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D7.2: Comparative effectiveness of school-based interventions targeting physical activity, physical fitness or sedentary behaviour on obesity prevention in 6-12-year-old children: a systematic review and meta-analysis

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PU	Public	☒
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Glossary of terms

Abbreviation	Definition
BMI	Body mass index
%BF	Percentage of body fat
NCDs	Non-communicable diseases
OB	Obesity
OW	Overweight
PA	Physical activity
PE	Physical Education
PICO	Population, intervention, comparison and outcome
PROSPERO	Prospective Register of Systematic Reviews
RCT	Randomised controlled trial
SES	Socioeconomic Status

CONTENT

1 Summary

We performed a systematic search of the literature aiming at comparing the effects on weight-related outcomes of interventions that focused on decreasing sedentary behaviours versus interventions that tried to increase physical activity, and interventions that strived to improve physical fitness in 6-12-year-old children. We identified 200 studies that met the inclusion criteria and 146 reports provided relevant data for meta-analysis. Overall, children in the intervention group had a mean difference in BMI of -0.18 kg/m^2, (95%CI=-0.27 to -0.09), -0.07 (95%CI= -0.10 to -0.05) in BMI z-score and -0.43% (95%CI= -0.66 to -0.21) in %BF, although there was a high level of observed heterogeneity (I^2=83-92%). Including multiple components of energy expenditure did not increase the effectiveness of obesity prevention programmes. For single-component interventions, a significant difference versus control was found for BMI -0.22 kg/m2 (95% CI=-0.38 to -0.06), BMI z-score -0.10 (95% CI=-0.13 to -0.07) and %BF -0.64 % (95% CI=-1.08 to -0.20). The pooled effects of multiple-component interventions were slightly smaller, with the differences between groups amounting to -0.19 kg/m^2 (-0.32 to 0.06) for BMI, -0.06 (-0.08 to -0.03) for BMI z-score and -0.06 % (-0.14 to 0.01) for %BF. Within single-component programmes, the largest effects were found for interventions designed to improve physical fitness, with the differences being in favour of the intervention groups for all 3 outcomes assessed. On the other hand, interventions that aimed to increase physical activity favourably affected BMI z-score, but not BMI or %BF. Lastly, only two interventions that focused exclusively on reducing sedentary behaviours were included and the pooled effect for BMI showed a non-significant difference in BMI compared to control of -0.19 kg/m^2 (95%CI= -0.70 to 0.32). The overall impression is that the mean pooled effects were larger in girls than in boys, especially for multi-component interventions, although it has to be stressed that the confidence intervals overlap. In addition, there is some evidence for inequity, as the effects on BMI were less pronounced when interventions were delivered exclusively to groups of economically disadvantaged children (-0.05 kg/m2, 95%CI=-0.29 to 0.19), compared to the effects in the general population (-0.24 kg/m^2, 95%CI= -0.34 to -0.14).

In conclusion, school-based PA interventions appear to be an effective strategy in the prevention of childhood obesity among 6-12-year old children. Complexity of intervention does not determine its effectiveness, as interventions that combined PA or fitness component with strategies to reduce sedentary behaviour were actually less effective in controlling weight gain compared to single-component interventions. Poor reporting on the dose of PA introduced by obesity prevention interventions precluded us from detecting a “best-buy” quantity of PA that would provide optimal effects with as little time and resources invested as possible. In order to enable such dose-response analyses, future studies should include comprehensive assessment of PA volume introduced and ensure to report this in sufficient detail.

2 Background

Non-communicable diseases (NCDs) remain the leading cause of death in most parts of the world, and large part of this mortality is ascribed to insufficient physical activity (PA) and obesity (WHO, 2009a). Specifically, physical inactivity is the fourth, and obesity has been ranked as the fifth leading risk for global mortality (WHO, 2009a). At the same time, the prevalence of overweight and obesity is rising worldwide among all age groups, with the epidemic being especially marked among children and adolescents (NCDRisC, 2017). In this age group obesity has increased dramatically during the last few decades of the 20th century, especially in the most developed countries (NCD-Risk, 2017). Interestingly, it seems that this increase has been much larger in 5-19-year-old children as compared to younger children (Di Cesare et. al, 2019).

Obesity in children has been linked to both short (Reilly et al., 2003) and long-term adverse health outcomes (Reilly & Kelly, 2011). Furthermore, childhood obesity frequently persists in adulthood, which is accompanied by many well-known detrimental effects on health (Singh et al., 2008). PA, alongside unhealthy dietary habits, is proposed as one of the major contributors to childhood obesity (Lobstein, 2004). In addition, PA in childhood has been linked to many other favourable health outcomes as well as to improved academic performance (Janssen & Le Blanc, 2010). While there remains little doubt that PA is beneficial for health, many posit that physical fitness is an even more powerful maker of health (Ortega, 2008). On the other hand, sedentary time has also been associated to several adverse health outcomes, although evidence for a specific link with obesity is weak (Carson et al. 2016). Even though there is only little or no evidence that a relationship between sedentary time and adiposity in children and adolescents is causal (Biddle et al. 2017), a recent study that collated data from 14 accelerometer investigations in children and used iso-temporal substitution to model the effects of reduced sedentary time on health estimated that replacing one hour of persistent sedentary time with non sedentary pursuits would lead to a mild reduction of BMI (Wijndaele et al. 2019). On the other hand, the same study found that replacing one hour of sedentary time by moderate-to-vigorous PA increases the estimated decrease in BMI by more than 7 times (Wijndaele et al. 2019). Hence, PA interventions might exhibit larger effects on obesity-related outcomes than interventions aimed at reducing sedentary behaviours. However, this remains to be confirmed in clinical trials

Obesity, physical activity and sedentary pursuits are complex phenomena that require population-based solutions. For children, schools are frequently identified as as an ideal setting for introducing lifestyle change and the prevention of weight gain. In most countries school is obligatory, at least by mid-adolescence, hence all children can be reached, which makes schools a perfect setting to reduce health inequalities. In addition, children spend a significant portion of the day in school. Because academic activities are mostly sedentary, ample opportunities for PA should be provided in order to increase energy expenditure and introduce the well-known benefits of PA on health and academic performance.

Indeed, several previous systematic reviews that examined the effects of obesity prevention interventions have shown that school-based interventions are most effective when a PA component is included (Bleich et al.,

2018, Wang et al., 2015, Waters et al., 2011). However, the characteristics of successful PA intervention are less understood.

We aimed to bridge this gap by assessing what types of PA interventions in schools are the most effective in improving obesity-related outcomes. To this end, we compared the effects of 3 groups of interventions: 1) that aimed to reduce sedentary behaviour; (2) interventions that intended to increase physical activity and (3) interventions that were designed to improve physical fitness. We identified several systematic reviews published in the last 10 years that covered this topic (Bleich et al., 2018, Dobbins et al. ,2009, Dobbins et al., 2013, Harris et al., 2009, Lavelle et al., 2012, Liu et al., 2019, Wang et al., 2015, Waters et al., 2011). However, none of these studies attempted to document and analyse specific elements of PA programmes. Moreover, several of these analyses might have missed large studies as they were restricted to randomised designs (Dobbins et al., 2013, Liu et al., 2019). Others were restricted to high-income countries (Wang et al., 2015) or to a single outcome only (Harris et al., 2009, Lavelle et al., 2012). Thus, in order to cover a complete spectrum of PA interventions we included all school-based interventions that targeted energy expenditure, regardless of the type or duration of the intervention. The wide range of included interventions will serve to identify features that enhance the effectiveness of these programmes in obesity prevention, with special focus on the type of energy expenditure component targeted.

3 Methods

The protocol for this review was registered with Prospective Register of Systematic Reviews (PROSPERO 2019 CRD42019129295), and the methods are briefly described in the following sections.

3.1 Literature search and data extraction

We searched MEDLINE, The Cochrane Central Register of Controlled Trials (CENTRAL), Scopus, LILACS, OpenGrey, Open Access Thesis and Dissertations, Clinical Trials and the WHO International Clinical Trials Registry for peer-reviewed studies published in the last 25 years (between 1/1/1994 and 15/4/2019). We designd our research question by following PICOT framework, used MeSH terms in Medline plus keyword searches structured around four constructs (population – children; intervention – physical activity, fitness and sedentary behaviour; setting – school; outcome – adiposity) and adapted this strategy to individual databases (full search strategy for Medline is available in *Appendix 1*). We did not limit our search to any specific geographical region, however, we included only studies written in European languages. The search strategy was validated by conducting sensitivity analysis in MEDLINE with a test set of 10 key papers selected as exemplary papers answering our resarch question. Adjustments to the search strategy finished when all 10 key papers were identified by the search. All database search results were extracted and imported into the web-based reference manager: Rayyan. After removing duplicates, results were screened initially by abstract and title. The first 500 results were screened independently by two reviewers (HP,JK). Given that >95% agreement between reviewers in included studies was recorded, each of the two reviewers screened half of the remaining

results. Ambiguities on study eligibility were resolved through discussion with a third reviewer (MSo). In addition to this, we checked reference lists of key systematic reviews in the same area for eligible studies (Beauchamp et al., 2014, Bleich et al., 2018, Dobbins et al. ,2009, Dobbins et al., 2013, Harris et al., 2009, Lavelle et al., 2012, Waters et al., 2011). Lastly, we searched reference lists of all included reports.

Inclusion criteria were: (1) randomised or non-randomised control trial, controlled before-after study or natural experiment; (2) control group; (3) participants aged 6 to 12 years (mean age at the start of the study = 5.5 to 12.49); (4) interventions of any duration that have aimed to either: a) increase physical activity and/or physical fitness; b) reduce sedentary behaviour; (5) intervention was performed primarily in school-setting; (6) follow-up of at least 12 weeks from the start of the intervention; (6) obesity related outcome was measured (BMI, BMI z-score, BMI percentile, prevalence or incidence of overweight or obesity, % body fat, skinfold thicknesses, waist circumference, waist circumference percentile and waist-to-height ratio). Studies were excluded if: (1) no weight related outcome was reported or the data came from self-report (2) they included exclusively children with overweight or obesity or only special populations (e.g. children with a specific illness, blind, physically disabled etc.); (3) full text was not available (i.e. only conference abstract).

After study selection, an extraction template was created (MSo) and study characteristics were extracted by two reviewers working independently (ŽLP and PJ). Papers reporting on the results of the same study were collated so each study is the unit of analysis rather than each paper. Values at the longest available follow-up were taken for quantitative analyses.

The details on the intervention content were extracted from both the main papers, the intervention protocols and the related web resources. Two reviewers independently extracted half of data, and about 10% of the extracted data were double checked by the third reviewer (MSo). Extracted items included: Authors, year, period of the study, number of clusters and participants, demographic characteristics, details on intervention type and content, duration of intervention and follow-up and adverse outcomes.

Obesity-related study outcomes were extracted by two reviewers (JK and PJ), working independently on half of data, and entered in a pre-designed excel template. The third reviewer verified 10% of the extracted results, and any discrepancies were resolved through discussion.

3.2 Risk of bias assessment

A single reviewer (MSo) assessed the risk of bias of all studies that met our inclusion criteria using Cochrane "Risk of bias" assessment tool for randomised studies (Higgins et al., 2011), and modified Newcastle-Ottawa scale for non-randomised study designs (Wells, 2012).

For individual RCTs the assessment contained the following domains: (1) random sequence generation, (2) allocation sequence concealment, (3) blinding of participants and personnel, (4) blinding of outcome assessment, (5) incomplete outcome data, (6), selective outcome reporting. (7) other bias (in this domain we assessed bias arising from: a) contamination, b) low fidelity). For cluster-randomised trials we included several more domains specific to this design: 1) recruitment bias (when participants are approached after the clusters have already been randomised), 2) baseline imbalance (often present when small number of clusters are being

randomised), 3) loss of clusters (when whole clusters are lost from the trial, either immediately after randomisation or during follow-up), and inappropriate data analysis (when clustering of observations is not taken into account in data analysis). We judged the risk of bias in each domain as having low, high, or unclear risk. Studies judged as having low risk of bias in at least 5 domains for individual RCTs and 8 domains for cluster-RCTs were classified as having an overall low risk of bias.

For non-randomised study design risk of bias assessment was performed using modified Newcastle-Ottawa scale for cohort studies. This scale originally includes 8 domains, but one domain (i.e. demonstration that the outcome of interest was not present at start of the study) was deemed not to be applicable for studies included in this review, hence it was omitted. The domains assessed included: (1) representativeness of the intervention cohort (were participants representative for the community?), (2)selection of the non intervention cohort (were controls drawn from the same community as the participants of the intervention?), (3) ascertainment of intervention (was the intervention implemented according to the plan?) , (4) comparability of cohorts on the basis of the design or analysis (were analyses adjusted for age, gender and other important features, such as clustering, baseline values for the outcome of interest etc.), (5) assessment of outcome (was the outcome measured with an objective method), (6) was follow-up long enough for outcomes to occur (follow-up longer than 6 months from the start of the intervention), (7) adequacy of follow up of cohort (subjects lost to follow up unlikely to introduce bias due to low or balanced attrition). According to the standard scoring protocol (Wells, 2012), we awarded one star for domains 1,2,3,5,6,7 and a maximum of 2 stars for comparability of cohorts domain. Studies that totalled at least 6 stars were classified as having an overall low risk of bias.

3.3 Data Analysis

After excluding studies that did not provide standard errors, those that did not provide results at baseline (or pre-intervention) and those that did not provide information related to control group, we combined, by meta-analysis, studies that assessed following outcomes: BMI (102 studies, 171 analyses), BMI z score (56 studies, 119 analyses) and percentage of Body fat (%BF; 46 studies, 91 analyses). On the other hand, obesity prevalence/incidence and waist circumference were found to be unsuitable for meta-analyses due to large heterogeneity in reporting. We combine, in all cases, mean differences, calculated as:

Mean difference = Differences in the intervention group - Differences in the control group,

where the mean differences in the intervention and control groups denote the differences between values at follow up and baseline in each of the groups. The units of measurement were kg/m^2, units of the standardized normal and % for BMI, BMI z-score and %BF, respectively.

We computed the uncertainty parameter (I^2) representing the percent of total variance in the observed results explained by heterogeneity and assessed heterogeneity using the Q test (Thorlund et al., 2012). We performed the meta-analysis using a random-effects model which takes into account both within and between study heterogeneity (Leandro, 2005). Finally, we assessed publication bias for both overall results and main subgroup analyses with Egger's test for asymmetry (Egger et al., 1997)

3.3.1 Subgroup analyses

To compare the effects of interventions targeting different elements of energy expenditure, we first categorized interventions into those affecting physical activity, physical fitness or sedentary behaviour. Then, we classified interventions into those using single or multiple components (i.e. physical activity plus sedentary behaviour and physical fitness plus sedentary behaviour). We further stratified all analyses by single and multi-component interventions as well as by gender (both genders- studies that did not distinguish gender-, boys and girls). Lastly, for examining the equity aspect of interventions studied here, we compared the effects found in studies that focused on economically deprived children with interventions that included general population of children.

In some subgroup analyses the number of studies to be analysed was very small. This implied a reduced statistical power of the tests used. To increase this, and since we obviously could not increase the number of studies, we chose to allow the level of significance (alpha) to increase (up to 15%), thereby reducing the probability of making Type II errors and increase the statistical power at the expense of having a greater risk of making false positive (Type I) errors.

3.3.2 Sensitivity analyses

For sensitivity analysis, we stratified the analyses, separately for single component and multiple-component interventions, by study design (RCT), risk of bias (low risk of bias), study period (<2009 vs> = 2009), mean age of participants (<= 9 years vs. 10 -12 years).

4 Results

The search strategy retrieved 18 239 studies from 8 databases. After removing duplicates, 17 014 records were screened by title and abstract. In the next step, 1 091 were selected for screening of the full-text paper and 241 were found to conform to our inclusion criteria. Searching the reference list of 7 systematic reviews led to the addition of 11 papers, and additional search of references of included studies yielded 5 more reports. All in all, the search retrieved 257 papers. A large majority of the papers were in English (246 or 97%), while other languages included Spanish (8 papers), German (2 papers) and Dutch (1 paper). Several of the included papers reported on outcomes of the same intervention study at different time points or in different subpopulations. Hence, results were extracted from 200 individual intervention studies (listed in *Appendix 2*), and 146 of these provided data suitable for meta-analysis and were finally included in this review (Figure 1).

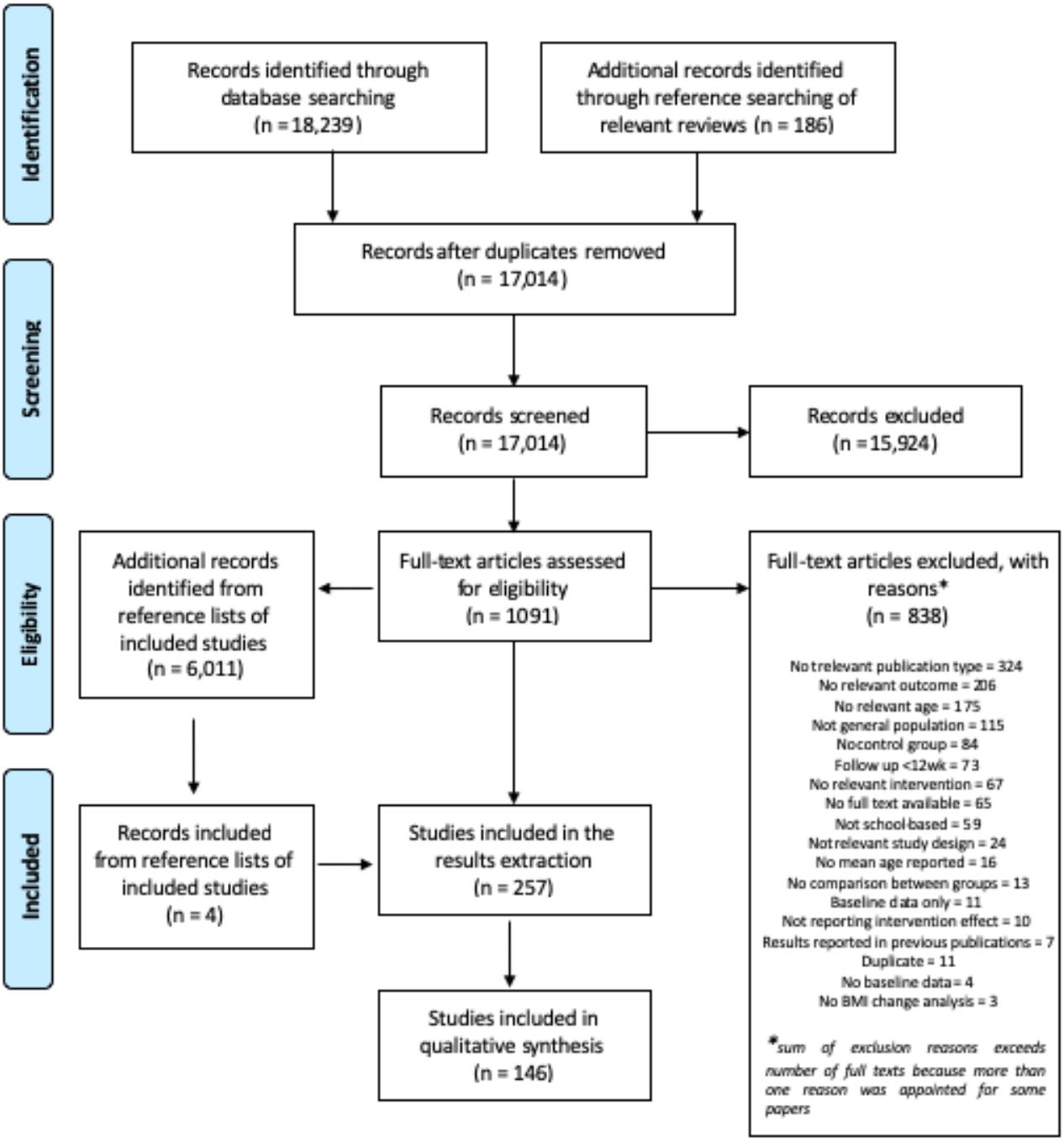

Figure 1: PRISMA flow chart showing the study selection process (from Moher et al., 2009)

4.1 Characteristics of the included studies

An overview of the characteristics of the included studies is given in Table 2 and the details on individual studies are presented in *Appendix 3*.

Table 1. Characteristics of the included studies

Study Characteristics		N	%
Location			
	Europe	64	44
	North America	44	31
	South America	9	6
	Asia	16	11
	Oceania	9	6
	Africa	2	2
Study design			
	RCT	91	62
	Quasi-experimental	55	38
Study period			
	before 2009	71	49
	2009-2019	48	33
	Not specified	27	18
Age of Participants			
	6-9 yrs	74	51
	10-12 yrs	66	45
	Both age groups	6	4
Characteristics of Participants			
	General population	116	79
	Low SES	26	18
	Specific ethnic group	4	3
Aims of intervention[a]			
	Sedentary time	2	2
	PA	55	38
	Physical fitness	47	32
	Combined	43	30
Diet component			
	Yes	95	65
	No	51	35
Duration of intervention			
	<6 months	38	26
	6-12 months	62	42
	>12 months	46	32
Follow up[b]			
	only post-intervention	99	68
	< 1 year	24	16
	>= 1 year	23	16
Parent involvement			
	Yes	81	55
	No	64	45
Additional setting			
	Yes	13	10
	No	133	90
Risk of bias			
	Low	36	25
	Moderate	71	48
	High	39	27

Quasi-experimental design includes non randomised controlled trials, controled before-after studies and natural experiments; RCT=randomised controlled trial; PA=physical activity; [a]one study had two experimental groups, one that included PA and the other exposed to a combined intervention that additionally included sedentary behaviour component; [b]follow-up period is given in months after the end of the intervention

The largest part of the studies was performed in Europe (44%), although studies from Central and Eastern Europe were scarce. A slightly lower share of studies was situated in North America (31%), mostly in the United States (34 studies). On the other hand, only two studies were performed in Africa (both in South Africa). In addition, only one study was performed in multiple countries (i.e. in eight European countries). Randomised controlled design was applied in over 60% of the included studies, with over 90% of these studies being cluster RCTs, a type of experimental study in which groups of subjects and not individual subjects are randomised (e.g. randomisation is performed by class or by school). A similar number of studies included younger and older children, and about 20% of the studies were focused on vulnerable groups of children. Finally, only a small part of school-based interventions extended to the community and home settings (13/146 studies), and just over half of the school-only interventions attempted to involve parents and guardians (81/146 studies).

