantly influenced the consumption of fruits and vegetables, processed food and the sedentary lifestyle of their preschoolers; while the children in the control group showed a significant increase in the consumption of junk food and sedentary behavior from T1 to T2. The teachers did not significantly influence preschool children in terms of food or physical activity. In the KR_1 program, the intervention group showed significant improvements in healthy lifestyle behaviors, but not in childhood obesity status; and significant improvements in parental behaviors. The US_2 study, the Sustainability via Active Garden Education (SAGE) program, presents the first results of the pilot test[29]: children significantly increased physical activity during SAGE classes compared to normal classes, but they consumed more calories in the absence of hunger after the intervention. The parents' reports did not show changes in the consumption of fruits and vegetables or in the physical activity of the parents, possibly due to the low involvement of the families.

In the IL1 program, it was verified that excess weight decreased significantly within the intervention group, with no significant change in the control group. Religious children presented a two-fold risk of excess weight or obesity. Knowledge was improved in both study groups, with no effect on health behaviors. As for UK1, there was a significant reduction between the pre-

and post-intervention. There were no changes in the Body Mass Index (BMI) from the post-intervention to the 6-month follow-up. The psychosocial variables did not change significantly. The MX_1 program showed improvements in the BMI of overweight or obese children and in triglycerides in the three ethnic groups. The mestizo ethnic group showed more significant improvements in BMI in the second intervention; while the Seris ethnic group showed improvements only in cardiovascular risk factors, and the Yaquis showed improvements in the diabetes risk factors.

The IT_1 and EU_1 studies, in addition to including the intervention areas of the studies described above, also addressed non-chemical dependences (screen time). In the IT_1 study, the program demonstrated that 48.4% of the children in the intervention group had a low risk Combined Health Behaviour Score (CHBS) compared to 28.0% of the children in the control group and with no influence on the BMI results. In the EU_1 European study, half of the sample (50.4%) did not meet the recommendations for physical exercise or screen time in any of the periods. Of those who adhered, only 0.6% met the recommendations for physical exercise or screen time at T0 and T1. The children who met the recommendations at T0 and T1 consumed significantly less milk-based desserts and snacks compared to those who did not meet any of the recommendations. Those who met both recommendations at T0 and only one at T1 had a significantly lower consumption of soft drinks and savory snacks and higher consumption of fruits and vegetables compared to the control group. In addition, those children who met one of the recommendations at T0 and T1 had a significantly lower consumption of soft drinks, sweets, desserts and snacks, and a higher consumption of fruits and vegetables. Those children who did not adhere to the recommendations at T0 and performed one of them at T1 had a lower consumption of soft drinks,

juices, sweets, desserts and savory snacks compared to the reference group.

The SW_1 program, which also addresses the area of sleep and rest, shows that it is possible to influence the intake of unhealthy food and drinks by obese children, providing individual parental support in a school context. There was no effect of the intervention on sedentary lifestyle. In addition, the intervention had no apparent effect on the BMI for the entire sample.

The ES_2 study focused on the following intervention areas: healthy eating, physical exercise, parental education, sleep/rest, and body hygiene. Positive effects were observed on emotional perception and resilience in the intervention group. Children and families showed high acceptability of the program and, due to their participation in it, important barriers and facilitators for the implementation process were identified.

The BR_1 and US_3 programs focused on screen dependences: The first also included physical exercise and parental education and US_3, food and sleep/rest. In the BR_1 community-based program, it was verified that physical activity did not change although the physically inactive subgroup had increased its levels of physical activity. Television and video game time during the week decreased, while computer time increased. Overweight and obese participants reduced their BMI z score but were unable to change the proportion of physical inactivity and sedentary behavior in young individuals. In the US_3 study, there was an increase in agricultural knowledge, about sugar in drinks, and about bedtime routines. The only significant change was observed for knowledge about the bedtime routine, which was 15% higher in the intervention school.

As for the NL_1 and US_4 programs, they include healthy eating, physical exercise, and screen dependences. The NL_1 study demonstrated that the significant favorable effects for the Healthy Primary School of the Future

(HPSF) in the full version versus control schools for school water consumption, vegetable and dairy food intake, sedentary time and light physical activity, among others. Almost no significant favorable effects were found for partial HPSF. Complete HPSF is effective in promoting children's health behaviors at T1 and T2 compared to control schools. The US_4 program showed a statistically significant improvement in the consumption of fruits and vegetables among the children in the control group and the intervention group. The parents in the intervention group reported that their children were much less involved with post-intervention screens than reported by the parents in the control group.

In summary, we can assert that, as far as efficiency is concerned, the programs analyzed managed to partially achieve the objectives for which they were proposed. However, there is a clear lack of holistic programs to promote healthy lifestyles in the school context, aimed at children aged 3 to 10. In recent years, a number of strategies and programs have evolved, with names as diverse as Health Promoting Schools, Global School Health, Child Friendly Schools and the Focusing Resource on Effective School Health. All of these strategies have in common the school's global approach and the recognition that all aspects of the school community life are potentially important for health promotion[30], but there is no consensus on techniques and instruments for monitoring the several dimensions of lifestyles, let alone holistic interventions to promote healthy lifestyles.

SCOPING REVIEW LIMITATIONS

Only studies in Portuguese, Spanish and English were included, as well as studies that were available in full text; we run the risk of excluding other studies of great interest for this scoping review.

CONCLUSION

A healthy lifestyle in children includes behaviors and habits that encompass several dimensions that contribute to their well-being and health. Although childhood obesity is an important issue, programs that focus only on dimensions such as food, physical activity, screen dependences, and sleep and rest habits (even privileging playful educational activities and training for parents and teachers) do not reveal very significant effects. However, it was verified that interventions involving children up to 5 years of age, parents and teachers become more efficient, since they are the ones that most influence and shape the lifestyles of the children. It also reveals that the programs assume that, by promoting health literacy, they are influencing better lifestyles, which is not true. According to the National School Health Program, all dimensions of a child's life should be trained by parents and educators in order to increase health literacy and predispose them to adopt healthier lifestyles. Studies that mobilize the entire educational community tend to be more effective and have made it possible to identify barriers and facilitating factors.

It is suggested to carry out scientific studies that propose holistic interventions on lifestyles. The diverse scientific evidence found in the present study is important to guide the practice of community Nursing, since it can guide the design of interventions in school health and their implementation with a view to promoting healthy lifestyles in the children. In this sense, the "Gostar de Mim" ("Like Me") school health program was conceived and is being validated in Portugal, in the Center Region. This program reaches 28 schools (approximately 835 families) with a view to increasing health literacy for families and children in primary schools. "Gostar de Mim" recommends that, for this age group, the interventions focus on raising awareness among the families, the main caregivers of the children, and

modulators of their health-related lifestyle.

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DATA EXTRACTION INSTRUMENT
Scoping Review title:
Review objective/s:
Review question/s:
Inclusion/Exclusion Criteria:
Population:
Concept:
Context:
Study Details and Characteristics of extraction
Author/s:
Title:
Journal:
Volume:_____ Pages:_____
Year of publication:
Country of origin:
Aims
Study population and sample size
Context
Methodology/methods_
Programs type
Duration and number of interventions
Outcomes and details
Participants (details e.g. age/sex and number)
Key findings related to the scoping review questions
Gaps in the research
Details/Results extracted from study

Appendix I - Data extraction instrument. (5)

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