Majority of interventions included in this review were designed to affect only one component of energy expenditure (104/146 studies or 71%), with about half of these targeting physical activity and the other half aiming to improve physical fitness. On the other hand, only 2 interventions that focused exclusively on sedentary behaviour were included in quantitative sythesis, one that restricted screen time and the other that introduced standing desks in the classrooms. Next, among 43 interventions with multiple components, only 6 aimed at reducing sedentary behaviour and improving fitness, while the other 37 strived to increase physical activity while reducing sedentary behaviour. Comparison of characteristics of single-component vs. multiple-component interventions is given in Table 2. Studies that included multiple components introduced some form of PA less frequently, and when they did, they delivered a smaller dose of PA compared to single-component interventions. In addition, multiple-component interventions involved parents more often (77% vs. 48%). Duration was similar in the two groups of interventions, as well as the share of interventions that included a diet component (mostly in the form of nutritional education or changes in food provision and environment.). Around 1/3 of interventions extended over several years, with a couple of programmes spanning over 4-6 years. Finally, the sustainability of intervention effects was analysed in about one third of the studies, although only about half of these studies followed participants for at least one year after the end of intervention.

Table 2. Characteristics of the studies stratified by single-component and multiple-component interventions

Study Characteristics		Single component (N=104)	Multiple component (N=43)
		N (%)	N (%)
Study design			
	RCT	59 (57)	33 (77)
	Quasi-experimental	45 (43)	10 (23)
Study period			
	Before 2009	51 (49)	21 (49)
	2009-2019	33 (32)	15 (35)
	Not specified	20 (19)	7 (16)
Age of Participants			
	6-9 yrs	54 (52)	20 (47)
	10-12 yrs	45 (43)	22 (51)
	Both age groups	5 (5)	1 (2)
Intervention components			
	Sedentary behaviour	2 (2)	43 (100)
	Physical activity	55 (53)	37 (86)
	Physical fitness	47 (45)	6 (14)
Duration of intervention			
	<6 months	23 (22)	15 (34)
	6-12 months	49 (47)	14 (33)
	>12 months	32 (31)	14 (33)
Follow up[a]			
	Only post-intervention	72 (69)	27 (63)
	< 1 year	17 (16)	7 (16)
	>= 1 year	15 (15)	9 (21)
Duration of PA (min/week)			
	0	7 (7)	16 (37)
	1-120	41 (40)	14 (32)
	>=120	42 (40)	5 (12)
	Not specified	14 (13)	8 (19)
Intensity of PA			
	Low-to-moderate	23 (22)	2 (5)
	Moderate-to-vigorous	47 (45)	9 (21)
	Not specified	34 (33)	32 (74)
Diet component			
	Yes	65 (63)	31 (72)
	No	39 (37)	12 (28)
Parent involvement			
	Yes	50 (48)	33 (77)
	No	54 (52)	10 (23)
Additional setting			
	Yes	8 (8)	5 (12)
	No	97 (92)	38 (88)
Risk of bias			
	Low	18 (17)	18 (42)
	Moderate	56 (54)	15 (35)
	High	29 (29)	10 (23)

PA=physical activity; [a]follow-up period is given in months after the end of the intervention

4.2 Risk of bias

Risk of bias across domains for randomised and non-randomised studies is shown in Figures 2 and 3, respectively, while risk of bias assessment across individual studies is presented in Tables A1 and A2 (*Appendix 4)*. We judged all randomised studies as having a high risk of bias in blinding of participants and study personnel since this is generally not possible for PA interventions. On the other hand, we considered all trials to have low bias in blinding of outcome assessors domain as the outcomes were objectively assessed, and as such, not subject to observer bias. In addition, no studies have been found to have a possibility of selective reporting. We judged most of the trials as having low risk of bias concerning loss to follow up (72/82), incomplete outcome data (74/91) and baseline imbalance (61/82). In addition, risk of bias was low for about half of the trials in terms of allocation concealment (48/91), random sequence generation (43/91) and adequatestatistical analyses for clustered nature of the data (50/82). Conversely, there was unclear or high risk of other bias in almost 2/3 of trials, mostly relating to low intervention fidelity. In spite of seemingly favourable results of risk of bias assessment, only 24/91 trials were judged as having an overall low risk of bias (according to criteria described in Methods).

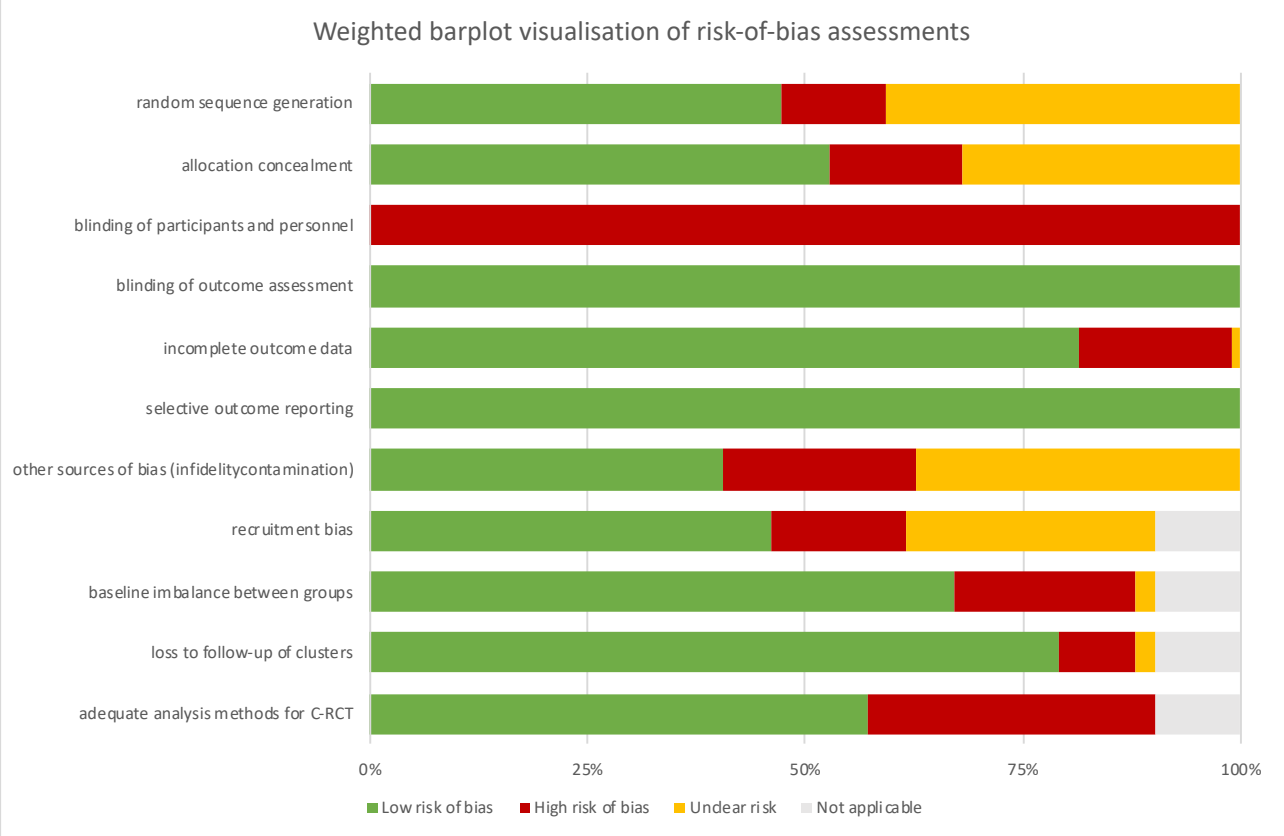

Figure 2. Risk of bias across domains for randomised studies

For non-randomised studies, least bias was noticed for the outcome domain, where 1/3 of the studies were awarded maximum points. On the other hand, in terms of selection only one study was given maximum points. Lastly, for comparability, an equal part of studies was assigned with 0,1 or 2 points. Generally, 12/55 studies totalled at least 6/8 points and were, hence, considered to have low overall risk of bias.

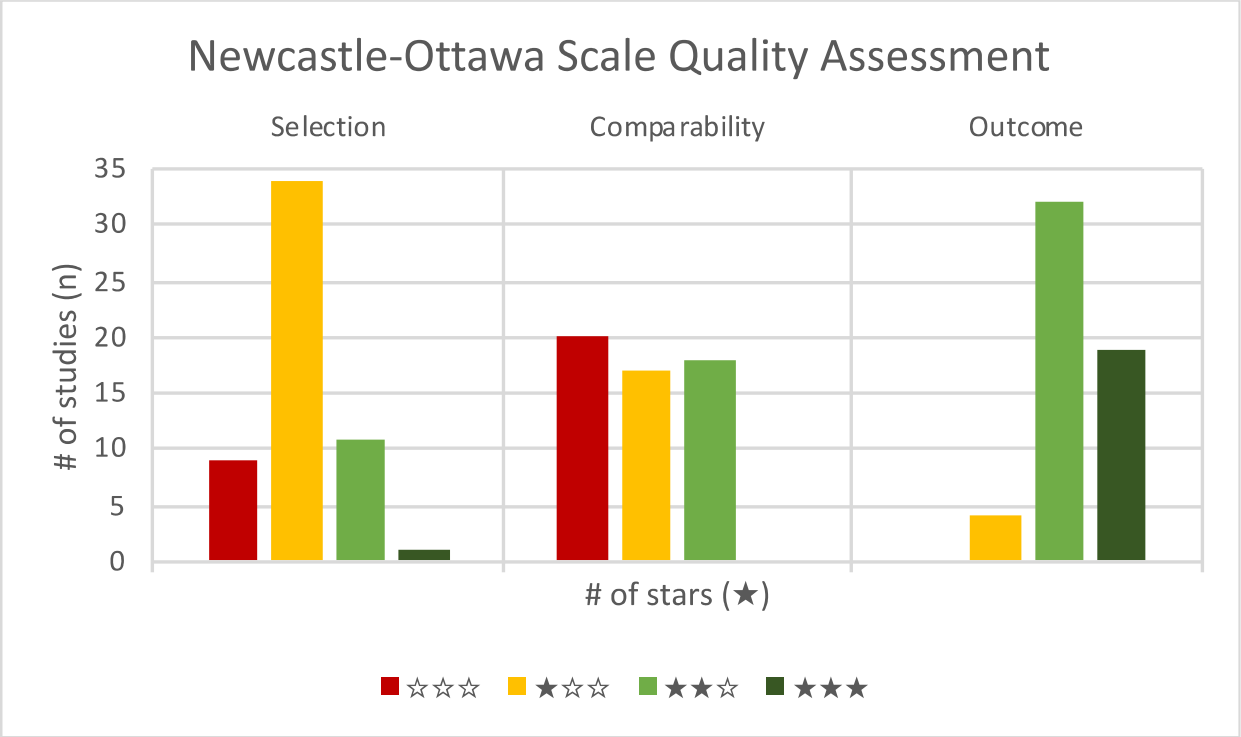

Figure 3. Risk of bias across domains for non-randomised study designs

4.3 Overall results

All in all, pooled effect sizes indicated that school-based physical activity interventions favourably affected all 3 outcomes analysed (BMI= -0.18 kg/m^2, 95%CI=-0.27 to -0.09; BMI z-score= -0.07, 95%CI= -0.10 to -0.05; %BF -0.43%, 95%CI= -0.66 to -0.21). Yet, it has to be noted that indices of heterogeneity were large for all outcomes and ranged from I^2=83% to I^2=92%.

When only studies that provided effects by gender are examined (n=22G and 21B for BMI, n=11G and 12B for BMI z-score, n= 13G and 13G for %BF), it becomes evident that gender is a significant moderator of the effectiveness of interventions analysed here. Specifically, interventions were effective or borderline effective in girls irrespective of the outcome assessed (BMI=-0.21 kg/m^2, -0.28 to -0.14; BMI z-score=-0.12, -0.27 to 0.03; %BF= -0.68%, -1.08 to -0.29), while in boys null pooled effect was noted for BMI (-0.01 kg/m^2, -0.08 to 0.05) and BMI z-score (-0.01, -0.05 to 0.06), and only borderline pooled effect was seen for %BF (-0.49%, -1.12 to 0.15, p=0.13).

4.4 Results by intervention characteristics

4.4.1 Single-component vs. multiple-component interventions

Forest plots showing the effects of individual interventions stratified by the number of components used are shown in Figures A1-3 (*Appendix 5*). For single-component interventions, a significant difference versus control was found for BMI -0.22 kg/m^2 (95% CI=-0.38 to -0.06), BMI z-score -0.10 (95% CI=-0.13 to -0.07) and %BF -0.64 % (95% CI=-1.08 to -0.20). The pooled effects of multiple-component interventions were slightly smaller, with the differences between groups amounting to -0.19 kg/m^2 (-0.32 to 0.06) for BMI, -0.06 (-0.08 to -0.03) for BMI z-score and -0.06 % (-0.14 to 0.01) for %BF. Again, heterogeneity was large for all outcomes in single-component interventions (I^2 ranged from 88% to 95%), but much smaller for multiple-component programmes (I^2 = 77%, 49%, 5% for BMI, BMI z-score and %BF, respectively).

Pooled effects from the interventions that allowed for comparison across gender are given in Table A3 (*Appendix 6*). Again, the overall impression is that the mean pooled effects are larger in girls than in boys, especially for multi-component interventions, although it has to be stressed that the confidence intervals overlap. At the same time, multi-component interventions were more effective compared to single-component programmes for girls, while for boys this was not seen.

Finally, findings from sensitivity analyses (Table A4, *Appendix 7*) showed that the pooled effects still favoured interventions when only studies judged as low risk of bias or only RCTs were analysed, although the effects tended to be smaller than in the main analysis, and not very different between single-component and multiple-component interventions.

4.4.2 Types of interventions within single-component and multiple-component programmes

Within single-component programmes the largest effects were found for interventions designed to improve physical fitness, with the differences being in favour of the intervention groups for all 3 outcomes assessed (BMI= -0.35 kg/m^2; 95% CI=-0.61 to -0.09; BMI z-score =-0.10 , -95% CI=-0.17 to -0.03); %BF= -1.64 % ; 95% CI=-2.66 to -0.63). On the other hand, interventions that aimed to increase physical activity favourably affected BMI z-score (-0.10; -0.13, -0.07), but not BMI (-0.14 kg/m^2; -0.35, 0.07) or %BF (-0.14%; -0.42, 0.14). Lastly, only two interventions that focused exclusively on reducing sedentary behaviours were included and the pooled effect for BMI showed a non-significant difference in BMI compared to control of -0.19 kg/m^2 (95%CI= -0.70 to 0.32).

Multi-component interventions designed to improve physical fitness while also aiming to reduce sedentary time proved to be unsuccesseful in favourably affecting BMI -0.11 kg/m^2 (95% CI=-0.32 to 0.10), or BMI z-score 0.02 (95% CI=-0.08 to 0.12), while the effects on %BF could not be computed due to limited number of studies. In contrast, pooled results for multi-component interventions aiming to increase physical activity while also trying to reduce sedentary time favoured interventions for both BMI (-0.24 kg/m^2, 95%CI=-0.39 to -0.08), and BMI z-score (-0.06, 95%CI=-0.08 to -0.03), but not for %BF (-0.14, 95%CI= -0.42 to 0.15).

Mean pooled results comparing the effectiveness of differernt types of interventions by gender are presented in Table A3 (*Appendix 5*). The number of studies included in these analyses was fairly small (n=3-7 for PA and n=2-10 for fitness), hence smaller power and large confidence intervals. Still, mean effects were generally larger in girls for interventions that aimed to increase PA, while for interventions that were designed to improve physical fitness the opposite was true.

4.5 Effectiveness of interventions in vulnerable groups of children

Our search identified 26 studies that included predominantly economically deprived children. In general, the effects on BMI were less pronounced when interventions were delivered to vulnerable groups of children (-0.05 kg/m^2, 95%CI=-0.29 to 0.19), compared to the effects in the general population (-0.24 kg/m^2, 95%CI= -0.34 to -0.14). Of note, this holds for both single-component and multiple-component interventions. Namely, while both single-component and multiple-component interventions favourably affected BMI in general child population by -0.29 kg/m^2 (95%CI =-0.46 to -0.13), and -0.27 kg/m^2 (95%CI -0.46 to -0.07), respectively, for interventions that involved vulnerable groups of children the pooled results showed non-significant differences in BMI of 0.10 kg/m^2 (-0.50 to 0.70) for single-component interventions and -0.07 kg/m^2 (-0.16 to 0.02) for multiple-component interventions.

On the other hand, the effects on BMI z-score in underprivileged children were comparable to the ones noted for general population (low SES: -0.07 kg/m^2, -0.12 to -0.01; general population: -0.08 kg/m^2, -0.10 to -0.06). There was an indication that this effect was slightly modified by the number of components included in the intervention, with single-component interventions being somewhat more successful in affecting weight change in disadvantaged groups. Specifically, for single-component interventions pooled results showed a slightly larger reduction in BMI z-score by -0.14 (95%CI=-0.22 to -0.06) in deprived children vs. -0.10 (95%CI=-0.13 to -0.07) in the general population. On the other hand, pooled effects for multiple-component intervention showed a non-significant effect on BMI z-score in underprivileged children (-0.04, 95%CI= -0.10 to 0.02) and a mild reduction in general population (-0.06, 95%CI=-0.09 to -0.03).

Comparisons of the effects on body fat were impeded by too few studies that focused on low SES that included body fat as an outcome.

4.6 Assessment of publication bias

A formal evaluation of all available results using Egger's regression did not show evidence of publication bias for either BMI (z = -0.79, p = 0.43) or BMI z-score (z = -1.36, p = 0.17), while moderate funnel plot assymetry was indicated for and BF% (z = -2.30, p = 0.02). When stratified by the number of components, for single-component interventions publication bias was noted only for BF% (z = -2.59, p = 0.01). Conversely, for multiple-component interventions publication bias was not seen for any of the three outcomes analysed.

5 Discussion

In this systematic review we compared the effects of interventions that intended to increase physical activity with interventions that were designed to improve physical fitness and with interventions that aimed to reduce sedentary behaviour on obesity-related outcomes in 6-12-year-old children. The main results of our study include: 1) school-based PA interventions appear to be an effective strategy in the prevention of childhood obesity among 6-12-year old children; 2) interventions that combined PA or fitness component with strategies to reduce sedentary behaviour were actually less effective in controlling weight gain compared to single-component interventions; hence, including behavioural strategies to reduce sedentary behaviour to PA or fitness programmes does not provide additional benefits for obesity prevention 3) interventions that were designed to improve physical fitness produced larger effects than interventions that strived to increase PA; 4) intervention effects were generally larger in girls than in boys, especially for multi-component programmes; 5) interventions that were delivered exclusively to economically deprived children analysed here were less able to induce favourable effects on BMI compared with interventions conducted in more general settings.

We found an overall difference in favour of the intervention group of -0.18 kg/m^2 (95%CI=-0.27 to -0.09) for BMI, -0.07 for BMI z-score (95%CI= -0.10 to -0.05) and -0.43% (95%CI= -0.66 to -0.21) for %BF. The effect size for PA interventions reported here is notably larger than the the overall effect of all kinds of school-based obesity prevention initiatives on BMI of -0.08 kg/m^2 (95%CI: -0.11, -0.05,) reported in a recent meta-synthesis of 10 different meta-analyses (Kobes et al., 2018), but rather similar to the effect reported for school-based programmes that included PA (Wang et al., 2015; Waters et al, 2011). Although clinical importance of the effect size reported here is probably trivial, such small shifts at the population level can produce significant public health benefits by ireducing weight gain in non-overweight children. Plus, it is worth noting that the effects of the PA interventions are probably underestimated due to the well-known limitations of BMI in distinguishing fat from fat-free mass on one side, and the large measurement error of commonly used methods for assessing body composition on the other side.

In terms of characteristics that moderate the effectiveness of these type of interventions, the World Health Organisation has recommended that obesity prevention programmes should span over at least one year, include both PA and a diet component and involve parents, if possibly extending also to the home and community settings. (WHO, 2009b). Our findings supplement these guidelines by indicating that interventions should be designed to improve fitness in order to maximise the effects on weight gain prevention in 6-12-year old children. However, this finding needs to be corroborated in future studies as there was considerable overlap in confidence intervals of the effects of PA and fitness interventions studied here. Next, when analysing a smaller number of studies that reported effects by gender, we found evidence that fitness-oriented interventions are more effective than PA directed ones only in boys, but not among girls. Therefore, more evidence is needed that this applies to both genders. Still, epidemiological studies support evidence from trials described here by reporting stronger cross-sectional associations with cardiometabolic risk factors for fitness than for physical activity (Hurtig-Wennlöf et al., 2007). Similarly, physical fitness has been identified as a moderator of the

relationship between PA and cardiometabolic risk in children. More specifically, PA was associated with cardiometabolic risk factors in low fit children, but not in their fit peers (Skrede et al., 2018).

The finding that the interventions that encompass several behaviours are not superior to programmes that focus on just one behaviour has already been reported for combination of PA with diet component. Although evidence on this is not unequivocal, it was previously shown that diet+PA interventions in a variety of settings are not superior to single component programmes (Kobes et. al., 2018), and that these kinds of combined interventions have an even smaller impact on weight-related outcomes than single component programmes when set in schools (Wang et al., 2015). Similarly, a meta-analysis of mostly non- school-based programmes showed that multi-components interventions (targeting sedentary behaviour and PA) were not more effective in BMI reduction than interventions that focused exclusively on sedentary behaviour (Liao et al., 2014). Our search strategy allowed for only 2 studies that aimed to reduce sedentary behaviour to be included in the quntitative sythesis. This precluded us from estimating reliable pooled effect sizes for any of the obesity-related outcomes assessed. However, we were able to estimate the impact of adding sedentary behaviour to PA/fitness intervention programmes on the prevention of obesity and found no added value of including sedentary behaviour component. Prior studies that included a variety of settings and a wider age range also failed to show the effectiveness of these types of intervention in obesity prevention (Liao et al., 2014, Biddle et al., 2014). This is hardly surprising given the low intensity of these kinds of programmes, strong reliance on educational content only, and the high reinforcement of media use in todays cultures. This is hardly surprising given the low intensity of these kinds of programmes, strong reliance on educational content only, and the high reinforcement of screen use in todays cultures. Although it has been reported that these types of programmes can produce a significant decrease in sedentary behaviours, the effect size is too small to have an impact on weight regulation (Biddle, 2014). Nevertheless, given the unprecendented increase in exposure to screens faced by contemporary children (Rideout, 2015), it is of paramount importance to increase the efforts in redesigning strategies for controlling the amount of time children spend in front of the screens. To this end, behavioral strategies that have been a cornerstone of strategies to reduce sedentary time up to now, should be supplemented with policies oriented at changes in the environment.

As about 2/3 of the included studies have included a diet component, it is not possible to ascribe positive findings of interventions reported in this review specifically to increase in energy expenditure. However, several previous reviews have found that diet-only interventions are less effective than the ones focused exclusively on PA (Wang et al., 2015, Bleich et al., 2018). Still, multi-faceted interventions targeting both sides of the energy equation should be advocated as the most beneficial approach for obesity prevention. Hence, delineating the effects of diet and PA strategies in real world setting is neither possible nor required.

Overall, mean pooled effectsof obesity prevention interventions analysed in this review were larger in girls than in boys, especially for multi-component interventions, although it has to be emphasised that the confidence intervals did not overlap only for BMI. It is well known that school-aged girls are less physically active compared to boys (Riddoch et al, 2004). To that end, the amount of PA typically used in intervention

studies probably contributes more to the overall daily PA of girls. This, in turn, might lead to larger effects on energy expenditure and weight regulation.

The increasing burden of obesity and inactivity across SES has been well-documented (Love et al., 2019). We found evidence that interventions that were delivered to economically deprived children analysed here were less able to induce favourable effects on BMI than interventions in general population. However, this should be interpreted with caution, as these two groups of interventions differed is several characteristics. Namely, despite having similar characteristics in terms of components included, including a diet component, and involving parents, 35% of interventions directed to disadvantaged children were shorter that 6 months compared to only 22% such interventions addressed at general population. In addition, this group of interventions introduced less PA (median PA duration=60 min/week compared to 90 min/week in general population). Still, echoing our findings in 6-12-year-old children, a review of obesity interventions that focused on disadvantaged adolescents reported that only two out of six school-based obesity prevention initiatives managed to produce beneficial effects on BMI (Kornet-van der Aa et al.,2017). Nevertheless, as parents of this group of children can be very hard to reach, schools and the community remain the settings that should be a focus of public health policies aimed at reducing health inequalities. On the other hand, it is obvious that school-based intervention strategies directed at underprivileged children need to be redesigned in order to achieve effects observed in more affluent children. To that end, a recent review that analysed the effects of obesity prevention programmes across socio-economic position, has shown that interventions targeting individual-level behaviour change may be less successful in disadvantaged children and that structural changes to the environment might be a better approach in reducing inequalities (Beauchamps et al., 2014).

Finally, although only a handful of analysed studies provided data on adverse outcomes, we found no evidence for changes in body satisfaction, eating behaviours or underweight prevalence. In addition, the incidence of injuries was very low, even in studies with large volume of PA. Hence, school-based PA programmes can be considered very safe, regardless of the components used or PA volume implemented.

Strengths and limitations

Our review has many strengths. First, we did not rely on search strategies set by prior reviews. Instead, we searched 8 databases, including grey literarure sources. Second, unlike most of the previous similar reviews, we did not limit our search to English language, thus increasing the probability of detecting evidence from low-middle income countries. Third, we accepted different study designs instead of constraining to RCTs, whilst insisting on the control group to minimise bias. Fourth, we gathered very detailed data on the content of interventions, with a special reference to the frequency, intensity, duration and type of PA. Fifth, we included measures of body composition instead of relying only on BMI, which is regularly critiqued as an imperfect measure of adiposity. Furthermore, BMI can be affected by physical activity through an increase in lean body mass which then typically leads to underestimation of intervention effects on adiposity.

Several limitations of this review are also worth noting. First, although, unlike prior reviews, we extended our search beyond English language, we could not include non-European languages, so we might have missed studies from Asia or Africa. Second, large variability in intervention characteristics led to statistical heterogeneity, which warrants caution when interpreting the results of meta-analysis. Third, a large number of studies describing PA interventions failed to document the exact duration of PA and even fewer studies have quantified the intensity of implemented activities. This limitation precluded us from describing the dose-response relationship. Similarly, the large variability in reporting prevented us from analysing the effects of PA interventions on overweight prevalence and abdominal obesity. Next, a limited number of studies identified in some subgroups impeded the assessment of effect modification. Finally, we found only two studies that focused exclusively on reducing sedentary behaviour, and both studies used only BMI as outcome. Hence, we were unable to compute reliable estimates of the effects of such interventions on obesity-related outcomes.

Implications for future research

Important gaps in the evidence were uncovered by our analyses. For example, very few studies identified by our review focused exclusively on decreasing sedentary behaviour, and studies that added sedentary behaviour component to a PA or fitness-oriented programme rarely went beyond educational activities. Hence, there is a clear need for more trials with a strict focus on sedentary behaviours, particularly such that would use an innovative approach, aligned with interests and routines of today's children. To this end, we did not find studies that have evaluated the effectiveness of wearable technology (e.g. activity trackers) or smartphones in obesity prevention. In view of excessive reliance on mobile phones of contemporary children, wearable and mobile technology could prove to be a powerful agent in physical fitness enhancement, but also in the reduction of screen time. Preliminary evidence that interventions that used screen-based technology have successfully reduced screen time is already available (Barnett et al., 2018). Next, poor reporting on the dose of PA introduced by obesity prevention interventions precluded us from detecting a “best-buy” quantity of PA that would provide optimal effects with as little time and resources invested as possible. In order to enable such dose-response analyses, future studies should include comprehensive assessment of PA volume introduced and ensure to report this in sufficient detail.

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Appendix 1: Search strategy on Medline

1. exp Obesity/
2. obes*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
3. exp Body Weight/
4. body weight.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5. exp Body Weight/ or exp Weight Gain/
6. exp Body Weight Changes/
7. exp Body Fat Distribution/
8. body fat distribution.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. exp Body Composition/
10. body composition.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11. Body Mass Index/ or BMI.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
12. exp Body Mass Index/
13. (body adj2 mass).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
14. overweight*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15. exp Overweight/
16. overeat*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
17. over eat$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
18. weight.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

19. (body adj2 fat).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
20. exp Waist Circumference/
21. waist circumference.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
22. exp Skinfold Thickness/
23. skinfold thickness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
24. skin fold*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
25. (body fat and percent$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
26. exp Weight Loss/
27. weight loss.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
28. adipos*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
29. exp Adipose Tissue/
30. (weight adj1 (prevent$ or reduc$ or los$ or control$ or manage$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
31. (body weights and measures).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
32. exp Schools/
33. school$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
34. (class or classes or classroom*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
35. exp child/

36. child$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
37. preteen$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
38. school$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
39. boy*1.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
40. girl$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
41. kid*1.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
42. p?ediatric$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
43. 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42
44. exp Exercise/
45. exercise$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
46. physical activit*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
47. physical inactivity.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
48. motor activit*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
49. exp "Physical Education and Training"/
50. physical education.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

51. physical training.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
52. (life style or lifestyle or life-style).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
53. leisure activit$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
54. leisure activities/ or exp recreation/ or exp relaxation/
55. exp Weight Lifting/
56. weight lift$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
57. exp sports/
58. exp Exercise Therapy/
59. exercise therapy.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
60. (physical$ adj5 (fit$ or train$ or active$ or endur$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
61. (physic$ adj (activ$ or fit$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
62. (phys$ adj3 education).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
63. (exercise$ adj5 (train$ or physical$ or activ$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
64. (walk$ or jog$ or swim$ or weight lift$ or danc$ or aerobics sport$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
65. cycle$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
66. ((chair or sitting or car or automobile or auto or bus or indoor or indoor or screen or computer) adj2 time).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary

concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
67. sedentar*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
68. exp Sedentary Behavior/
69. seat*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
70. sedentary lifestyle.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
71. ((chair or sitting or car or automobile or bus or indoor or in-door or screen or computer) adj time).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
72. low energy expenditure.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
73. exp energy intake/ or exp caloric restriction/
74. (screen based entertainment or screen-based entertainment or screen time).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
75. exp screen time/
76. bed rest.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
77. sitting.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
78. stationary behaviour.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
79. stationary behavior.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
80. standing.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

81. reclin*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
82. recumben*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
83. lying.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
84. bout*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
85. television viewing.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
86. computer viewing.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
87. television game*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
88. computer game*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
89. video game*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
90. exp physical fitness/ or exp cardiorespiratory fitness/
91. physical fitness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
92. ((physic* or strength* or resist* or circuit* or weight or aerob* or cross or endurance or structur*) adj3 train*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
93. (physical conditioning or fitness).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

94. musculoskeletal fitness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
95. cardiovascular fitness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
96. 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95
97. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31
98. 32 or 33 or 34
99. 43 and 96 and 97 and 98
100. limit 99 to yr="1994 -Current"
101. limit 100 to "all child (0 to 18 years)"
102. 100 not 101
103. exp Obesity/
104. obes*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
105. exp Body Weight/
106. body weight.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
107. exp Body Weight/ or exp Weight Gain/
108. exp Body Weight Changes/
109. exp Body Fat Distribution/
110. body fat distribution.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
111. exp Body Composition/
112. body composition.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
113. Body Mass Index/ or BMI.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
114. exp Body Mass Index/
115. (body adj2 mass).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

116. overweight*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
117. exp Overweight/
118. overeat*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
119. over eat$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
120. weight.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
121. (body adj2 fat).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
122. exp Waist Circumference/
123. waist circumference.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
124. exp Skinfold Thickness/
125. skinfold thickness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
126. skin fold*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
127. (body fat and percent$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
128. exp Weight Loss/
129. weight loss.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
130. adipos*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
131. exp Adipose Tissue/
132. (weight adj1 (prevent$ or reduc$ or los$ or control$ or manage$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word,

keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
133. (body weights and measures).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
134. exp Schools/
135. school$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
136. (class or classes or classroom*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
137. exp child/
138. child$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
139. preteen$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
140. school$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
141. boy*1.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
142. girl$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
143. kid*1.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
144. p?ediatric$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
145. 137 or 138 or 139 or 140 or 141 or 142 or 143 or 144
146. exp Exercise/
147. exercise$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

148. physical activit*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
149. physical inactivity.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
150. motor activit*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
151. exp "Physical Education and Training"/
152. physical education.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
153. physical training.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
154. (life style or lifestyle or life-style).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
155. leisure activit$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
156. leisure activities/ or exp recreation/ or exp relaxation/
157. exp Weight Lifting/
158. weight lift$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
159. exp sports/
160. exp Exercise Therapy/
161. exercise therapy.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
162. (physical$ adj5 (fit$ or train$ or active$ or endur$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
163. (physic$ adj (activ$ or fit$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
164. (phys$ adj3 education).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism

supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
165. (exercise$ adj5 (train$ or physical$ or activ$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
166. (walk$ or jog$ or swim$ or weight lift$ or danc$ or aerobics sport$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
167. cycle$.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
168. ((chair or sitting or car or automobile or auto or bus or indoor or indoor or screen or computer) adj2 time).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
169. sedentar*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
170. exp Sedentary Behavior/
171. seat*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
172. sedentary lifestyle.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
173. ((chair or sitting or car or automobile or bus or indoor or in-door or screen or computer) adj time).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
174. low energy expenditure.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
175. exp energy intake/ or exp caloric restriction/
176. (screen based entertainment or screen-based entertainment or screen time).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
177. exp screen time/
178. bed rest.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

179. sitting.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
180. stationary behaviour.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
181. stationary behavior.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
182. standing.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
183. reclin*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
184. recumben*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
185. lying.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
186. bout*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
187. television viewing.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
188. computer viewing.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
189. television game*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
190. computer game*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
191. video game*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept

word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
192. exp physical fitness/ or exp cardiorespiratory fitness/
193. physical fitness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
194. ((physic* or strength* or resist* or circuit* or weight or aerob* or cross or endurance or structur*) adj3 train*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
195. (physical conditioning or fitness).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
196. musculoskeletal fitness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
197. cardiovascular fitness.mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
198. 146 or 147 or 148 or 149 or 150 or 151 or 152 or 153 or 154 or 155 or 156 or 157 or 158 or 159 or 160 or 161 or 162 or 163 or 164 or 165 or 166 or 167 or 168 or 169 or 170 or 171 or 172 or 173 or 174 or 175 or 176 or 177 or 178 or 179 or 180 or 181 or 182 or 183 or 184 or 185 or 186 or 187 or 188 or 189 or 190 or 191 or 192 or 193 or 194 or 195 or 196 or 197
199. 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122 or 123 or 124 or 125 or 126 or 127 or 128 or 129 or 130 or 131 or 132 or 133
200. 134 or 135 or 136
201. 145 and 198 and 199 and 200
202. limit 201 to "child (6 to 12 years)"
203. limit 202 to yr="1994 -Current"
204. 102 or 203

Appendix 2: List of included and excluded studies

STUDIES INCLUDED IN THE QUANTITATIVE SYNTHESIS

1. Adab, P., Pallan, M. J., Cade, J., Ekelund, U., Barrett, T., Daley, A., . . . Cheng, K. K. (2014). Preventing childhood obesity, phase II feasibility study focusing on South Asians: BEACHeS. BMJ Open, 4(4). doi:10.1136/bmjopen-2013-004579
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9. Aparco, J. P., Bautista-Olórtegui, W., & Pillaca, J. (2017). Impact evaluation of educational-motivational intervention “como jugando” to prevent obesity in school children of cercado de lima: Results in the first year. Revista Peruana de Medicina Experimental y Salud Publica, 34(3), 386-394. doi:10.17843/rpmesp.2017.343.2472
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Appendix 3: Characteristics of included and excluded studies

STUDIES INCLUDED IN THE QUANTITATIVE SYNTHESIS

Authors and year		Adab et al. 2014
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 4 schools in the control group
	Follow-up	1 year follow-up
	Country	UK
	Period	2007/2008
Participants	Number of participants at baseline and follow-up (intervention/control)	269 individuals in the intervention group and 305 individuals in the control group at baseline; 234 individuals in the intervention group and 254 individuals in the control group at follow-up
	Age	6-8 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- predominantly South Asian; Socio-economic status- had a higher proportion of children eligible for free school meals (FSM), indicating higher deprivation.
Intervention	Description	The intervention targeted both diet and physical activity behaviours and consisted of two main strands: (1) increasing children's physical activity levels and promoting healthy eating through schools; a. 'Wake Up Shake Up': a short (10 min) organised daily dance or exercise routine to music. b. Organised playground activities at lunch and break times through the training of school staff to act as 'play leaders' c. 'Take 10': teaching resource which links 10 min physical activity in the classroom to curricular subjects d. Villa Vitality' day. Half the day is spent with Football Club coaches, exercising and learning football skills. (2) increasing skills among family members through family educational activities. (3) Community volunteers were recruited through schools to become trained walk leaders.Training was provided to equip volunteers to organise and lead walks in their local community.
	Duration of intervention	12-months

	Frequency of PA	Not specified.
	Duration of PA	>50 min/week
	Intensity of PA	Not specified.
	Type of PA	/
	Parent involvement	Five-week courses on healthy cooking were delivered through schools to parents or other family members. Parents were given information on local sporting and leisure venues and events. They were invited to attend weekend taster sessions with their children, through school.
	Setting	School+community
	Who delivered the intervention	Trained school staff (including teachers, teaching assistants or lunch time assistants).
	Theoretical framework	Analysis Grid for Environments Linked to Obesity (ANGELO framework).
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (UK 1990 growth reference charts); physical activity (accelerometry); food intake (food diary analysis programme)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Adab et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	26 schools in the intervention group and 28 schools in the control group
	Follow-up	3 months post-intervention and 18 months post-intervention
	Country	UK
	Period	Recruitment took place between April and May 2011 (group 1 schools and pupils) and from January to May 2012 (group 2 schools and pupils); 2.5 yrs intervention
Participants	Number of participants at baseline and follow-up (intervention/control)	1134 individuals in the intervention group and 1328 individuals in the control group at baseline; 660 individuals in the intervention group and 732 individuals in the control group at follow-up
	Age	6-7 yrs
	Sex	Both boys and girls

	Other characteristics	Ethnicity- Caucasian; Socio-economic status- The region includes a multi ethnic population from diverse socioeconomic backgrounds living in rural and urban areas.
Intervention	Description	The intervention programme comprised four overlapping components:(1) Thirty minutes of additional moderate to vigorous physical activity on each school day—at least 15 minutes to be outside of break times, although class teachers customised timing of delivery and exact activities undertaken according to their class circumstance (2) Termly cooking workshops during school time, which parents were invited to attend to participate in with their child and that were preceded by short classroom sessions for the children 3) A six week programme (Villa Vitality) developed to encourage healthy eating and increase physical activity and delivered by staff from an iconic sporting institution. School classes spent two days undertaking activities (indoor based movement routines, using dance mats, ball skills session, interactive nutritional sessions, and an opportunity to practise cooking skills) at an English premier league football club (4) Information sheets signposting children and their families on ways to be active over the summer (identical for all schools) and physical activity opportunities in their local area
	Duration of intervention	12-months
	Frequency of PA	5 times/week (every school day).
	Duration of PA	150 min/week.
	Intensity of PA	Not specified.
	Type of PA	Desgined PA programs: Wake Up Shake Up (involves children following aerobic-type activity routines (5–10 minutes) to music (shown on a self-explanatory DVD)); Activate (involves progressive repeated patterns of movement to music); Positive Play (a resource designed to be used during school playtimes); Fit to Succeed (a resource that provides ideas with easy-to-follow guidance on how to incorporate 10- to 15-minute bursts of PA into a child's school day)
	Parent involvement	Yes. via school events and information sheets
	Setting	School

	Who delivered the intervention	Class teachers, teaching assistants or lunchtime supervisors (depending on school).
	Theoretical framework	Not specified.
	Control	Regular curriculum
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score; diet, physical activity and blood pressure (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Aguilar et al. 2010
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	10 schools in the intervention group and 10 schools in the control group
	Follow-up	Post-intervention and at the half time during intervention
	Country	Spain
	Period	2004-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	513 individuals in the intervention group and 606 individuals in the control group at baseline; 375 individuals in the intervention group and 546 individuals in the control group at follow-up
	Age	9-11 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-main economic activities of population-farming, food processing and mechanical industries
Intervention	Description	After-School PA consisted of 3 weekly 90-minute sessions per week, during approximately 28 weeks every year. The physical activity sessions were planned by 2 qualified physical education teachers and were supervised by sports instructors.
	Duration of intervention	28 weeks/year (2 academic years)
	Frequency of PA	3 times/week
	Duration of PA	270 min/week
	Intensity of PA	LPA to MPA
	Type of PA	The activities included sports with alternative equipment (pogo sticks, frisbees, jumpimg balls, small parachutes, etc), cooperative games, dance, and recreational athletics.
	Parent involvement	No

	Setting	School
	Who delivered the intervention	2 qualified physical education teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	The children attended 78.4% of the sessions in the first year and 71.6% of the sessions in the second year. Each student participated in an average of 54 physical activity sessions in the first year and in 57 sessions in the second year.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; %body fat (BIA, skinfolds); prevalence of overweight and obesity (IOTF)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Agurto et al. 2018
Methods and setting	Study design	Non-RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	Chile
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	76 individuals in the intervention group and 77 individuals in the control group at baseline and at follow-up
	Age	8.4+-0.7 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	A HIIT program was applied in Physical Education classes. The HIIT program was executed under the 30 ’x 1’ x 10 mode, that is, 30 seconds of intense exercise followed by 1 minute of passive rest, repeated 10 times.
	Duration of intervention	12-weeks
	Frequency of PA	2 times/week.
	Duration of PA	30 minutes/week
	Intensity of PA	High intensity (vigorous).
	Type of PA	Chase games, speed races and jump rope.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	PE teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities.

	Intervention fidelity	Those students who were not able to perform some type of physical activity and who missed more than 3 exercise sessions were excluded from the sample.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (WHO); %body fat (BIA); functional capacity (6 min test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Alvirde-García et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Community
	Number of clusters	1 community in the intervention group and 1C in the control group; 2 schools in the intervention group and 3 schools in the control group
	Follow-up	Only post-intervention
	Country	Mexico
	Period	2007-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	1927 individuals in the intervention group and 755 individuals in the control group at baseline; 816 individuals in the intervention group and 408 individuals in the control group at follow-up
	Age	9.0+-1.7 yrs
	Sex	Both boys and girls
	Other characteristics	Semi-rural populations; 40% and 34% OW+OB at baseline
Intervention	Description	The CATCH program includes the modification of the school curriculum, changes in cooperatives, increased physical activity and exercises with the family. The proposals of the CATCH program on physical activity include organized actions that promote recreation in order to reach pre-established levels of moderate PA at vigorous during the break, in PE classes and in extracurricular actions (including exercise with the family).
	Sedentary time, physical activity or both	Not specified.
	Duration of intervention (months or weeks)	36-months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.

	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Parents' society participated in meetings
	Setting	School.
	Who delivered the intervention	Not specified.
	Theoretical framework	Not specified.
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Anderson et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	30 schools in the intervention group and 30 schools in the control group
	Follow-up	Post-intervention and 1 year after the immediate assessment
	Country	UK
	Period	2011
Participants	Number of participants at baseline and follow-up (intervention/control)	1064 individuals in the intervention group and 1157 individuals in the control group
	Age	9-10 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The AFLY5 intervention is a school based intervention that aims to increase children's self efficacy and knowledge, together with motivating parents, to increase children's levels of physical activity, reduce sedentary behaviour, and increase consumption of fruit and vegetables; The intervention consists of 16 lessons, 10 homeworks, and school newsletter inserts. It is taught in normal lesson time, by the school teacher. Lessons include fitness measurments, safe workout instructions, nutrition education and analysis of TV time. The 16 lesson sincluded 9 that were primarily related to how to be more active and less sedentary and why this was important, 6 to healthy nutrition and how to

		achievethis and 1 about reducing screen viewing
	Duration of intervention	12-months
	Frequency of PA	/
	Duration of PA	/.
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes. Child-parent interactive homework plans, written materials for parents. The homework activities were designed to involve parents and other family members in the behavioural change process by reinforcing the messages delivered during lessons. The homework included activities such as "Freeze my TV," in which a time/programme normally spent watching television would be replaced with physically active play involving the parents and other family members that the child would write a log about.
	Setting	School.
	Who delivered the intervention	Teachers.
	Theoretical framework	Social Cognitive Theory.
	Control	No intervention
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Moderate to vigorous physical activity per day (accelerometer); minutes of sedentary behaviour per day (accelerometer) and reported daily consumption of servings of fruit and vegetables
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Angelopoulos et al. 2009
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	13 schools in the intervention group and 13 schools in the control group
	Follow-up	Only post-intervention
	Country	Greece
	Period	January 2005 – January 2006
Participants	Number of participants at baseline and follow-up (intervention/control)	321 individuals in the intervention group and 325 individuals in the control group at baseline and at follow-up
	Age	10-11 yrs

	Sex	Both boys and girls
	Other characteristics	Greek children
Intervention	Description	A 12-month intervention programme was integrated in the existing school curriculum; primarily combined with Physical Education (PE) and Science and Environmental classes providing the less possible disturbance. The themes covered were self-esteem, body image, nutrition, physical activity, fitness and environmental issues. The material was implemented for 1–2 h per week. Several motivational methods and strategies were used for increasing knowledge (i.e. discussion, active learning, cues), increasing skills and self-efficacy (i.e. modelling, guided practice, enactment), achieving better self-monitoring (i.e. problem solving, goal setting), changing attitudes and beliefs (i.e. self re-evaluation, environmental re-evaluation, arguments, modelling, direct experience) and changing social influence (i.e. modelling, mobilizing social support). Special emphasis was placed on increasing children's fun and excitement for exercise. This was achieved by children'sparticipation in two 45-min PE sessions per week (a total ofabout 60 classes per year) which were delivered in theplayground. The sessions were enjoyable, fitness-oriented (rather than motor-oriented) and of moderate intensity; Playgrounds and school yards were accessible for children to play after the end of the curricular programme
	Duration of intervention	12-months
	Frequency of PA	2 times/week.
	Duration of PA	90 min/week.
	Intensity of PA	MPA
	Type of PA	Enjoyable, fitness-oriented (rather than motor-oriented) activites.
	Parent involvement	Yes. Invited to meetings and advised to support their children in being physically active rather than to encourage sedentary behaviours.
	Setting	School.
	Who delivered the intervention	Trained school teachers.
	Theoretical framework	Theory of Planned Behaviour.
	Control	Not specified.
	Intervention fidelity	Parental attendance at the meetings was high with a mean rate of 86%
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI z score (CDC); The 24-h recall technique was used to collect dietary intake information for two consecutive week days and one weekend day; Physical activity during leisure time (standardized

		questionnaire completed by the children for two consecutive weekdays and one weekend day); blood pressure (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Annesi et al. 2015
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 4 schools in the control group
	Follow-up	Post-intervention and at the half time during intervention
	Country	USA
	Period	/
Participants	Number of participants at baseline and follow-up (intervention/control)	72 individuals in the intervention group and 42 individuals in the control group at baseline and at follow-up
	Age	7.2+-1.1 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-11.4 % White, 75.4 % African-American, 11.4 % Hispanic; Socio-economic status-median family income of US$62,200 was moderate
Intervention	Description	After-school PA program consisted of the daily sessions: -5 min: active warm-up and focus upon a specific movement for the week (e.g., skipping) – 10 min: the day's assigned "high-intensity activity" – 10 min: alternate days of either a "behavioral topic" (e.g., "positive self-talk") or "health topic" (e.g., "what is a grain?") – 10 min: "content reinforcement" activity where the day's behavioral or health topic was bolstered by a structured physical activity (e.g., complete an assigned physical movement when a whole- vs. refined-grain food is named by a counselor) – 10 min: "go-to game" consisting of a moderate- to high-intensity game selected by the counselor from an approved list
	Duration of intervention	24-weeks
	Frequency of PA	4 times/week

	Duration of PA	100 min/week
	Intensity of PA	MVPA
	Type of PA	Running games
	Parent involvement	Yes; Letters explaining what was recently emphasized within the program, and how it might be supported outside of school, were sent to parents/guardians weekly
	Setting	School
	Who delivered the intervention	Counsellors (rarely had any formal training in physical education or health education methods)
	Theoretical framework	Social Cognitive Theory
	Control	Unsupervised PA was offered to children for 120min/week
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI percentile (CDC); Muscular strength (number of push-ups completed while maintaining a 3-s pace per repetition); Cardiovascular fitness (running and/or walking for as long a distance as possible over a period of 3 min); Exercise barriers self-efficacy (five-item version of the Exercise Barriers Self-Efficacy Scale for Children); Physical self-concept-five designated "behavior" items of the Physical Self-Concept subscale (PSC) of the Tennessee Self-concept Scale
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Annesi et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	Multiple sites
	Follow-up	At the half time during intervention and 3 months after intervention
	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	86 individuals in the intervention group and 55 individuals in the control group at baseline and at follow-up
	Age	10.0+-0.9 yrs (9-12)
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 31% White, 65% Black and 4% other; Socio-economic status- average
Intervention	Description	Daily lessons consisted of (i) a warmup of light movement and stretching (5 min), (ii) moderate-to vigourous physical activities via

		an assortment of structured tag, ball and mobility games and tasks (30 min) and (iii) self management/self-regulatory skills or nutrition education where topics such as productive self-talk, recruiting social supports and the goal setting-progress feedback process were taught and reviewed, and information on healthy nutrition and hydration was supported by brief lectures and posters (10 min on alternate days).
	Duration of intervention	24-weeks
	Frequency of PA	4 times/week
	Duration of PA	180 min/week
	Intensity of PA	MVPA
	Type of PA	Cardiovascular activities were emphasised throughout the physical activity components, with body-weight resistance occasionally interspersed. Games and tasks were intended to be inclusive of deconditioned children by, for example, ensuring that the requisite physical skills to complete scheduled activities were manageable, avoiding elimination of participation from games because of lesser athleticism, and fostering an internal competition based on personal long-term goals (e.g. 'improve my endurance to be better at basketball') and short-term progress on those goals.
	Parent involvement	One-page letters were periodically sent or emailed to parents/guardians informing them of topics covered within Youth Fit 4 Life, and how they could support their child's physical activities (e.g. participating in physical activities with them; encouraging their being physically active every day) and healthy eating (e.g. providing foods and snacks that are consistent with government recommended nutritional standards; modelling and encouraging healthy selections when eating outside of the home).
	Setting	School
	Who delivered the intervention	Study staff, care counsellors
	Theoretical framework	Social Cognitive Theory
	Control	Regular programme
	Intervention fidelity	Study staff conducted structured fidelity checks during approximately 10% of sessions. Minor deviations from the required protocol were typically corrected through direct interactions between the study staff and after-school care counsellors

Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; self-regulation for physical activity (five items); overall negative mood (6-items); exercise self-efficacy (The Exercise Barriers Self-Efficacy Scale for Children); cardiovascular endurance (walking or running for 3 min); muscle strength (push-ups while maintaining 3-s pace)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Aparco et al. 2017
Methods and setting	Study design	Non-RCT
	Unit of allocation	Education institutions
	Number of clusters	2 in the intervention group and 2 in the control group
	Follow-up	Only post-intervention
	Country	Peru
	Period	2008-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	477 individuals in the intervention group and 377 individuals in the control group at baseline; 414 individuals in the intervention group and 282 individuals in the control group at follow-up
	Age	7.4 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	1) Five educational sessions (three of healthy eating and two of physical activity) were developed. The structure of the session included the initial stage, in which educational materials (food models, sports and recreational equipment) were used for the collection of previous knowledge; then, the development of the contents (through the puppet theatre with scripts based on a pedagogical design that addressed the competencies of each session) and the closure (where the evaluation of learning and experiential activity was developed). The whole process lasted 50 min. The educational session was developed for each grade and section in each of the classrooms, with a monthly periodicity (except July and August for school holidays). 2) Physical activity component: Training of physical education teachers to develop classes with motivational and inclusive activities that allow all students to participate in physical activation. Identify “opportunities” to develop

		physical activity and provide sports equipment to develop physical activation. Twice a week a nutritionist and an educator visited the intervention school to develop a physical activation session during recess. For this, the physical activity kit was available to students and routines and contests were organized in the area of courtyard. 3) Dissemination of the health food standard in the school kiosk to food and beverage vendors within EI, as well as teachers and parents.
	Duration of intervention	8-months
	Frequency of PA	2 times/week.
	Duration of PA	Not specified
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Yes, home visits with educational activities
	Setting	School + Home
	Who delivered the intervention	PE teachers, nutritionist and an educator, school agents of healthy eating.
	Theoretical framework	Not specified.
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI-z-score (WHO); WC (measured); OW and OB prevalence (WHO); nutrition and food (questionnaire); physical activity (questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Azevedo et al. 2014
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 2 schools in the control group
	Follow-up	1 year
	Country	England
	Period	September 2010-March 2012
Participants	Number of participants at baseline and follow-up (intervention/control)	280 individuals in the intervention group and 217 individuals in the control group at baseline; 242 individuals in the intervention group and 203 in the control group at follow-up
	Age	11-13 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – Caucasian

Intervention	Description	Dance mat systems were with the aim of promoting an innovative opportunity for physical activity. Apart from the initial 6 weeks when there was a more structured delivery of dance mats into the curriculum, intervention schools had the freedom to use the dance mats in whatever way they wanted. However, the local authority team who supported the implementation of the dance mats suggested that schools consider using them in scheduled physical education classes, during breaks and lunchtimes, and also outside of school hours as part of 'enrichment' activities. Records showed that the mats were mostly used during PE lessons and lunch time, but the use was vwry incomsisent and dropped over time.
	Duration of intervention	about 14 –months
	Frequency of PA	Not specified.
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Exergame (exercise game).
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	None.
	Control	Regular school programme
	Intervention fidelity	Contextual issues in the introduction of the dance mats moderated the overall intensity of effects downwards because of declining support for the initiative
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical activity- (accelerometer); BMI; %body fat (DXA); aerobic fitness (20-m multistage shuttle run test); health-related quality of life (Kidscreen questionnaire); self-efficacy (children's physical activity self-efficacy survey); school attendance, focus groups with children and interviews with teachers were collected
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Bacardi-Gascon et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	Only-post intervention

	Country	Mexico
	Period	2008-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	280 in the intervention group and 252 in the control group at baseline; 256 in the intervention group and 222 in the control group at follow-up
	Age	8.5±0.73 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Hispanic
Intervention	Description	The classroom curricula for 2nd and 3rd grades were designed to promote healthful eating behaviors and to increase physical activity. One 30-min interactive lesson was delivered by nutrition graduate students each week for 8 weeks during the academic year.
	Duration of intervention	Not specified
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes, 60-minute session delivered by nutrition professionals each month for 4 months
	Setting	School
	Who delivered the intervention	Nutrition graduate students
	Theoretical framework	Bronfenbrenner's Ecological Model
	Control	Not specified
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; BMI z scores (WHO(2007) LMS parameters for sex and age); WC (measured); food inventory (questionnaire); Physical activity (self-reported questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Balas-Nakash et al. 2010
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 schools in the intervention group and 1 schools in the control group
	Follow-up	Only post-intervention
	Country	Mexico
	Period	2008
Participants	Number of participants at baseline and follow-up (intervention/control)	179 individuals in the intervention group and 140 individuals in the control group; 105 (33%) dropped out at follow-up
	Age	8-12 yrs
	Sex	Both boys and girls

	Other characteristics	Socio-economic status-medium SES
Intervention	Description	Intervention compared the effects of two groups of exercise routines on cardiovascular disease risk markers. Routine A was the reference group, with 20 min of less intense activity and routine B was the new group with 40 min of aerobic exercises. Both routines included an initial-phase with warm-up exercises, a middle-phase with aerobic exercises and a final-phase for relaxation, in accordance with national guidelines.
	Duration of intervention	12-weeks
	Frequency of PA	5 times/week
	Duration of PA	200 min/week
	Intensity of PA	MVPA
	Type of PA	Aerobic exercises
	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	100 min/week (less intense activity)
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); %body fat (BIA); prevalence of overweight and obesity (CDC); physical fitness (PA questionnaire); biochemical measurements and blood pressure (measured);
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Benjamin et al. 2015
Methods and setting	Study design	Non-RCT
	Unit of allocation	Community
	Number of clusters	1 community in the intervention group and 1 community in the control group – 2 private and 2 public schools in each community
	Follow-up	6 months after the intervention
	Country	US
	Period	Summer 2011 – spring 2012
Participants	Number of participants at baseline and follow-up (intervention/control)	64 individuals in the intervention group and 40 individuals in the control group at baseline; 34 individuals in the intervention group and 18 in the control group at follow-up
	Age	7.8 (1.8) I; 8.3 (1.9) C
	Sex	Both boys and girls

	Other characteristics	Ethnicity- White intervention mean 49 (SD 76.6) control 34 (85.0), African American intervention 12 (18.8) control 5 (12.5), Other intervention 3 (4.7) control 1 (2.5), Hispanic or Latino/a intervention 4 (6.3) control 0 (0.0) Household income, yearly : <30000$ (mean 11 (SD 15.2) in the intervention group and 14 (35) in the control group); 30001-90000% (27 (42.2) in the intervention and 20 (50) in the control); >90001$ (26 (40.6) in the intervention and 6 (15) in the control)
Intervention	Description	The Mebane on the Move volunteers promoted PA through walking and running clubs in the elementary schools for children and in the community for families, Participating students in kindergarten through fifth grade run after school, learn about the components of a healthy lifestyle, and earn prizes for increasing their mileage; portable play equipment was provided to low-income families through home delivery food assistance programs, and sidewalks, crosswalks, and walking trails were installed throughout town; free community exercise programs were offered to children and adults at the recreation center.
	Duration of intervention	6-months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Walking and running.
	Parent involvement	Yes, via community exercise programms and play equipment
	Setting	School and community.
	Who delivered the intervention	Business leaders, faith communities, schools, government officials, and local health professionals trough community.
	Theoretical framework	Socioecological model.
	Control	No intervention
	Intervention fidelity	Some crosswalks and bike lanes were not installedowing to funding limitations and problems obtaining approval from the state department of transportation, and improvements to park equipment and greenery were not implemented due to funding constraints.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical activity (accelerometer ActiGraph); BMI z-score (CDC)

Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Barbeau et al. 2007
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	278 at baseline; 118 individuals in the intervention group and 83 individuals in the control group at follow-up
	Age	8-12 yrs (mean=9.5)
	Sex	Girls only
	Other characteristics	Ethnicity-black
Intertvention	Description	The intervention consisted of 30 minutes of homework time during which the subjects were provided with a healthy snack free of charge, and 80 minutes of PA. The PA component included 25 minutes of skills development (e.g., how to dribble a basketball), 35 minutes of MVPA, and 20 minutes of toning and stretching
	Sedentary time, physical activity or both	PA
	Duration of intervention	10-months
	Frequency of PA	5 time/week
	Duration of PA	400 min/week
	Intensity of PA	MVPA (175 min/week)
	Type of PA	Regular PE activities
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); %body fat (DXA); CV fitness (was assessed using a multistage treadmill test); Free-living PA (was measured using a 7-day recall)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Bhave et al. 2016

Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 schools in the intervention and control group and 1 school in the control group only
	Follow-up	Only post-intervention
	Country	India
	Period	2005/2006 – 2010/2011
Participants	Number of participants at baseline and follow-up (intervention/control)	375 individuals in the intervention group, 209 in the control group 1 and 374 in the control group 2 at baseline; 304 in the intervention group, 187 in the control group 1 and 374 in the control group 2 at follow-up
	Age	from 7-10 years until 12-15 years of age and children 12-15 years at the start of a study
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Indian; Socio-economic status-"The Symbiosis School in Pune caters to children from high socioeconomic background and has a strong academic reputation."
Intervention	Description	A 5-year multi-intervention programme, covering three domains: physical activity, diet and general health, and including increased extra- and intra-curricular physical activity sessions; daily yoga-based breathing exercises; increasing PE sessions to 6/week and making PE a 'scoring' subject; ofering attractive physical activity sessions (eg,'Bollywood dancing') during holidays; nutrition education; healthier school meals; fast-food seller were banned from outside the school gates. We aimed to introduce a health education programme about the importance of diet for health, activity and lifestyle, with weekly age-appropriate interactive 1-h sessions was introduced
	Duration of intervention	60-months
	Frequency of PA	6 times/week
	Duration of PA	240min/week
	Intensity of PA	Not specified.
	Type of PA	Daily yoga-based breathing exercises ('pranayam'), and attractive physical activity sessions. Fitness modules were introduced to PE curriculum
	Parent involvement	Parents received regular fitness reports and opportunities to discuss these individually with nutritionists and doctors
	Setting	School
	Who delivered the intervention	PE techers; nutritionist
	Theoretical framework	Not specified.

	Control	Regular school activities.
	Intervention fidelity	Neither the weekly health education sessions, nor the science modules could be sustained because of academic pressures.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); physical fitness (simple tests of strength, flexibility and endurance); diet and lifestyle indicators -time watching TV, studying and actively playing (questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Borrestad et al. 2012
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	Denmark
	Period	2010
Participants	Number of participants at baseline and follow-up (intervention/control)	26 individuals in the intervention group and 27 individuals in the control group at baseline; 24 individuals in the intervention group and 22 in the control group at follow-up
	Age	10.8+-0.7 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The cycling group was encouraged to cycle to and from school on each school day during a period of 12 weeks from March to May in 2010. The researcher primarily facilitated the intervention; however, school staff and a specialist in cycling safety and parents were also involved. The intervention programme was performed at school during school hours in group sessions every second week, resulting in a total of six group sessions. Each session lasted approximately 30 minutes. When motivating children to cycle to school we focused on raising awareness, countering passive transport, and helping parents support. Moreover, we focused on health benefits from physical activity, especially cycling, and also road safety issues, including cooperation with the Norwegian Council for Road Safety.
	Duration of intervention	12-weeks
	Frequency of PA	/
	Duration of PA	/

	Intensity of PA	/
	Type of PA	/
	Parent involvement	All parents/ guardians for the intervention group were invited to a session at baseline focusing on information and encouraging cycling to school. Furthermore, all parents/guardians for the whole study group (intervention and control group) received four letters throughout the study providing information about the study.
	Setting	School
	Who delivered the intervention	Researcher, school staff, specialist in cycling
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; Prevalence of overweight (IOTF); Cardio respiratory fitness (electronically braked cycle ergometer (Monark 839 ergomedic))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Brandstetter et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	16 schools in the intervention group and 16 schools in the control group
	Follow-up	2 months follow-up
	Country	Germany
	Period	2006-2007
Participants	Number of participants at baseline and follow-up (intervention/control)	540 individuals in the intervention group and 579 individuals in the control group at baseline; 450 individuals in the intervention group and 495 in the control group at follow-up
	Age	7.6 +-0.4 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 30% migrants
Intervention	Description	The URMEL-ICE-intervention consists of material for 1 school year including 29 teaching units (each 30–60 min), 2 short blocks of physical activity exercises a day (each 5–7 min), 6 family homework lessons (tasks that cannot be accomplished by the child himself without the help of a parent) and materials for the training and information of the parents.

	Duration of intervention	10-months (1 school year)
	Frequency of PA	2 times/day
	Duration of PA	50-70 min/week
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes, via 6 family homework
	Setting	School
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Social Cognitive Theory
	Control	Not specified
	Intervention fidelity	75% teachers implemented two thirds or more of the required 29 teaching units over the intervention school year; on average 23.1 (SD = 6.3) teaching units were used
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z score (sex-specific BMI charts for Germany); WC (measured); body fat (subscapular and triceps skinfold); frequency of consuming sugar-sweetened beverages at school and at home, frequency of playing outdoors, frequency of participating in club sport and in other sport activity and time spent watching TV on weekdays and weekends (5-point Likert scale > parental questionnaires)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Breslin et al. 2012
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	12 schools in the intervention group and 12 schools in the control group
	Follow-up	Only post-intervention
	Country	Northern Ireland
	Period	September/October 2014 - January/February 2015
Participants	Number of participants at baseline and follow-up (intervention/control)	The sample for analysis contained 416 children; divided between the intervention schools (n=209) and the control schools (n=207); Mean (and SD) physical activity and sedentary accelerometer scores in minutes per day at baseline to follow-up – intervention n= 50, control n=34
	Age	8-9 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- North Irish (Caucasian); Socio-economic status- lower socioeconomic

		backgrounds: Primary schools from areas of social and economic disadvantage were approached to participate in the study
Intervention	Description	Sport for LIFE (Sport is for Living, Integration, Fun and Education) is a 12-week physical activity and healthy eating programme. Purpose of the weekly sessions was increasing knowledge and understanding the benefits of regular participation in physical activity and sport and the importance of eating a healthy balanced diet. Each week for 1 hour, children were taught activities on the effects of physical activity on health, fun games for indoors and outdoors and nutrition The programme ended with a physical activity festival with an invited Olympic gold medal winning guest in attendance; this event was to enhance children's long term goals and motivation to be active.
	Duration of intervention	12-weeks
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	No
	Setting	School.
	Who delivered the intervention	Sports outreach officers delivered the programme in partnership with the class teacher.
	Theoretical framework	Social Cognitive Theory.
	Control	Regular school activities.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Daily MVPA in the previous week (was measured using questions from the Health Behaviour in School-Aged Children (HBSC) survey); The KIDSCREEN-27 (Ravens-Sieberer et al., 2005) is a Health Related Quality of Life (HRQoL) measure which has previously been used to assess wellbeing
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Bumaryoum, 2015
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	7 schools in the intervention group and 6 schools in the control group

	Follow-up	Only post-intervention
	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up	166 individuals in the intervention group and 88 individuals in the control group at baseline; 140 individuals in the intervention group and 76 individuals in the control group at follow-up
	Age	mean age=10.8 years
	Sex	Both boys and girls
	Other characteristics	Ethnicity: Caucasian 82.9%, American Indian 6.7%, Asian 0.6%, African American 2.4% , Mexican American 4.3%, Other 3.0%; Urban/rural: 54.6% rural
Intervention	Description	KQ program; Teen teachers taught nutrition and physical activity lessons within five schools; SNAP-ED taught the nutrition lessons in two schools; The same curriculum was taught by both SNAP-ED and TT using hands on nutrition education and physical activities. The following topics were covered in the six lessons: (1) Introduction, Label Lingo and Think Your Drink, (2) Eating Out, Portion Sizes and Snacks, (3) Fruits and Veggies, (4) Grains and Breakfast, (5) Dairy Intake, (6) Consumer Connections, Median Messages and Wrap-up. A physical activity lesson was incorporated into all six sessions.
	Duration of intervention	4-6 months
	Frequency of PA	1-2x /month
	Duration of PA	10-15 min/session
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes; via newsletters
	Setting	School
	Who delivered the intervention	Teen teachers (TT) and SNAP-ED educators
	Theoretical framework	Not specified
	Control	Regular activities, no education
	Intervention fidelity	Not reported
Outcomes		BMI cut-off (CDC); Blood pressure (OMRON Intelli Sense Digital BP Monitor); lipid levels cut-off -age specific standards set, haemoglobin - HemoCue Photometer Hb201+
Adverse outcomes		NR

Authors and year		Caballero et al. 2003
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	21 schools in the intervention group and 20 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	879 individuals in the intervention group and 825 individuals in the control group at baseline; 727 individuals in the intervention group and 682 individuals in the control group at follow-up
	Age	7.6 ± 0.6 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-American Indian; 47% of the children in the intervention school - BMI greater than the 85th percentile of the Centers for Disease Control and Prevention's reference values and 48% of children in the control school - BMI exceeded this cutoff at baseline
Intervention	Description	The intervention had 4 components: *1*) change in dietary intake, *2*) increase in physical activity, (a PE program implemented 3x/wk for 30 min and based on the SPARK (Sports, Play and Active Recreation for Kids) program plus exercise breaks of 2–10 min in the classroom) *3*) a classroom curriculum focused on healthy eating and lifestyle (two 45-min lessons were delivered by teachers each week for 12 wk) , and *4*) a family-involvement program.
	Duration of intervention	36 months
	Frequency of PA	3 times/week
	Duration of PA	90 min/week
	Intensity of PA	MPA or VPA
	Type of PA	Not specified
	Parent involvement	Yes
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Social learning theory
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (skinfold); Physical activity (measured with the use of both a motion sensor and a self-reported activity questionnaire); knowledge, attitudes, and

		behaviours related to diet and physical activity (questionnaire); Food intake during school lunch (measured by direct observation)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Cao et al. 2015
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	7 schools in the intervention group and 7 schools in the control group
	Follow-up	First follow-up at 1st year (January 2012), second at 2nd year (January 2013) and third at 3rd year (January 2014)
	Country	China
	Period	2011-2014
Participants	Number of participants at baseline and follow-up (intervention/control)	965 individuals in the intervention group and 889 individuals in the control group at baseline; 985 individuals in the intervention group and 828 in the control group at last follow-up
	Age	7 +-0.4 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Asian
Interventiom	Description	FIS-based comprehensive intervention model combined models of family- and school-based interventions and had three aspects: health knowledge, dietary behavior, and exercise behavior. Family-based PA: A strip of skipping rope provided to each student and appropriate level of physical activity at home supervised and monitored by parents. School-based PA: 20-meter music shuttle run 2–3 times per week; Ensure the participation rate of regular school physical education and extracurricular activities; More than 1-hour physical activity time each school day; Featured sports activities such as rope skipping and football. Health education: 6-hour health education course per semester. Dietary intervention: Teachers' control of eating speed for students during lunch and advice on eating less junk foods; Reducing fat content of food at canteens and making more fruits and vegetables available.
	Duration of intervention	33-months
	Frequency of PA	5 times/week

	Duration of PA	> 5 hours/week
	Intensity of PA	Not specified
	Type of PA	Shuttle run, sports activities(rope skipping and football)
	Parent involvement	Parents' participation of obesity prevention lectures. Instructions to parents about healthy eating habits of children. A strip of skipping rope provided to each student and appropriate level of physical activity at home supervised and monitored by parents. Parents' completion of "Students' Extracurricular Physical Activity Registration Form" during summer and winter vacations, including frequency, duration, intensity, and other information of physical activity.
	Setting	School, family
	Who delivered the intervention	Teachers and parents
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (WHO); prevalence of overweight and obesity (China group for obesity standards)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Centis et al. 2012
Methods and setting	Study design	Non-RCT
	Unit of allocation (child, classroom, school…)	School
	Number of clusters	7 schools
	Follow-up	3 months
	Country	Italy
	Period	2008-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	103 individuals in the intervention group and 106 in the control group at baseline; 98 in the intervention and 100 in the control group at follow-up
	Age	9.4+-0.4 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-10% migrants
Intervention	Description	The intervention in the experimental arm was extended to include three fortnightly meetings with the children during curricular hours, by experts of the Faculty of Exercise and Sports Sciences, University of Bologna, specifically

		trained in the practice of physical activity in young children. Their intervention was finalized to implement new recreational physical activities to be performed in the course of the following weeks. Children were given step counters to stimulate and measure their daily activity. The nutritional intervention consisted in a meeting to stimulate children to the correct nutritional practice of breakfast. The meeting, conducted by a physician and an expert of motivational activities, consisted in a brief theoretical lesson and an active didactics, in which every child worked with food to prepare his/her own breakfast in a funny way.
	Duration of intervention	5-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes, three motivational meetings focusing on the benefits of healthy diet and physical activity. The parents were taught about the food pyramid, correct food choices and cooking, the advantages of physical activity, and the emotional aspects of food. The parents received weekly telephone calls for the first 4 months. The telephone contact with the parents allowed continuous check of ongoing habit changes(breakfast, snacks, fruit and vegetable consumption, meals composition, and physical activity).
	Setting	School+Home
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI SDS (Italian reference); body fat (triceps skinfold); WC (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Contardo Ayala et al. 2016
Methods and setting	Study design	Non-RCT

	Unit of allocation (child, classroom, school…)	Class
	Number of clusters	1 class in the intervention group and 1 class in the control group
	Follow-up	Only post-intervention
	Country	Australia
	Period	March – October 2016 (8 months)
Participants	Number of participants at baseline and follow-up (intervention/control)	20 individuals in the intervention group and 21 individuals in the control group at baseline; Valid activPAL data were obtained from 95% of the participants who wore the monitors in both groups at baseline, and 95% in the CC and 90% in the IV at follow-up. Additionally, valid ActiGraph data was obtained from 100% of the participants who wore the monitors in the CC and 95% in the IV at baseline, and 33% and 83% at follow-up, respectively. Anthropometric measures were obtained from 100% of participants at baseline and from 90% in the CC and 95% in the IV at follow-up. The musculoskeletal pain/discomfort questionnaire was answered by 95% in the CC and 100% in the IV at baseline and from all the participants at follow-up
	Age	11-12 yrs
	Sex	Both boys and girls
	Other characteristics	Australian children
Intervention	Description	Each participant in the intervention class was provided with a manually height-adjustable workstation (LearnFit Ergotron Pty Ltd., Sydney, Australia) that allowed them to complete classwork in either a seated or standing position. Original classroom chairs were replaced with stools (Furnwear Bodyfurn Lab stool, Melbourne, Australia) high enough to allow a comfortable seated position for all participants when the desk was lowered. Prior to commencement of the intervention, a professional development session was delivered to the teacher in the intervention classroom, adapted largely from the Transform-Us! program. The pedagogical strategies recommended that extended classroom teaching blocks (of at least 60 min) be interrupted every 30 min with a two-minute guided light-intensity active break from sitting (e.g., bean-bag throwing between students while spelling/counting in a standing position). The teacher also delivered 9 key messages in the curriculum about the importance of reducing sitting and increasing physical

		activity. In addition, the teacher was asked to deliver at least one 30-min standing lesson each day.
	Duration of intervention	8-months.
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	Standing;
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	The control class followed standard pedagogical practice and retained traditional classroom furniture.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	Physical activity (Children wore an activPAL inclinometer (PAL Technologies Ltd., Glasgow, UK) at the mid-point on the front of their right thigh during waking hours for eight consecutive days and ActiGraph GT3X accelerometer (ActiGraph LLC, Pensacola, FL, USA)); Systolic and diastolic BP (measurements were taken three times on the participant's right arm using an OMRON HEM-907 automatic digital blood pressure machine with a paediatric cuff); Children's height (measured to the nearest 0.1 cm using portable stadiometers), and their body mass was measured to the nearest 0.1 kg using portable calibrated electronic scales); WC (measured); BMI (kg/m2) and WC z-scores were calculated from raw anthropometric data using Stata functions (based on Cole (1990) method) [50]. Children's BMI was categorised according to the International Obesity Task Force definition of healthy weight or overweight/obese; Questions related to the perception of musculoskeletal pain/discomfort
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Dagger et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 6 schools in the control group

	Follow-up	Post-intervention and 10 weeks post-intervention
	Country	England
	Period	2010-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	30 individuals in the intervention group and 30 individuals in the control group at baseline; 24 individuals in the intervention group and 22 in the control group at follow-up; randomly selected subsample from 314 participants
	Age	mean=10.6; range 10-12 years
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 95% white
Intervention	Description	The CHANGE! curriculum consisted of 20 weekly lesson plans worksheets, homework tasks, lesson resources, and a CD-ROM. The lessons were of 60 minutes duration and provided an opportunity for children to discuss, explore, and understand the meaning and practicalities of PA and nutrition as key elements of healthy lifestyles. The core message of the PA and sedentary behaviour components was "move more, sit less" with no specific prescription given as to what forms of PA the children should do. The nutrition components focused on topics such as, energy balance, macronutrients, and eating behaviours. The homework tasks supplemented the classroom work and targeted family involvement in food and PA related tasks
	Duration of intervention	20-weeks
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes. via homework tasks
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Social Cognitive Theory
	Control	Regular school programme
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score; WC (measured); % body fat (DXA)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		da Silva et al. 2013
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	Individuals in the intervention group from 3 public schools and individuals in the control group from 7 public schools.
	Follow-up	Only post-intervention
	Country	Brazil
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	108 individuals in the intervention group and 130 individuals in the control group at baseline; 80 individuals in the intervention group and 122 in the control group at follow-up
	Age	6-11 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – Brazilian
Intervention	Description	Two parallel activities comprised the program, one was nutritional education and the other was programmed physical activity. In addition to the activities of the intervention program, other complementary activities were developed involving students and family: a lecture on childhood obesity and two gymkhanas with games and play activities. The nutrition education occurred once a week for 50min duration. Eighteen topics were addressed and the curriculum included reinforcement activities about knowledge of food content and healthy nourishment. The content was delivered through talks, movies, ludopedagogical activities and snack preparation by the students. The students took part in extra classroom-structured physical activities twice a week (50 min each). The classes were designed by the Assistant Manager of Fitness from the Cooper Institute (Dallas, TX, USA) and were given by trained teachers. The classes were structured according to a previous plan, with severalactivities, with 10 min of warm-up, 20 min of cardiovascular activity, 15 minof muscle endurance work and 5 min of flexibility exercises.
	Duration of intervention	28-weeks
	Frequency of PA	2 times/week.
	Duration of PA	100 min/week.
	Intensity of PA	Not specified.

	Type of PA	Cardiovascular activity, muscle endurance and flexibility exercise.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Trained teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Body composition (skinfolds by means of a Lange adipometer (in the triceps area and on the calf) according to the manual for Fitnessgram/Activitygram); BMI (was evaluated using the 2007 World Health Organization growth curve as a reference); Physical activity (recall questionnaire on recorded activities for every 30 min, between 0700 and 2200 of the previous day); fitness tests: PACER—progressive aerobic cardiovascular endurance run; the push-up test evaluates strength and resistance of the upper body muscles; the curl-up test evaluates abdominal strength and resistance; the back-saver sit and reach test evaluates flexibility.
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Deborah et al. 2018
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	1 intervention school and 1 control school
	Follow-up	Post-intervention
	Country	US
	Period	2012-2013
Participants	Number of participants at baseline and follow-up (intervention/control)	There were 130 fourth-grade youth at the control school and 174 fourth-grade youth at the intervention school who participated in the study. Of these participants, 92 youth (n=38 control; n=54 intervention) wore the Polar Active monitor for at least 2 days during both pre- and post-assessments and were included in the analyses.
	Age	9-10 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – 37% of youth at the control school and 65% at the intervention school identified as non-white.

		Socio-economic status - "82% of parents at the control school and 91% at the intervention school had at least a high school degree or General Equivalency Development and household income was > $100,000 for 37% at the control school and 26% at the intervention school."
Intervention	Description	The goals of the SHCP included (1) increasing Five overlapping components comprised the SHCP: (1) nutrition education and promotion, (2) family and community partnerships, (3) supporting regional agriculture, (4) foods avail-able on the school campus, and (5) school wellness committees and policies. These components were addressed through the implementation of nutrition education, cooking demonstrations, school gardens, family newsletters, health fairs, salad bars, procurement of regional produce, and school-site wellness committees.
	Duration of intervention	9-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	via family newsletters and health fairs.
	Setting	School.
	Who delivered the intervention	UCCE nutrition educator.
	Theoretical framework	Social-ecological model.
	Control	Regular programme.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical activity (Polar Active monitors (Polar, Lake Success, NY))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		de Cruz et al. 2017
Methods and setting	Study design	Group RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	School year 2014/2015 (not exactly reported)

Participants	Number of participants at baseline and follow-up (intervention/control)	Subsample of the GOTM study sample, 150 participants with 72 individuals in the intervention group and 78 individuals in the control group
	Age	12.1+-1.03 yrs
	Sex	Only girls
	Other characteristics	Ethnicity- The majority of guardians identified the participants as Black or African American (56.3%), followed by White or Caucasian and then Multi-Racial; Socio-economic status- The majority of participants were eligible for free and reduced lunch (81.4%)
Intervention	Description	Participants in the intervention groups received a comprehensive 17- week school-based intervention aimed at increasing participants' minutes of MVPA. The intervention group participated in an after-school PA club offered three days per week for 90 minutes each day. The club offers enjoyable PA designed to provide the girls with sixty minutes of MVPA and to help them improve PA skills.
	Duration of intervention	17-weeks
	Frequency of PA	3 times/week.
	Duration of PA	270 min/week.
	Intensity of PA	MVPA (180 min).
	Type of PA	1) Fun games (e.g. tag, kickball, boot camp stations, hula hoops, jump ropes, and capture the flag); 2) dance/aerobics (e.g. dance video games projected on a large screen, Zumba and other dance fitness routines, line dances popular among girls, aerobics, and Pilates); 3) walking or sport skills (e.g. soccer, basketball, volleyball, lacrosse, running, tennis, martial arts, track, floor hockey, badminton; ultimate disc).
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Not specified.
	Theoretical framework	Not specified.
	Control	Regular school activities.
	Intervention fidelity	Participants in the GOTM afterschool program attended an average of 50.6% (26.28) of the 49-50 intervention sessions provided.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; %body fat (BIA)

Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		de Henauw et al. 2015
Methods and setting	Study design	Non-RCT
	Unit of allocation	Country with schools as the primary unit of selection; matched by size of the communities and the overall socio-demographic and socioeconomic profile of the populations
	Number of clusters	8 countries
	Follow-up	Only post-intervention
	Country	Multi- country (Sweden, Germany, Estonia, Hungary, Cyprus, Italy, Spain and Belgium)
	Period	2007-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	8482 individuals in the intervention group and 7746 individuals in the control group at baseline; 5727 individuals in the intervention group and 5314 individuals in the control group at follow-up
	Age	6.0+-0.017 yrs
	Sex	Both boys and girls
	Other characteristics	/
Instagram	Description	IDEFICS intervention programme targeted diet, physical activity and stress-related lifestyle factors. Six intervention modules were targeting the children in the school environment (aimed at improving the food environment and physical activity opportunities and at educating children on a healthy lifestyle). This included health-related physical education curricula, creation of active playgrounds and classroom education on lifestyle. One complementary module was developed specifically for involving parents in the school interventions and for guiding them in their efforts to improve their children's lifestyle. Finally, three modules were designed to enhance awareness on healthy lifestyle in the community at large, to involve the local media and to start a process of public authorities-driven short-term and long-term changes in the community environment aimed at facilitating healthy lifestyle (e.g. free access to table water in the schools, improving community facilities and infrastructure for safe outdoor playing and for cycling).
	Duration of intervention	24 months
	Frequency of PA	Not specified

	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Parents received educational folders and videos to learn about parenting strategies that can remove barriers and facilitate them in their ability to create health-promoting family environments.
	Setting	School and community
	Who delivered the intervention	Not specified
	Theoretical framework	Socio-Ecological Model;
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI SDS (IOTF); body fat (skinfolds); WHtR (measured); prevalence of overweight and obesity (IOTF)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		de Meij et.al 2011
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	9 schools in the intervention group and 10 schools in the control group
	Follow-up	Only post-intervention
	Country	Netherlands
	Period	Measurements - beginning of the school year September to October 2006 - end of the first school year May to June 2007 – end of the second school year May to June 2008; The intervention duration was 8 months in the first year (from November to June) and 9 months in the second year (September 2007 to May 2008)
Participants	Number of participants at baseline and follow-up (intervention/control)	1199 individuals in the intervention group and 1258 individuals in the control group at baseline; 1156 in the intervention group and 1207 in the control group at 8-month follow-up; 841 in the intervention group and 983 in the control group at 20-month follow-up
	Age	6-12 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-‘Dutch,’ ‘Turkish,’ ‘Moroccan’ and ‘Surinamese’ were included in the analyses as separate groups, because those ethnicities were most prevalent in the sample. The remaining

		ethnicities were coded as 'other western' or 'other non-Western.' Socio-economic status - a majority of pupils with low socio-economic status
Intervention	Description	JUMP-in incorporates policy, environmental and individual components, and involves primary schools, municipal authorities, local sport services, sports clubs and youth healthcare. Longer-term objectives are the prevention of overweight and improvement of physical fitness through increased PA levels. Components of JUMP-in programme: (1) School sports activities (Easy accessible school exercise activities are offered in or near to the school premises); (2) Pupil follow-up system (PE teacher monitors the pupils once a year, in order to stimulate pupils in a structured way in their development in the areas of sport and physical activity and in attaining the physical activity recommendation for youth); (3) The Class Moves! (Programme offers during normal lessons regular breaks for physical activity, relaxation and posture exercises); (4) Choose your Card! (Card game approach that works with assignments to be done in the class and at home. The method is especially aimed at raising awareness on the importance of physical activity for health and one's own physical activity behaviour, self-efficacy, social support, planning skills, of both the children and their parents; (5) Parental information service (The importance of physical activity and sports for children and the role played by parents in supporting and stimulating such activity among their children is emphasized.); (6) Activity-week (In the Activity-week some components of JUMP-in are brought together. Parents play an important role in this week.); (7) Children who have motor and movement disabilities or who experience hampering factors in their PA behaviour (such as overweight), receive additional adapted physical education lessons (Club Extra) or motor remedial teaching. If necessary, parents of overweight or obese children receive an invitation for consultation from the youth healthcare or hospital.
	Duration of intervention	10-months (one school year)
	Frequency of PA	Offered on daily basis. Participation not reported
	Duration of PA	Not specified.

	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Information meetings, courses and sports activities for parents.
	Setting	School
	Who delivered the intervention	Not specified.
	Theoretical framework	Precede Proceed model; The Intervention Mapping protocol
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; Daily physical activity (Actigraph accelerometer (Actigraph 7164 or Actigraph GT1M)); Sports participation (assessed in a personal intervju); Weight status was divided into normal weight, overweight and obesity (based on internationally acknowledged BMI cut-off points for children as defined by Cole et al); waist and hip circumference (measured); Aerobic fitness (shuttle run test (SRT) – 18 m instead of 20 m)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Donnelly et al. 1996
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 schools in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	1992-1994
Participants	Number of participants at baseline and follow-up (intervention/control)	236 individuals in the intervention group and 102 individuals in the control group at baseline; 44 individuals in the intervention group and 64 in the control group with laboratory data
	Age	9.2+-1.0 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 94% white; Socio-economic status- 44% free or reduced lunch; body fat baseline- > subjects with 22% or greater body fat- 11 in the intervention group and 25 in the control group
Intervention	Description	Project was designed to provide a nutrition and physical activity intervention for grade

		school children to reduce obesity and improve physical and metabolic fitness. Existing classroom teachers delivered activities designed to promote energy expenditure. Activities were designed to use large muscle groups for 30 to 40 minutes, 3 days per week. Aerobic activities that can be easily incorporated into the individuals lifestyle were emphasized at the expense of competitive games. Activities such as hopping, skipping, and aerobic games are examples of activities Nutrition education was delivered in modules using trained, classroom teachers. Eighteen grade-specific modules (9 per year) were developed. Meals were planned with the existing kitchen staff to reflect the Lunchpower! program.
	Duration of intervention	24-months
	Frequency of PA	3 times/week
	Duration of PA	90-120 min/week
	Intensity of PA	Not specified
	Type of PA	Hopping, skipping, and aerobic game
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Not specified
	Control	Regular school PA programme
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; %body fat (underwater weighing); The level of physical activity in the classroom (SOFIT procedure); peak aerobic Capacity (the subject walked to volitional exhaustion on a motor-driven treadmill); blood samples (enzymatic methods in kits provided by Sigma Diagnostics); Systolic and diastolic blood pressure (was measured after a 5-minute rest using appropriate size cuffs for children such that the rubber bladder encircled at least two-thirds of the arm); Twenty-four-hour energy intake (intervju)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Drummy et al. 2016

Methods and setting	Study design	Cluster RCT
	Unit of allocation	Classroom
	Number of clusters	7 classes in the intervention group and 7 classed in the control group
	Follow-up	Only post-intervention
	Country	Northern Ireland
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	120 at baseline; 54 in the intervention group and 53 in the control group at follow-up
	Age	9-10 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The teachers in the intervention group were asked to lead a 5-min activity break three times per day for 12 weeks. The researcher met with teachers and principals prior to the beginning of the study to provide information packs on the activity breaks which included detailed instructions for approximately 40 exercises.
	Duration of intervention	12-weeks
	Frequency of PA	15 times/week
	Duration of PA	75 min/week
	Intensity of PA	MVPA
	Type of PA	Hopping, jumping and running on the spot, scissor kicks.
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; Body fat % (sum of 4 skinfolds); Physical activity (Actigraph accelerometer)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Dzewaltowski et al. 2010
Methods and setting	Study design	RCT
	Unit of allocation	School

	Number of clusters	4 schools in the intervention group and 3 schools in the control group
	Follow-up	Post-intervention
	Country	US
	Period	2005-2006 baseline assessment; intervention year 1 2006-2007; intervention year 2 2007-2008
Participants	Number of participants at baseline and follow-up (intervention/control)	148 individuals in the intervention group and 125 individuals in the control group at baseline; 134 individuals in the intervention group and 112 individuals in the control group at follow-up
	Age	Approximately 9 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - "American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latino, Native Hawaiian/Pacific Islander, White, Other"
Intervention	Description	The HOP'N intervention was designed to target the development of the skills and efficacy of adult leaders and children to build healthy after school environments. The after-school program at each site was approximately 2.5 hours per day. The quality elements included an organized daily PA session for at least 30minutes, a daily healthful snack that included a FV, and a weekly nutrition and PA education experience. 1) Every day, staff had the goal to implement 30 minutes of organized PA following the CATCH Kids Club PA principles. The project provided the CATCH Kids Club curriculum box and PA equipment. The CKC physical activity box included a variety of activities including warm-ups, main activities (walk/run/jog and aerobic recreation games) and cool-downs. CKC physical activities underscored simple generalisable skills such as gross motor movement (throwing, catching and kicking) and large muscle movement, while heavily emphasising student enjoyment. 2) After-school program staff was directed to work with their school's food service to provide FV with every snack. 3) a weekly social-cognitive-theory based curriculum was delivered for 60 minutes once a week. Child behavioral goals were: Be physically active every day; eat FV at every meal or snack; drink less soda and juice drinks; and cut back on TV and video games
	Duration of intervention	12-months
	Frequency of PA	5 times/week
	Duration of PA	150 min
	Intensity of PA	Not specified
	Type of PA	Not specified

	Parent involvement	Yes. They participate in signing home environment change contract with their kids
	Setting	School and home
	Who delivered the intervention	After-school staff and extension assistant
	Theoretical framework	Social Cognitive Theory
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (CDC); BMI; PA (was assessed during afterschool programs with ActiGraph GT1 M accelerometers (Shalimar, FL))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Erfle et al. 2015
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	30 schools in the intervention group and 9 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2009-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	9722 individuals in the intervention group and 4881 in the control group at baseline; 6693 in the intervention group and 3513 in the control group at follow-up
	Age	11-14 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The intervention group propose and implement its own PE program to implement 30 minutes of daily PE throughout 1 academic year (September 2009 to June 2010), and to conduct pre- and post-assessments during this time period (fall 2009 and spring 2010). The control group maintained its normal schedule of nondaily PE throughout 1 academic year (September 2010 to June 2011) and was provided with funding from Active Living Research to conduct pre- and post-assessments during this time period (fall 2010 and spring 2011).
	Sedentary time, physical activity or both	PA
	Duration of intervention	10-months

	Frequency of PA	5 times/week
	Duration of PA	150 min/week
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time.	BMI; BMI percentile (CDC); physical activity (mile run, curl-ups, and push-ups)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Ermetici et al. 2016
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 3 schools in the control group
	Follow-up	At half time during intervention and post-intervention
	Country	Italy
	Period	2009-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	262 individuals in the intervention group and 225 individuals in the control group at baseline; 242 individuals in the intervention group and 220 individuals in the control group at follow-up
	Age	12.5+-0.4 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-95% white; Socio-economic status-average income of the households was about 35,000 euros; The parental educational levels included mainly middle-school and high-school certificates.
Intervention	Description	Intervention included changes in the school environment (alternative healthy vending machines, educational posters) and individual reinforcement tools (school lessons, textbook, text messages, pedometers, re-usable water bottles). All traditional vending machines were replaced with

		machines containing healthy foods and beverages, including fresh fruit and vegetables, dried fruit, fruit juices, smoothies without added sugar, and drinkable yogurt, all from local farms, carefully evaluated by our expert nutritionist team. Educational posters adapted from The Healthy Eating Plate conveying messages promoting healthy diet, water consumption, and daily exercise were posted in schools. The schools were asked to create more opportunities for exercise during breaks. Pupils were allowed to leave their classrooms and walk in the corridors or outdoor play areas or a total of one additional hour a week.
	Duration of intervention	24-months
	Frequency of PA	Not specified
	Duration of PA	60min/week
	Intensity of PA	Not specified
	Type of PA	Walking, free play
	Parent involvement	Automated text messages promoting a healthy diet and daily exercise were sent to the students and their parents three times a week throughout the two school years including school vacations.
	Setting	School
	Who delivered the intervention	Expert nutritionists
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (CDC); WHtR (measured); physical activity (questionnaire and pedometer); food and beverages consumption (questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Eyre et al. 2016
Methods and setting	Study design	Non-RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	6 weeks follow-up post-intervention
	Country	UK
	Period	March – July 2013
Participants	Number of participants at baseline and follow-up (intervention/control)	94 individuals in the intervention group and 40 individuals in the control group; 55 individuals in

		the intervention group and 30 individuals in the control group at follow-up
	Age	mean age 9.48, SD = 0.62 years (intervention group); mean age 11.12 years, SD = 0.32 years (control group)
	Sex	Both boys and girls
	Other characteristics	Ethnicity - "Indian, Pakistani, and Bangladeshi"; Socio-economic status - "The school 4th school within the most deprived ward (index of multiple deprivation score = 5.57) of Coventry (Coventry City Council, 2010; Department for Communities and Local Government, 2010) was recruited via cluster sampling at ward and school level."
Intervention	Description	The intervention group undertook a 6-week, school-based pedometer intervention using an integrated curriculum model. There were two stages to this intervention; the first stage was designed to increase PA through increasing opportunities to be active throughout the school day by using a pedometer challenge which was linked to the curriculum. The children were challenged to achieve total daily steps of 18,000. To increase adherence to the pedometer challenge, each child was taught to skip (15 minute lesson) and provided with a personal skipping rope. This was included to encourage free play at school and outside of school. Additionally, afterschool activity sessions were held with a shorter duration (45 minutes), once a week: Warm up (5 minutes); Plyometric and skill drillcircuits (15 minutes); Playground games (15 minutes); Cool down (5 minutes); Secondly, the curriculum was modified, topics in Science (i.e. 'keeping healthy' (Year 5) and 'journeys' (Year 4)), were developed and delivered to varied education/ability needs. A themed health week was held, where all subject lessons related to the theme.
	Duration of intervention	6-weeks.
	Frequency of PA	1 time/week.
	Duration of PA	45 min/week.
	Intensity of PA	Not specified.
	Type of PA	Rope skipping in free play. Athletics, games, dance, gymnastics in PE.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Teachers and research staff.
	Theoretical framework	Integrated curriculum model.

	Control	Regular school programme.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI-for-age and sex (was assessed as kg/m2 based on British reference curves 1990 for children and young people); %body fat (BIA); physical activity (pedometers); WC (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Fairclough et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 6 schools in the control group
	Follow-up	Post-intervention and 10 weeks post-intervention
	Country	England
	Period	November 2010- March/April 2011
Participants	Number of participants at baseline and follow-up (intervention/control)	318 children from Wigan Borough in north-west England, UK 166 individuals in the intervention group and 152 individuals in the control group at baseline; 104 individuals in the intervention group and 117 in the control group at follow-up
	Age	10-11 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- Caucasian (Approximately 95% of the children were of white British ethnicity, which is representative of the school age population in Wigan; Socio-economic status- area of high deprivation and health inequalities
Intervention	Description	The CHANGE! curriculum consisted of 20 weekly lesson plans worksheets, homework tasks, lesson resources, and a CD-ROM. The lessons were of 60 minutes duration and provided an opportunity for children to discuss, explore, and understand the meaning and practicalities of PA and nutrition as key elements of healthy lifestyles. The core message of the PA and sedentary behaviour components was “move more, sit less” with no specific prescription given as to what forms of PA the children should do. The nutrition components focused on topics such as, energy balance, macronutrients, and eating behaviours. The homework tasks supplemented the classroom work and

		targeted family involvement in food and PA related tasks
	Duration of intervention	20-weeks
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes. via homework tasks
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Social Cognitive Theory
	Control	Regular school programme
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); physical activity (objectively assessed for 7 consecutive days using ActiGraph GT1M accelerometers); food intake (24 hour recall food intake questionnaire); BMI cut-points (IOTF)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Farias et al. 2009
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 in the intervention group and 1 in the control group
	Follow-up	Only post-intervention
	Country	Brazil
	Period	2006-2007
Participants	Number of participants at baseline and follow-up (intervention/control)	186 individuals in the intervention group and 197 individuals in the control group at baseline and at follow-up
	Age	12.3+-1.1 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status- 7,5% low SES
Intervention	Description	Both groups were submitted to two 60-minute physical education classes per week, totaling 68 classes during the school year. Control group students performed physical activities considered routine in the school. Meanwhile, case group students were submitted to programmed physical activity, with the maximum heart rate (HRmax) of each student monitored by the heart rate monitors.
	Duration of intervention	10-months (one school year).
	Frequency of PA	2 times/week.

	Duration of PA	120 min/week.
	Intensity of PA	Initially, the case group performed light intensity physical activities, with 40 to 55% HRmax, for a maximum period of 1/3 of the study, time needed to allow it to jump to 55 to 75% HRmax.
	Type of PA	Classes consisted of three sections: first, aerobic activity (flexibility exercises, jumping rope, walking, alternating running, jumping in continuous rhythm, recreational games) for 30 minutes; second, playing sports (volleyball, indoor soccer, handball, swimming) for 20 minutes; and, third, stretching for 10 minutes.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Not specified.
	Theoretical framework	Not specified.
	Control	Control group students performed physical activities considered routine in the school, such as playing games, calisthenics, learning the fundamentals of particular sports, and playing sports.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; body fat (triceps and subscapular skinfolds); %BF (Slaughter); Fat and lean masses (kg) (using the formula from Behnke e Wilmore); obesity prevalence (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Farmer et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	8 schools in the intervention group and 8 schools in the control group
	Follow-up	Post-intervention and 1 year post-intervention
	Country	New Zeland
	Period	Baseline data - March to December 2011 and 2-year data collection was completed in December 2013.
Participants	Number of participants at baseline and follow-up (intervention/control)	418 individuals in the intervention group and 422 individuals in the control group at baseline; 391 individuals in the intervention and 369 individuals in the control at Year 1; 344 individuals in the intervention and 325 in the control at Year 2
	Age	2nd and 4th grade children

	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The researchers, playworker and school community worked together to develop a playground action plan that met the needs of each school community. Following baseline evaluations of their play space, each intervention school was provided with a list of tailored suggestions for improvements. This was specific to each school but could include the addition of more interactive play equipment, and alterations to school rules and policies that may limit risk-taking during play (for example, no tree climbing, separation of older and younger children into physically separate play areas), with all alterations meeting playground safety standards. Although intervention schools were provided with initial start-up funds of NZD$15 000, the majority of recommendations involved no to little cost, such as leaving trees that had been cut down in pieces or letting the grass grow long to encourage imaginative play, re-purposing real-estate signs for sledding down hills, purchase of raincoats and gumboots to allow outside play when wet, and using plastic piping and sand for water play.
	Duration of intervention	14-15 months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	No
	Setting	School.
	Who delivered the intervention	Researchers, playworker and school community.
	Theoretical framework	Not specified.
	Control	Control schools were asked not to change their play environment.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); BMI z-score (WHO); Physical activity (accelerometer (ActiGraph GT3X, Actigraph Corp, Pensacola, FL, USA) 24 h a day for 7 days)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Ford et al. 2013

Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Post-intervention and 15 weeks after
	Country	England
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	174 at baseline; 77 individuals in the intervention group and 75 individuals in the control group at follow –up
	Age	5-11 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The walkers took part in the accumulated brisk walking programme during school time, which involved walking at a brisk intensity around the school grounds for 15 min in the morning and afternoon. The morning and afternoon walking session began at the start of the school day and immediately after the lunch break, respectively. Participants were led around the school field.
	Duration of intervention	15-weeks
	Frequency of PA	3 times/week
	Duration of PA	90 min/week
	Intensity of PA	MPA
	Type of PA	Walking at a brisk intensity
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teaching assistants and the principal investigator
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (BOD POD, skinfolds)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Foster et al. 2008
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	Schools in the intervention group and 5 schools in the control group
	Follow-up	Only post-intervention

	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	749 individuals in the intervention group and 600 individuals in the control group at baseline; 479 individuals in the intervention group and 365 individuals in the control group at follow-up
	Age	11.2+-1.0 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-44%black,17%Asian,22%Hispanic,11%white; Socio-economic status-schools that had >50% of children eligible for federally subsidized, free, or reduced-price meals; 40 % OW or OB, 25% OB at baseline
Intervention	Description	The study included the following components: (1) school self-assessment; (2) nutrition education; (3) nutrition policy; (4) social marketing; and (5) parent outreach. All of the school staff in the intervention schools were offered 10 hours per year of training in nutrition education. At these trainings, staff received curricula and supporting materials such as Planet Health and Know Your Body. The goal was to provide 50 hours of food and nutrition education per student per school year. Its purpose was to show how food choices and physical activity are tied to personal behavior, individual health, and the environment. In each of the intervention schools, all sodas, sweetened drinks, and snacks that did not meet the standards set by the were removed from the vending machines and the cafeteria line.
	Duration of intervention	24-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes, via home and school association meetings, report card nights, parent education meetings, and weekly nutrition workshop
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Regular school activites
	Intervention fidelity	Teachers provided an average (SD)of 48.0 (27.1) and 44.0 (18.3) hours of nutrition education during each year of the intervention.
Outcomes	State the outcome and the method of assessment	BMI; BMI z –score (CDC); overweight and obesity incidence (Institute of medicine); dietary intake (Youth/Adolescent Questionnaire); Physical

	weight related outcomes, PA, fitness, sedentary time	activity and sedentary behaviour, specifically television viewing (measured by the Youth/Adolescent Activity Questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Fritz et al. 2016
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 3 schools in the control group
	Follow-up	Children were followed in the intervention group with school start 1998 and 1999 with annual follow-up measurements for the following 5 years while the children with school start 2000 had their second measurement done after 3 years and then additional measurements after 4 and 5 years, respectively. Children in the control group had their second measurement done after 2 years and then additional measurements after 3, 4 and 5 years, respectively
	Country	Sweden
	Period	Children who started the intervention school 1998–2000; children who started the control schools 1999–2000; We then followed children in the intervention group with school start 1998 and 1999 with annual follow-up measurements for the following 5 years while the children with school start 2000 had their second measurement done after 3 years and then additional measurements after 4 and 5 years, respectively. Children in the control group had their second measurement done after 2 years and then additional measurements after 3, 4 and 5 years, respectively
Participants	Number of participants at baseline and follow-up (intervention/control)	807 individuals in the intervention group and 1580 individuals in the control group at baseline; 743 individuals in the intervention group and 1538 individuals in the control group at follow-up
	Age	6-9 yrs at the start of the study
	Sex	Both boys and girls
	Other characteristics	Ethnicity - Swedish (Caucasian)
Intervention	Type	Extra hours of PE.
	Description	In the intervention school the amount of physical education (PE) in the school curriculum was increased from 60 minutes

		PE/week to 40 minutes/school day (200 minutes per week) for three years. The intervention consisted of a variety of activities such as jumping, running, playing and ball games, i.e. the regular Swedish school curriculum for PE but with an extended duration.
	Duration of intervention	36-months
	Frequency of PA	Every school day. 5 times/week.
	Duration of PA	200 min/week.
	Intensity of PA	Not specified.
	Type of PA	Variety of activities such as jumping, running, playing and ball games
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Classroom teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities (Regular PE 60 min/week).
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI: Muscle strength (Two physiotherapists performed lower limb concentric isokinetic Peak Torque (PT) measurements using Biodex System); Leg lean and fat mass (DXA); Lifestyle and physical activity habits (a non-validated questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Gallota et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	3 schools-16 classes
	Follow-up	Only post-intervention
	Country	Italy
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	78 individuals in the experimental group 1, 83 individuals in the experimental group 2, 69 individuals in the control group
	Age	8-11 yrs
	Sex	Both boys and girls
	Other characteristics	Overweight prevalence- 21 overweight/obese children in experimental group 1, 20 in the experimental group 2 and 12 in the control group at baseline
Intervention	Description	Changes to PE content were introduced. Two programs differed in type and mode of physical

		activities in which children were engaged but they were equivalent in structure, overall duration and intensity, and consisted of two 1 h sessions per week. The exercise intensity of both programs was monitored using an OMNI scale (Utter et al., 2002) to avoid possible differences in intensity between the two types interventions. Each lesson of both interventions included 15 min of warm-up, 35 min of moderate-to-vigorous physical activities (MVPA) within a range of 5 < RPE < 8 (OMNI RPE scale) and 10 min of cool down and stretching. The nutritional intervention was based on the nutritional program ``European School Fruit Scheme'' of the European Commission of Agriculture and Rural Development. The intervention consisted of topics like fruit and vegetables characteristics, nutritional values, biodiversity, seasonality, and territoriality. The topics were taught monthly through methodologies that are linked to children's system of learning (short lectures/talks, games and sensory workshops). In addition, a properly trained staff provided one free piece of fresh fruit (or vegetable) to children each school week, as a snack at mid-morning or mid-afternoon break. Every child consumed fruits or vegetables at least 36 times during the program, and at least ten different kinds of fruit or vegetable.
	Duration of intervention	5-months
	Frequency of PA	2 times/week
	Duration of PA	60 min/week
	Intensity of PA	MVPA
	Type of PA	Intervention 1: endurance, strength, flexibility exercises and circuit training for cardiovascular health (e.g., fast walking, running, skipping). Intervention 2: coordination and dexterity of the participants (e.g., bouncing, throwing, and/or receiving a ball). The sport-games module: handball, mini-volleyball, mini-basketball). The rhythmic activities module: rhythmic and time perception abilities. The gymnastics module: general movement development. The fitness activities module: strength, endurance, speed and flexibility.
	Parent involvement	An information campaign targeted at parents was conducted by producing and distributing

		informative material and by creating a specific web site section
	Setting	School
	Who delivered the intervention	Specialist PE teacher + generalist teacher
	Theoretical framework	Not Specified
	Control	Regular PE program delivered by a generalist teacher
	Intervention fidelity	Not Specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (IOTF); body fat (BIA); physical activity leve (Italian version of the Physical Activity Questionnaire for Older Children (PAQ-C)); sedentary time (parental proxy intervju); eating habits (7-day diet record)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Gorely et al. 2011
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 4 schools in the control group
	Follow-up	10 and 20 months post-intervention (IG); 8 and 18 months post-intervention (CG)
	Country	UK
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	310 individuals in the intervention group and 279 individuals in the control group at baseline; 206 individuals in the intervention group and 215 individuals in the control group at follow-up
	Age	7-11 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - The majority of participants were of white British ethnicity (intervention 94.8%, control 96.5%). Socio-economic status - intervention group being of lower socio-economic status than the control group when measured by the IMD for the postcode defined ward in which each participant resided. These differences were paralleled in household income with income in intervention schools being significantly lower (it is worth noting though that over 50% of parents chose not to supply this information)
Intervention	Description	The programme aimed to increase children's activity levels through PE lessons that taught the skills of running.

		Healthy food choices were explained and encouraged in a holistic approach to children's health education. The programme was multifaceted and comprised: 1. a CD-rom learning and teaching resource for teachers; 2. two highlight events (1 mile run/walks) to give the children a goal for increasing their physical activity; 3. an interactive website for pupils, teachers and parents to raise awareness of the need for physical activity and healthy eating; 4. a local media campaign employing regional radio and print media to maintain interest and create excitement; 5. a summer activity wall planner and record.
	Duration of intervention	10 months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Running/walking events
	Parent involvement	Yes, homework tasks (activity planner)
	Setting	School
	Who delivered the intervention	School teachers
	Theoretical framework	Social Cognitive Theory
	Control	Regular PE and health curriculum
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (Subscapular and triceps skinfold); WC (measured); Physical activity (Digiwalker SW200 pedometer, 50% of children also wore an ActiGraph GT1M accelerometer)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Graf et al. 2008
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	12 schools in the intervention group and 5 schools in the control group
	Follow-up	Only post intervention
	Country	Germany
	Period	2001-2005
Participants	Number of participants at baseline and follow-up (intervention/control)	433 individuals in the intervention group and 178 individuals in the control group at baseline; 410 individuals in the intervention group and 170 in the control group at follow-up
	Age	6.8+-0.4 yrs
	Sex	Both boys and girls

	Other characteristics	/
Intervention	Description	One education lesson per week (20–30 min) provided by teachers.The main topics of the health education dealt with biological background, nutrition, and self-management. Additionally, physical activity breaks (5 min each) should be allowed during lessons once a morning. Furthermore, pupils were given physical activity opportunities during breaks and their physical education lessons were optimized by training the teachers
	Duration of intervention	48-months
	Frequency of PA	5 times/week
	Duration of PA	25 min/week
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	via brochures and parent-teacher meetings
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Combination of the Theory of Planned Behaviour and the Precaution Adoption Process Model.
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; Obesity (was defined as body mass index 97th percentile, using the definition of the International Task Force on Obesity in Childhood and population-specific dana); endurance performance (Six-minute run); motor development (body coordination test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Grydel et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	12 schools in the intervention group and 25 schools in the control group
	Follow-up	Only post-intervention
	Country	Norway
	Period	The data collections took place at each school in September 2007 (baseline) and in May 2009 (post-intervention)
Participants	Number of participants at baseline and follow-up (intervention/control)	527 individuals in the intervention group and 958 individuals in the control group at baseline; 491 in the intervention group and 870 in the control group at 20-month follow-up

	Age	11.2+-0.3 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Multiple intervention efforts were orchestrated to promote a healthy diet and to increase awareness of healthy choices, to increase participants' physical activity during school hours and leisure time, and to reduce screen-time: (A) Lessons with student booklet:1. Diet and physical activity, 2. Meals, 3. 5 a day, 4. Sugar-rich beverages, 5. Your choice - monthly; (B) Posters for classrooms: Key messages, A4-size, placed on a larger 'frame-poster' including the HEIA logo – monthly; (C) Fruit and vegetable (FV) break: Cutting equipment per class provided,students brought FV – weekly (D) Physical activity (PA) break:10 min of PA conducted in regular classrooms – weekly; (E) Sports equipment for recess activities:1–2 large boxes per school. Examples of content: Frisbees, jump-ropes, elastic bands,hockey-sticks, a variety of ball – available daily; (F) Active commuting campaigns:Register days with active transport to/from school for 3 weeks (5 campaigns); (G) One class-set per school to be used in PE(SPARK), as tasks at school, as homeassignment and active commuting; (H) Computer tailored individual advice:1. Fruit, 2. Vegetables, 3. Physical activity, 4. Screen time, 5. Sugar sweetened beverages + 1-week action plans for each topic (instruction on what, where and when to dothe suggestions for behaviour change)
	Duration of intervention	10-months (one school year)
	Frequency of PA	1 day/week.
	Duration of PA	10 min/week
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Yes, through fact sheets and brochures. Participation in practical tasks/challenges for leisure time/weekends.
	Setting	School (class), home,
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Socio-ecological model
	Control	Not specified.
	Intervention fidelity	„Unpublished process evaluation data indicate that the level of implementation of the components decreased frommidway to

		postintervention, thus reducing both the reach and dose received by the participants“
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (WHO); WC (measured); waist-to-height ratio - WTHR (measured); pubertal status (self-reported and parental education was self-reported by the parents)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Habib Mourad. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 4 schools in the control group
	Follow-up	3 weeks post-intervention
	Country	Lebanon
	Period	2009-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	193 individuals in the intervention group and 181 individuals in the control group at baseline; 188 individuals in the intervention group and 175 in the control group at follow-up
	Age	9-11 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Arab; OW+OB>40% at baseline
Intervention	Type	Lifestyle curriculum.
	Description	‘Health-E-PALS’ had three coordinated intervention components: 1) Culturally appropriate classroom sessions designed to promote healthy eating and physical activity. (The 45 minute sessions were delivered each week for 12 weeks.) Pedometers were distributed to students and they were instructed on method of use. They were encouraged to use it at home with their families. 2) A family programme which introduces the intervention to families and assists them in creating a supportive environment at home for healthy lifestyle behaviours. (Parents meetings, School events, Take home pamphlets. Frequency not specified). 3) A food service intervention targeting the school shop and the lunch boxes sent by the family.
	Sedentary time, physical activity or both	Both.
	Duration of intervention	12-weeks

	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes. parent meetings, School events and Take home pamphlets
	Setting	School.
	Who delivered the intervention	Nutritionists.
	Theoretical framework	Social Cognitive Theory.
	Control	Regular school activities.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); dietary, physical activity, and sedentary behaviour habits (questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Hamelink-Baksteen et al. 2008
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	8 schools in the intervention group and 1 schools in the control group
	Follow-up	Only post-intervention
	Country	Netherlands
	Period	2005-2007
Participants	Number of participants at baseline and follow-up (intervention/control)	393 individuals in the intervention group and 80 individuals in the control group at baseline; 349 individuals in the intervention group and 77 individuals in the control group at follow-up
	Age	2nd and 6th grade
	Sex	Both boys and girls
	Other characteristics	12% OW at baseline
Intervention	Description	Program consisted of 6 parts. 1. Healthy food consumption carried by teachers. The children eat fruit and vegetables in the classroom for two days a week. 2. Health education curriculum for prevention of overweight (5 weeks program about breakfast, snacks and exercise). 3. Curriculum that promote sport and healthy lifestyle (3-week program, conducted by the teacher, tries to make children enthusiastic about an active lifestyle and a sport choice that suits them)

		4. The 'Shop Game' was an educational information tool, also carried out by the teacher, and consists of a recreated supermarket for children. 5. Members of the multidisciplinary project team organized "Healthy on Weight information evenings for parents and teachers. 6. The weight management course "Okido! a secondary preventive intervention of 9 weeks. This is intended for overweight children from 9 to 12 years old and their parents. The course consisted of dietary guidance and exercise instruction
	Duration of intervention	Not specified
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes, education evenings about healthy lifestyle and weight.
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Regular school programme
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; overweight and obesity prevalence (IOTF)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Harrick et al. 2012
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	3 schools in the intervention group and 3 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2009
Participants	Number of participants at baseline and follow-up (intervention/control)	48 individuals in the intervention group and 52 individuals in the control group at baseline and 47 individuals in the intervention group and 51 individuals in the control group at follow-up
	Age	10.3+-0.6 yrs

	Sex	Both boys and girls
	Other characteristics	Ethnicity- Asian 50%, Latino 27%, white 4%, black 4%; socio-economic status- 60% free or reduced lunch
Intervention	Description	SPARK program consists of 3 primary features: an active curriculum, staff development, and follow-up support. A typical SPARK lesson lasted 30 minutes and had two parts: health-fitness activities (15 minutes) and skill-fitness activities (15 minutes). Ten health-related activity units included aerobic dance, aerobic games, walking/jogging, and jump rope. Progression was developed by modifying the intensity, duration, and complexity of the activities. Although the main focus was on developing cardiovascular endurance, brief activities to develop abdominal and upper body strength were included. To enhance motivation, students self-assessed and recorded their own fitness levels monthly. Nine sport units that developed skill-related fitness included basketball and soccer. These sports and games had the potential for promoting cardiovascular fitness and generalizing to the child's community (e.g., Frisbee games). Low activity games, such as softball, were modified to make them more active.
	Duration of intervention	5-months
	Frequency of PA	5 times/week
	Duration of PA	150 min/week
	Intensity of PA	Not specified
	Type of PA	Basketball, soccer, aerobic dance, aerobic games, walking/jogging, and jump rope.
	Parent involvement	No
	Setting	School
	Who delivered the intervention	After-school physical activity coordinator
	Theoretical framework	Not specified
	Control	Regular school programme
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (CDC); Cardiorespiratory fitness (VO2) (validated 20-m shuttle test); Physical activity (uniaxial GT1M accelerometer (Actigraph, LLC, Fort Walton Beach, FL))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Harrison et al. 2006
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 4schools in the control group
	Follow-up	Only post-intervention
	Country	Ireland
	Period	2003
Participants	Number of participants at baseline and follow-up (intervention/control)	182 individuals in the intervention group and 130 individuals in the control group at baseline; 91% successfully followed up post intervention
	Age	10.2±0.7 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status- all schools were in areas of greatest social disadvantage
Intervention	Description	Children were taught how to use an 'activity points system' in conjunction with a project diary to keep track of the time spent inactive and screen pursuits. One point was awarded for every 5 min of physical activity with one point deducted for every 15 min of screen time. An explanation of the system was placed on a poster in every classroom
	Duration of intervention	16-weeks
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	The diaries formed part of the child's homework and were signed by parents. Parents were encouraged in writing to support children in their attempts to switch off and get active and to verify behaviour by signing diaries.
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Social Cognitive Theory
	Control	Control schools did not receive the 'Switch Off—Get Active' intervention but were promised first refusal should the intervention be extended to the rest of the health authority region.
	Intervention fidelity	The programme was implemented with fidelity in all schools. Implementation was verified by checking completed workbooks

		(evidence of lesson delivery) and pupil diaries (evidence of continuous self-monitoring and goal setting).
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; Physical activity and screen time (measured using the 1-day Previous Day Physical Activity Recall (PDPAR) instrument validated with this age group); Physical activity self-efficacy (previously validated instrument, with minor modifications-this tool contained 10 Likert-type statements with a three-category response to each); prevalence of overweight (International Obesity Task Force definitions); Aerobic fitness (20 m shuttle test).
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Hatzis et al. 2010
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	24 schools in the intervention group and 16 schools in the control group
	Follow-up	Re-evaluation of the program was performed at 3, 6 and 10 years after its initiation
	Country	Greece
	Period	1992-1998
Participants	Number of participants at baseline and follow-up (intervention/control)	602 individuals in the intervention group and 444 individuals in the control group at baseline; 331 individuals in the intervention group and 303 individuals in the control group at follow-up (around 550 analysed depending on outcome)
	Age	6.3+-0.4 yrs
	Sex	Both boys and girls
	Other characteristics	50% urban, 50% rural
Intervention	Description	The health and nutritional components of the program were conducted by classroom teachers and incorporated 13 to 17 h of teaching over the academic year. The physical fitness and activity component of the program included practical sessions as well as classroom sessions (4 to 6 h of classroom material per year). The practical part was delivered in the playground where enjoyable, fitness oriented (rather than motor-oriented). Little attention was placed on competition and verbal rewards were given for all levels of effort and ability.

		When weather conditions did not permit outdoor physical activity sessions, the time was devoted to indoor health education intervention activities. Also, three to five workbook exercises per year were completed at home by pupils together with their parents.
	Duration of intervention	36-months
	Frequency of PA	2 time/week
	Duration of PA	90 min/week
	Intensity of PA	MPA
	Type of PA	All sessions consisted of a short initial warm-up period with stretching exercises, followed by activities such as skipping, fitness stations, and several aerobic group games.
	Parent involvement	Pupils together with their parents completed Three to five workbook exercises per year at home. Furthermore, parents were encouraged to modify their own dietary habits, where appropriate, in addition to those of their children.
	Setting	School
	Who delivered the intervention	Classroom teachers, PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; %body fat (skinfolds); WC (measured); Diet (was analyzed using an electronic food database, based on the USDA food database and chemical analyses of 120 Greek foods undertaken by the Wageningen Agricultural University and TNO Voeding in the Netherlands); Systolic and diastolic blood pressure (measured); Biochemical measurements; Physical fitness (endurance 20-m shuttle run test (20mSRT) as described by the EUROFIT Tests Protocol)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Have et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 6 schools in the control group
	Follow-up	Only post-intervention
	Country	Denmark
	Period	2012-2013

Participants	Number of participants at baseline and follow-up (intervention/control)	294 individuals in the intervention group and 211 individuals in the control group at baseline; 268 individuals in the intervention group and 182 individuals in the control group – drop out rate: 8.8% in the intervention group and 13.7% in the control group at follow-up
	Age	7.2±0.3 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The intervention group received classroom-based PA incorporated into math lessons for one school year. Subjects in the intervention group received an average of 6 math lessons of 45 minutes per week during the intervention. Each 45-minute lesson consisted of at least 15 minutes of PA spread over the lesson, and sedentary activities were limited to bouts of maximum 20 minutes.
	Duration of intervention	10-months (1 school year)
	Frequency of PA	6 times/week
	Duration of PA	At least 90 min/ week
	Intensity of PA	Not specified
	Type of PA	One example: Skipping rope
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Theory of Embodied Cognition
	Control	Subjects in the control group received regular classroom instruction, also with an average of 6 math lessons of 45 minutes per week.
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; physical activity level (accelerometry); aerobic fitness (Andersen test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Heelan et al. 2009
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2004-2006

Participants	Number of participants at baseline and follow-up (intervention/control)	201 individuals in the intervention group and and 123 individuals in the control group at baseline and at follow-up
	Age	8.1±1.7 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-90% White, 7%Hispanic
	Description	The study promote a physical activity and reduce the prevalence of overweight in children. By supporting them to walk to and from school every day. The concept of WSB programs is that children walk to school in groups along a set route (and with set stops along with way). An adult WSB leader (a paid college student) met the neighborhood children at these designated walk-stops at specified times each morning and walked the group of children to their school and back to the walk stop in the afternoon. Eight routes were created for the 2 WSB schools.
	Duration of intervention	104-weeks
	Frequency of PA	10 times/week
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Walking
	Parent involvement	No
	Setting	School and home
	Who delivered the intervention	WSB leader (a paid college student)
	Theoretical framework	Not specified
	Control	Regular school-based PE
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score; body fat % (skinfolds); physical activity (accelerometer Acti-Graph)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Herazo-Beltran et al. 2018
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	Colombia
	Period	2017
Participants	Number of participants at baseline and follow-up (intervention/control)	27 children in the intervention group and 29 children in the control group at baseline and at follow-up

	Age	9.4 +- 0.6 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	An aerobic exercise program was designed with a frequency of three times per week, with a duration of 60 minutes for 3 months at moderate intensity (60–70% of the heart rate frequency). 10 min warm-up, 40 min exercise and 10 min cool-down
	Duration of intervention	3-months
	Frequency of PA	3 times/week.
	Duration of PA	180 min/week.
	Intensity of PA	60 – 70% HR.
	Type of PA	Aerobic exercise
	Parent involvement	Yes, via workshops on diet and PA
	Setting	School.
	Who delivered the intervention	Not specified.
	Theoretical framework	Not specified.
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Ho et al. 2017
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	1 month
	Country	Hong Kong, China
	Period	2013-2014
Participants	Number of participants at baseline and follow-up (intervention/control)	692 at baseline; 333 individuals in the intervention group and 331 individuals in the control group at follow-up
	Age	12.3+-0.76 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Asian
Intervention	Description	The intervention was divided into 2 similar parts (each with 9 sessions) that were separated by a school examination period and holiday from December to January. Each part started with 1.5 sessions (135 minutes) of

		introduction and warm up, during which the mentor introduced the chosen sport through deliberate play. Then, a half-session (45 minutes) goal setting followed, in which the students discussed what kind of sporting goal they would like to achieve. After setting the goals, the students spent 6.5 sessions (585 minutes) building their sporting skills with the support of the mentors and peers, during which the mentors infused problem-solving techniques through experiential learning. Lastly, a 45-minute debriefing was conducted for skill consolidation and self-reflection.
	Duration of intervention	From October 2013 to June 2014, excluding 3 months of school holiday and an examination period. The program had 18 weekly sports mentoring sessions, each lasting for 90 minutes.
	Frequency of PA	1 time/week
	Duration of PA	90 min/week
	Intensity of PA	Not specified
	Type of PA	After-school sports mentorship: chosen sports included basketball, volleyball, or kickboxing.
	Parent involvement	No
	Setting	Schools and Community centers
	Who delivered the intervention	The intervention deliverers (mentors) were sports coaches with relevant certificates from local sports associations.
	Theoretical framework	The intervention framework was based on the 8 PYD principles of the National Research Council and Institute of Medicine. Emphasis was put on the youth-centered environment.
	Control	Students randomly assigned to the control group were provided with exclusive access to a Web-based health education game with 400 questions on healthy lifestyle during the same period. These students were instructed to log onto the Web site individually for 90 minutes per week for 18 weeks. The quiz game was previously shown to improve health-related knowledge and attitude.
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI z score (standard formula); body fat (BIA); physical and mental well-being (measured by Chinese version of SF-12v2); physical fitness (1-minute sit-up test,

		handgrip test, standing long jump, sit-and-reach test, Y-balance test; physical activity level-self-rated Physical Activity Rating Questionnaire for Children and Youth)
Adverse outcomes	State the outcome and the method of assessment	1 minor foot injury

Authors and year		Hollar et al. 2010
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 1 school in the control group
	Follow-up	Post-intervention
	Country	US
	Period	2-year period (2004–2005 and 2005–2006)
Participants	Number of participants at baseline and follow-up (intervention/control)	3769 individuals in both intervention schools and control school
	Age	Average age was eight years (range 4–13)
	Sex	Both boys and girls
	Other characteristics	Socio-economic status - Low income; Ethnicity - Just over one half (50.2%) of the study sample was Hispanic, 33.4% White, 8.0% Black, and 8.4% other (multi-ethnic, Asian, American Indian).
Intervention	Description	Components: (1) modified dietary offerings (school menus were modified to include more high fiber items, such as whole grains, fresh fruits, and vegetables; fewer items with high-glycemic effects, such as high-sugar cereals and processed flour goods; and lower amounts of total, saturated, and trans fats. (2) nutrition/lifestyle educational curricula for students, parents, teachers, staff (monthly educational programming for making healthy lifestyle choices) used 1-2h x week for kindergarten through second grade and less intense in grades three through five); (3) physical activity component; and (4) wellness projects (e.g., cultivating fruit and vegetable gardens). The physical activity component consisted of increased opportunities for physical activity during school; The amount and types of physical activity varied among intervention schools throughout the study period. During the

		second year of the study, students were provided with pedometers and tracking books so they could track the number of steps they took each day. However, the pedometers broke easily, and students tended to lose them. Therefore, the use of pedometers was discontinued. Instead, schools were encouraged to implement daily physical activity in the classroom using a 10–15 minute desk-side physical activity program (TAKE10! or WISERCISE©) during regular teaching time. These desk-side physical activities are matched with core academic areas, such as spelling and math, to encourage adoption of daily physical activity, in addition to recess and physical education time.
Intervention	Duration of intervention	24-months
	Frequency of PA	Daily for classroom PA
	Duration of PA	10-15 min/day
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes, via newsletters
	Setting	School
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Not specidied
	Control	Usual curriculum
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI percentile (CDC); blood pressure and pulse (measured using WelchAllyn® Spot Vital Signs automated measurement machine); academic scores (The Florida Comprehensive Achievement Test (FCA))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Hollis et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 5 schools in the control group
	Follow-up	Outcome data at 12 and 24 months
	Country	Australia
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	645 individuals in the intervention group and 505 in the control group at baseline; 592 in the intervention group and 459 in the control

		at 12-month follow-up; 560 in the intervention and 425 in the control at 24-month follow-up.
	Age	12 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – Australian; Socio-economic status - schools from socio-economically disadvantaged communities
Intervention	Type	Enhanced PE, Active recess, Extracurricular PA, Lifestyle Curriculum.
	Description	The intervention included the following seven physical activity intervention strategies: 1) Teaching strategies to maximise student physical activity in health andphysical education (PE) lessons; recommended procedures for fitness testing and‘personal best’days. 2.‘Development and monitoring of student physical activity plans within PE lessons’. 3.‘. All students participated in a 10-week enhanced school sport programme during school sport. The 10 physical activity and nutrition messages were selected because they represent the behaviors that are commonly associated with lower levels of disease risk and maintaining a healthy weight and included the following: (1) Keep track of your physical activity (using goals/diary); (2) Every step counts; (3) Reduce your time spent watching television, using the computer, and playing electronic games immediately after school; (4) Be active with friends and family, (5) Identify excuses for not being active, (6) Keep track of fruit and vegetable intake (using goals/diary), (7) Aim for two pieces of fruit and five servings of vegetables each day, (8) Drink more water and swap sugary drinks for diet drinks, (9) Reduce your portion sizes and eat at the dinner table, and (10) Reduce your junk food snacks 4. School policies were established or modified with the aim of enhancing students’physical activity. For example; incorporating pedometer-based lessons with PE, offering the enhanced school sport programme as a standard school sport option, routinely providing physical activity information to parents.

		5.‘Physical activity programmes during school breaks’. Schools were provided with physical activity equipment and encouraged to offer supervised physical activity on at least 2 days per week during recess and lunch breaks. 6) Schools hosted a physical activity expo that promoted local physical activity providers to students in Grade 8. Community physical activity providers were also promoted in school newsletters. 7.‘Parent engagement’. Information was regularly sent to the parents via existing school newsletters, the school website and PA4E1 newsletters on physical activity recommendations, school-based physical activity strategies, promotion of community physical activity providers and strategies to support their child’s physical activity. Four of the seven intervention strategies were implemented during the first 12 months (strategies 1, 2, 5 and 7 above). The remaining strategies were implemented over the next 12 months, with delivery of the initial strategies being maintained.
	Duration of intervention	19 – 24 months
	Frequency of PA	Active recess at least 2 times /week. Other activities not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Yes, via newsletters on physical activity recommendations, school-based physical activity strategies, promotion of community physical activity providers and strategies to support their child’s physical activity.
	Setting	School.
	Who delivered the intervention	Not specified.
	Theoretical framework	Social cognitive theory and socio-ecological theory.
	Control	Usual programmes.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (WHO); Physical activity (accelerometer (Actigraph GT3X+ and GT3X models))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Howe et al. 2011
Methods and setting	Study design	RCT
	Unit of allocation	Randomisation at individual level
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up	INTERVENTION: 31 attenders (ATT) and 31 non-attenders (NATT), participating in ≥60% or <60% of the intervention; 44 controls at baseline and follow-up.
	Age	8-12 yrs
	Sex	Boys only
	Other characteristics	Ethnicity: black
Intervention	Description	The intervention consisted of 30 minutes of homework time during which the subjects were provided with a healthy snack free of charge, and 80 minutes of PA. The PA component included 25 minutes of skills development (e.g., how to dribble a basketball), 35 minutes of MVPA, and 20 minutes of toning and stretching
	Duration of intervention	10-months
	Frequency of PA	5 time/week
	Duration of PA	400 min/week
	Intensity of PA	MVPA (175 min/week)
	Type of PA	Regular PE activities
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes		BMI; BMI percentile (CDC); WC (measured); fat mass (kg); fat free mass (kg); %BF; bone mineral content (kg) (DXA); bone mineral density (g/cm2); VO2-170 b/min (ml/kg/min); VO2-170 b/min (L/min) (method of indirect calorimetry (Sensormedics Vmax 229 cardiopulmonary system, Yorba Linda, CA) using a multistage treadmill test).
Adverse outcomes		NR

Authors and year		Jago et al. 2019
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 6 schools in the control group
	Follow-up	Only post-intervention
	Country	England
	Period	2017-2018
Participants	Number of participants at baseline and follow-up (intervention/control)	170 individuals in the intervention group and 165 in the control group at baseline; 139 in the intervention group and 113 in the control group at follow-up
	Age	8-10 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Extracurricular PA; The sessions began with fun warm-up activities, and then moved through a series of small sided games and activities with a focus on fun and participation while also improving fundamental movement skills such as running, catching, throwing and use of space in invasion games.
	Duration of intervention	15-weeks
	Frequency of PA	2 times/week
	Duration of PA	120 min/week
	Intensity of PA	not specifed
	Type of PA	Games
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Trained teaching assistants
	Theoretical framework	Self-determination theory
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; BMI-z score; physical activity (PAQ-C); PA motivation (5-point Likert scale); Health-related quality of life (KIDSCREEN-10, ChildHealth Utility 9D questionnaires)
Adverse outcomes	State the outcome and the method of assessment	NR

Study ID		53
Authors and year		Jansen et al. 2011
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School

	Number of clusters	10 schools in the intervention group and 10 schools in the control group
	Follow-up	Only post-intervention
	Country	Netherlands
	Period	From September-October 2006 to May – June 2007
Participants	Number of participants at baseline and follow-up (intervention/control)	1240 individuals in the intervention group and 1382 individuals in the control group; 1149 individuals in the intervention group and 1267 individuals in the control group at follow-up
	Age	All children in grades 3 through 8 (6 – 12 years of age)
	Sex	Both boys and girls
	Other characteristics	Dutch, but, the majority of pupils had a non-Dutch ethnic background, multi-ethnic; socio-economic status - low income inner-city neighbourhoods
Intervention	Description	(1) three additional PE sessions a week by a PE teacher (2) additional sport and play activities by PE teacher outside school hours which can be attended on a voluntary basis. (3) A third component is classroom education with three main lessons on healthy nutrition, active living and healthy lifestyle choices adapted for each grade. Children and parents receive a scorecard with the results, including the weight status of the child. (4) Local sports clubs are given the opportunity to present them- selves during PE classes and outside school hours. (5) Fitness assessement. Children receive a score card to take home with their test results compared with reference scores. When their BMI is above age and gender specific thresholds for overweight parents receive a letter and are offered individual counselling by the school nurse. When needed motoric remedial teaching is offered.
	Duration of intervention	24-months
	Frequency of PA	3 times/week. Plus optional 3-5 times/week of PA outside school hours
	Duration of PA	135min/week PE + 3-5h/week for play activties outside school hours
	Intensity of PA	Not specified.
	Type of PA	Dance and rope skipping for play outside school hours.
	Parent involvement	Besides the homework assignments and fitness score card, parents are involved by providing them with written information on the intervention and inviting them for a

		gathering at the beginning of the school year. During this gathering information is provided by the school nurse or a dietician about a healthy lifestyle, focusing on reducing sedentary activities (watching TV and playing on the computer), promotion of outdoor play, and reduction of sugar-sweetened beverage intake and promotion of having breakfast daily.
	Setting	School
	Who delivered the intervention	PE teachers; classroom teachers Staff of local sport clubs.
	Theoretical framework	Theory of planned behaviour and the ecological model of Egger and Swinburn.
	Control	Control schools continued with their usual curriculum.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; non-overweight, overweight or obese (based on the cut-offs published by the IOTF); WC (measuring tape (SECA 201) over the naked skin half-way between the lower rib and the top of the iliac crest); Fitness (20 m shuttle run)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Jiang et al. 2007
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 3 schools in the control group
	Follow-up	Only post-intervention
	Country	China
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	1056 individuals in the intervention group and 1433 individuals in the control group at baseline; 1029 individuals in the intervention group and 1396 in the control group at follow-up
	Age	8.4+-1.4 intervention; 8.2+-1.5 control
	Sex	Both boys and girls
	Other characteristics	11.7% obese in the intervention group at baseline and 11.5% obese in the control at baseline; Ethnicity-Asian; Beijing urban area
Intervention	Description	The main component of the intervention programme was nutrition education aimed at both the children and their parents. The

		intervention aimed to increase physical activity as well. All the overweight and obese children, along with the children who failed to pass routine school physical education tests were asked to run for 20 min after class.
	Duration of intervention	36-months
	Frequency of PA	4 times/week day. (for OW children only
	Duration of PA	80 min/week
	Intensity of PA	Not specified.
	Type of PA	Running.
	Parent involvement	Yes. via education lessons
	Setting	School.
	Who delivered the intervention	Researchers and PE teacher.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	The attendance rate at running sessions was 50–70%, ; More than 86% of the children who consented to join the intervention programme attended the meeting every time
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; prevalence of obesity and overweight (IOTF)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Jordan et al. 2008
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2005-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	577 individuals at baseline and 411 individuals at follow-up
	Age	9.0+-1.6 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-86% White, 7%Hispanic, 7%other
Intervention	Description	Gold Medal Schools program supports the adoption of school policies that provide opportunities for nutritious food choices, regular physical activity and tobacco prevention. The policies on PA include: •Teaching physical activity each week using the Utah State Office of Education's (USOE)

		physical education core curriculum; include methods to ensure faculty awareness of the policy • all K-12 physical education and physical activity are overseen by certified Physical Education (PE) teachers •Discouraging withholding PE or recess as a punishment; •Establishing a Gold Medal Mile waking program on or around school grounds and a goal for student participation •Offering a variety of competitive and non-competitive physical activity programs accessible to all students •Participating in various physical activity community events (e.g. the Walk Your Child to School Day, American Diabetes Association's School Walk for Diabetes, American Heart Association's physical activity and community service programs, Jump Rope for Heart or Hoops for Heart) •Allowing students to use physical activity facilities outside school hours Various policies on nutrition are also implemented (e.g. the Health Education core curriculum, Food is not to be used as a reward or as a punishment for students, "heart healthy" food choices outside the school meal services, limited access to vending machines, school stores, snack bars, and other food outlets)
	Duration of intervention	12-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	No.
	Setting	Schools
	Who delivered the intervention	Not specified
	Theoretical framework	Not specified
	Control	Regular school curriculum
	Intervention fidelity	Following study completion, the two intervention schools achieved gold medal status
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z score (CDC/WHO)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Kain et al. 2008
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	3 schools in the intervention group and 3 schools in the control group
	Follow-up	At 9 months; 15 months; 21 months
	Country	Chile
	Period	2003-2004
Participants	Number of participants at baseline and follow-up (intervention/control)	1759 individuals in the intervention group and 671 in the control group at baseline; 1466 in the intervention group and 573 in the control group at follow-up
	Age	9.8 +- 2.3 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status- proportion of children participating in the School Lunch Program as an indirect measure of poverty; for the control school it was 36 % while the mean for the intervention schools was comparable at 32%
Intervention	Description	The intervention included activities in nutrition and physical activity. Children got 10 hours in first and 4 hours in second year contents on healthy eating from trained teachers. Children got 90 min of additional weekly PE classes in both years..
	Duration of intervention	24-months
	Frequency of PA	Not specified
	Duration of PA	90 min/week
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes, two educational lessons by the nutritionist.
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Fully applied the first year and partially in the second one. In summary, the intervention changed during the second school year for reasons beyond the control of the investigators. It is evident that a weaker nutrition educational component was in place, while the physical activity component was more specifically focused to 1st and 2nd graders.

Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (CDC); WC (measured); body fat (triceps skinfold); obesity prevalence (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Kain et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 4 schools in the control group
	Follow-up	3 months
	Country	Chile
	Period	2011-2012
Participants	Number of participants at baseline and follow-up (intervention/control)	651 individuals in the intervention group and 823 individuals in the control group at follow-up – 76.6% of original sample
	Age	6.6+-1.1 yrs (range 6–8)
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-low income children; Obesity % lower at baseline in both intervention and control in boys and in the control in girls
Intervention	Description	The intervention included classroom nutrition education, increasing physical education (PE) class time, and increasing time children were moderately active during those classes. Teachers of PE classes were trained on how to increase MVPA during the class.In addition, 45 min of PE were added to the existing 135 min/week. Classroom education consisted of a brief theoretical part about healthy nutrition and practical work in the form of activities like painting and puzzles.
	Duration of intervention	12-months
	Frequency of PA	2x/week
	Duration of PA	180 min
	Intensity of PA	MPA or VPA
	Type of PA	Not specified
	Parent involvement	Yes, once a month motivational sessions about education and health food
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities

	Intervention fidelity	Minutes of MVPA and consequently % of class time children engaged in MVPA were very low and declined in control classes (24.5 to 16.2% of MVPA) while remaining unchanged in classes conducted by trained teachers (24.8 and 23.7%).
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; BMI z score (WHO reference); Prevalence of overweight and obesity; Moderate to vigorous activity (pedometers (New Life Style 1000))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Kain et al. 2004
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	3 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	Chile
	Period	March/April – November 2002
Participants	Number of participants at baseline and follow-up (intervention/control)	3577 individuals at baseline; 2141 individuals in the intervention group and 945 individuals in the control group at both baseline and follow-up
	Age	10.6 yrs
	Sex	Both boys and girls
	Other characteristics	Chilean; Low socio-economic status (approximately 35% of children receiving School Lunch Program)
Intervention	Description	Intervention program has two components: 1) Food and nutrition: applied the educational program developed by INTA/FAO, whose objective is to incorporate nutrition education into the 3rd to 8th grade curriculum. 2) Physical activity intervention included three aspects: (i) Canadian active living challenge a practical behavioral resource designed to instill a healthy and active The research PE teacher was responsible for its application and could only do it once a week ii) Provision of an extra 90 min per week of physical activity to children from 3rd to 8th grades during 6 months: These were mainly oriented toward a certain sport (soccer, basketball and volleyball) and were conducted by the school PE

		teacher/classroom teacher or research team PE teacher. (iii) Active recess: During one daily recess (15 min per day), music was played at recess time, so children were encouraged to dance, play ping-pong, basketball or volleyball as recreation, using the equipment provided by the study. This activity was implemented fo rapproximately 3 months, during the second half of the intervention period. (iv) Extra program: During the implementation of the PE program, the research team promoted activities beyond those planned originally. These were based on the individual interest of the PE teacher and varied according to the schools' facilities).
	Duration of intervention	6-months
	Frequency of PA	Not specified
	Duration of PA	90 min/week + 1dditional 75/week during 3 months
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Two meetings directed at healthy eating, obesity prevention and to reinforce national food-based dietary guidelines.
	Setting	School
	Who delivered the intervention	Teachers (trained by a nutritionist) and PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Triceps skinfold thickness (TSF) and waist circumference (WC) (measured); BMI; physical fitness (two health-related tests: the first one assesses flexibility of the lower back by reaching as far as possible from a standing position, while the other one is the endurance 20 m shuttle run test (20m SRT or Leger and Lambert test), which indirectly determines aerobic capacity by running at an increasing speed back and forth a distance of 20 m); dietary assessment questionnaire; attitudes and behavior related to healthy eating and physical activity: these were assessed on children from 4th to 8th grade and consisted in a self-registered questionnaire
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Katz et al. 2010
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	3 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2007-2008
Participants	Number of participants at baseline and follow-up (intervention/control)	655 individuals in the intervention group and 559 individuals in the control group at baseline; 603 individuals in the intervention group and 508 individuals in the control group at follow-up
	Age	7-9 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- predominantly white; socio-economic status- 62% free and reduced-price meals
Intervention	Description	The physical activity component, ABC (Activity Bursts in the Classroom) for Fitness incorporates brief bursts of activity in the classroom throughout the day at the discretion of the teacher. The project also features parental education and community involvement. ABC for Fitness aims to provide fun and creative activities that are noncompetitive, age-appropriate, and gender-neutral to promote an interest in physical activity. Ideally, the activity bursts added at least 30 minutes of daily physical activity. Each burst had 3 components: 1) Warm-up: stretching or light aerobic activity (eg, walking, arm circles, muscle stretching), 2) Core activity: strength activities or aerobic activities (eg, hopscotch, lunges, squats, star jumps, jogging, walking quickly, hopping, dancing to music, skipping), 3) Cooldown: stretching or low-intensity activity.
	Duration of intervention	Not specified.
	Frequency of PA	5 times/week.
	Duration of PA	At least 150 min/week.
	Intensity of PA	Not specified.
	Type of PA	strength activities or aerobic activities
	Parent involvement	The intervention also included a family/parental component in which fitness

		experts helped families learn how to be more active together.
	Setting	School + Family
	Who delivered the intervention	Classroom and PE teachers.
	Theoretical framework	Not specified.
	Control	Normal curricular activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI percentile (CDC); endurance, strength, and flexibility (Fitnessgram); Aerobic capacity (The Pacer, a 15- or 20-meter progressive, multistage shuttle run set to music); VO2max (was measured as a proxy for general fitness by using the recommended calculation based on the number of laps completed and child's age); Abdominal strength (curl-ups, upper-body strength-90-degree push-ups, back extensor strength-trunk lift, and flexibility-back-saver sit and reach); Classroom behaviour (was assessed by the work and social skills component of the ISD progress report for the 2007-2008 school year); Student attitudes toward physical activity (subset of the School Physical Activity and Nutrition (SPAN) Questionnaire); Academic performance (was assessed by comparing post-intervention Missouri Academic Performance (MAP) scores of fourth-grade students with their pre-intervention MAP scores from third grade (2006-2007 school year))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Kesztyus et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	43 schools in the intervention group and 41 schools in the control group
	Follow-up	Only post-intervention
	Country	Germany
	Period	2010-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	1964 at baseline; 1844 at follow up; 1733 data for analysis
	Age	7.1±0.6 yrs
	Sex	Both boys and girls

	Other characteristics	Socio-economic status-12% low income families
Intervention	Description	The three main topics of the program are the promotion of physical activity, the reduction in intake of sugar-sweetened beverages and the reduction of screen media consumption. All intervention materials were integrated into the regular curriculum; no extra lessons were required. As well as course materials for the teachers, the intervention materials include materials for children (e.g. activity breaks). Furthermore, the intervention consists of two physical activity exercises which are performed every school day ("active breaks", each exercise takes between 5 and 7 minutes).
	Duration of intervention (months or weeks)	24-months
	Frequency of PA	5 times/week
	Duration of PA	50-70 min/week (“active breaks”)
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes, via family homeworks and parent evenings
	Setting	School.
	Who delivered the intervention	32 experienced teachers (extra trained).
	Theoretical framework	Intervention mapping approach, Social cognitive theory and the socio-ecological model.
	Control	Regular school curriculum
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI percentile (German reference values); waist-to-height ratio –WHtR (measured); Incidence of abdominal obesity (WHtR>0.5)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Kipping et al. 2018
Methods and setting	Study design	Cluster-RCT
	Unit of allocation	School
	Number of clusters	10 schools in the intervention group and 9 schools in the control group
	Follow-up	Only post-intervention
	Country	England
	Period	February-June 2006

Participants	Number of participants at baseline and follow-up (intervention/control)	331 individuals in the intervention group and 348 individuals in the control group at baseline; 249 individuals in the intervention group and 223 individuals in the control group at follow-up
	Age	In year 5 9–10 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- English (Caucasian)
Intervention	Description	Planet Health lifestyle curriculum involving sixteen lessons on healthy eating, increasing physical activity and reducing TV viewing were adapted by two primary school teachers. Materials included lesson plans for nine physical activity lessons, six nutrition lessons and one lesson about screen viewing.
	Duration of intervention	5-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	In the physical activity lessons, the children played games based on the food groups using photographs of food that reinforced the theory taught in the nutrition lessons.
	Parent involvement	No
	Setting	School
	Who delivered the intervention	classroom teachers
	Theoretical framework	Social cognitive theory
	Control	usual curriculum
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	Screen-based activities (questionnaire); mode of transport to and from school defined as walking/cycling or being driven or going by bus to school (questionnaire); Obesity was defined using the BMI above the 95th centile of the reference curve for the age and gender of each child (UK National BMI classification)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Klakk et al. 2013
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 4 schools in the control group
	Follow-up	Only post-intervention

	Country	Denmark
	Period	2008-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	415 individuals in the intervention group and 327 individuals in the control group at baseline; 351 individuals in the intervention group and 281 individuals in the control group at follow-up
	Age	7.7-12 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – Caucasian
Intervention	Description	Curricular physical education was increased from 90 to 270 min per week distributed across at least three school days.
	Duration of intervention	24-months
	Frequency of PA	>=3 times/week.
	Duration of PA	270 min/week.
	Intensity of PA	Not specified.
	Type of PA	Play, exercise and games. The focus on technical and coordinative skills was increased as children entered adolescence.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	PE teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities (PE 90 min per week).
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; overweight and obesity prevalence (IOTF); body fat (DXA); pubertal stage (SAQ)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Knox et. al. 2012
Methods and setting	Study design	CBA
	Unit of allocation	Grade
	Number of clusters	1 intervention and 2 control
	Follow-up	Only post-intervention
	Country	UK
	Period	NR
Participants	Number of participants at baseline and follow-up	115 individuals in the intervention group and 77 in the control group at baseline; 101 in the intervention group and 66 in the control group at follow-up
	Age	12.4 ± .5 yrs intervention; 12.1 ± 1.1 yrs control

	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	School-based cross-curricular physical activity intervention Activity Knowledge Circuit was designed to increase schooltime physical activity by additional 2 hours. 3200 m of brisk walking was introduced during a 60-minute subject (normally classroom-based) lesson.
	Duration of intervention	18-weeks
	Frequency of PA	2 intervention lessons/week
	Duration of PA	2 x 60 minutes/week
	Intensity of PA	HR=130 beats per minute walking speed; one beep equating one step
	Type of PA	Aerobic – walking
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Subject teacher, researcher, and/or member of the physical education department
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes		BMI; waist and hip circumferences; skinfold thickness (biceps, triceps, subscapular, suprailiac) with caliper; blood pressure (automated blood pressure monitor); lipids, lipoproteins, glucose, insulin, high-sensitivity C-reactive protein, high-molecular-weight adiponectin (blood samples from the antecubital vein); aerobic fitness (20-m multistage fitness test); physical activity behaviour (Physical Activity Questionnaire for Adolescents (PAQ-A))
Adverse outcomes		NR

Authors and year		Laazar et al. 2007
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	14 schools in the intervention group and 5 schools in the control group
	Follow-up	Only post-intervention
	Country	France
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	197 individuals in the intervention group and 228 individuals in the control group at baseline and 99% at follow-up
	Age	7. 4±0.8 yrs (range 6-10)

	Sex	Both boys and girls
	Other characteristics	Socio-economic status-representative of community; 13,9% of children were obese at the baseline within intervention and 9,6% within control group
Intervention	Description	A playful physical practice and 45 min of dynamic exercise within 1 h of PA, based on traditional games
	Duration of intervention	6-months
	Frequency of PA	2 times/week
	Duration of PA	120 min/week
	Intensity of PA	Not specified
	Type of PA	Traditional games
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Sport science students (tutored by PE teachers)
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI-z-score; WC-measured; body fat (skinfolds); prevalence of obesity (French centiles); FFM (skinfold thicknesses, Brook equation)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Lau et al. 2016
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	Hong Kong
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	40 individuals in the intervention group and 40 ind control group at baseline and at follow-up
	Age	8-11 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – Asian
Intervention	Description	Active videogames (AVG) intervention. The Kine compatible with all the Xbox 360 models and this a webcam-style sensor device, allowing participan game without any joystick or hand controller.. Xb Series 1 and 2 that comprise six different sport ga season were adopted in the intervention. The two both team-based and individual sports, including 1 boxing, track and field, table tennis, beach volleyb association football in Season 1 and golf, darts, ba tennis, and American football in Season 2. The pla

		sports by mimicking how the sports are played in the equipment that usually is associated with them intervention was held after school in a large functi allowed all children in the intervention group to pl time. Team games were played with two children Xbox 360. This was designed to provide a better n climate compared with individual-based gameplay
	Duration of intervention	12-weeks.
	Frequency of PA	2 times/week.
	Duration of PA	120 min/week.
	Intensity of PA	MPA (4 METs)
	Type of PA	Physically active videogames mimicing sports
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Investigators
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; aerobic fitness (Progressive Aerobic Cardio Endurance Run (PACER) 20-m shuttle run perfor (ActiGraph GT3X+ accelerometer); Psychologica (multiple-item scales)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Li et al. 2010
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	Randomly selected two districts, DongCheng and Chong Wen, from the eight in urban Beijing. 10 primary schools from each district were randomly chosen and assigned to be either an intervention or control group.
	Follow-up	1 year
	Country	China
	Period	2005-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	At baseline (2005) control n=2371 (1194 boys and 1177 girls), intervention n=2329 (1264 boys and 1065 girls); at the end of intervention (2006) control n=2115 (1065 boys and 1050 girls), intervention n=2072 (1115 boys and 957 girls); at 1-yr follow up (2007) control n=2092 (1031 boys and 1061 girls), intervention n=2028 (1087 boys and 941 girls)

	Age	8-11 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Happy 10 program consisted of two daily 10-min physical activity sessions conducted in the break between classes. The program provided a variety of safe, moderate, age-, and space-appropriate exercises. Teaching materials included activity cards, video demonstrations, tracking posters, and stickers. Each activity card introduced one exercise and explained how to perform it.
	Duration of intervention	12-months
	Frequency of PA	10 times/week (2 times/day).
	Duration of PA	20 min/day or 100 min/week.
	Intensity of PA	MVPA (60 to 70 kcal/ school day).
	Type of PA	PA card games.
	Parent involvement	Parents were encouraged to develop new activity models.
	Setting	School
	Who delivered the intervention	Clasrrom teachers
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (WHO); body fat (BIA)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Li et al. 2014
Methods and setting	Study design	Non-RCT with cluster sampling
	Unit of allocation	School
	Number of clusters	4 public schools
	Follow-up	Only post-intervention
	Country	China
	Period	September 2012-January 2013
Participants	Number of participants at baseline and follow-up (intervention/control)	388 individuals in the intervention group and 533 individuals in the control group at baseline; 365 individuals in the intervention group and 488 individuals in the control group at follow-up
	Age	7-15 yrs
	Sex	Both boys and girls
	Other characteristics	/

Intervention	Description	The intervention program included three PA components: PE improvement, extra-curricular PA for overweight/obese students, and family PA with parent involvement. Schools were required to improve content, intensity and schedule of PE, to ensure that students have three compulsory 45-minute PE per week, with at least 30-minute MVPA in each class. On days without PE, PA at home for 20 to 30 minutes as a part of homework was required (rope jumping, jogging etc.). Extracurricular PA for overweight and obese students were organized by PE teachers during breaks, at noon, or after school hours, mainly being MVPA such as aerobics, jogging, rope jumping and kinds of games. Though this part was not compulsory, overweight and obese students were encouraged for participation for at least 3 days per week and a total of 30-min MVPA each day were guaranteed. Three health education lectures for students were given by the study team members in each school. The con-tents of lectures included the cause and harms of child-hood obesity, BMI reference for screening overweight and obesity in Chinese school-age children, healthy eating (increasing consumption of vegetables and fruits, reducing consumption of meat, snacks, western fast foods and eating in restaurants, avoiding sugary drinks), and physical activity (intensity, duration, reducing sedentary. At family setting, family PA guidance was provided and parents' encouraging and supervising function was promoted.
	Duration of intervention	12-weeks
	Frequency of PA	PE 3 times/week.
	Duration of PA	PE 135 min/week + 40-60 min/week homework PA for days without PE; + extra 90 min MVPA/week for OW and OB students
	Intensity of PA	MVPA (64%-94% of their age-predicted maximum heart rate).
	Type of PA	For elementary students of Grade 2 and 3, rope jumping and light throwing were mainly practiced; for those of Grade 4 and 5, sprint, endurance running (50 m*8 shuttle run) and rope jumping were practiced; and for middle school students, endurance running (1000 m

		for boys and 800 m for girls), long jumping and basketball were practiced. For overweight and obese students: aerobics, jogging, rope jumping and kinds of games.
	Parent involvement	Yes, via health education lesson
	Setting	School
	Who delivered the intervention	PE teachers, field professionals
	Theoretical framework	Social Ecological Model.
	Control	Usual practice.
	Intervention fidelity	In 720 PE of two schools, the attendance rate reached 95%-100%; 82.7% reached at least moderate PA level; Among 128 overweight and obese students who were encouraged to take part in extracurricular PA, 100% had participation of 3 times per week. In 60 extracurricular PA, 87.5% reached at least moderate PA level. Each intervention school had three health education lectures for students, each lasting for 30 to 40 minutes, with attendance rate of 95%-100%, and one health education lecture for parents, lasting 25-30minutes, with attendance rate of 100%. Distribution rate of educational materials was 100%.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI - "BMI Reference for Screening Overweight and Obesity in Chinese School-age Children" developed by Working Group on Obesity in China; WC (measured); skinfold thickness (triceps, subscapular and abdominal); serum lipids (total cholesterol, HDL-C, LDL-C and triglycerides); fasting blood glucose (measured); duration of MVPA (self -administered questionnaires)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Liu et al. 2008
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group (14 classes) and 1 school in the control group (12 classes)
	Follow-up	Only post-intervention
	Country	China
	Period	2004-2005

Participants	Number of participants at baseline and follow-up (intervention/control)	328 individuals in the intervention group and 425 individuals in the control group at baseline and at follow-up
	Age	1st to 5th grade
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The Happy 10 programme is a classroom-based physical activity programme for primary-school students. Many safe and age- and space-appropriate physical activities are included in the programme materials. The Happy 10 programme was actually organized and implemented by teachers among students in grades 1–5 in the intervention school, taking about 10 min at least once every school day from October 2004 to June 2005. A tracking poster and stickers were used to illustrate the progress of each class.
	Duration of intervention	9-months
	Frequency of PA	5x/week
	Duration of PA	10 min
	Intensity of PA	average METs value per PA session ranged from 4.8 to 6.2 kcal/kg/h
	Type of PA	Not specified
	Parent involvement	Not specified
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; prevalence of overweight and obesity (Group of China Obesity Task Force)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Liu et al. 2019
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 6 schools in the control group
	Follow-up	At the half of the intervention and post-intervention
	Country	China
	Period	October 2013 – September 2014

Participants	Number of participants at baseline and follow-up (intervention/control)	930 individuals in the intervention group and 959 individuals in the control group at baseline; 1837 (97.2%) at 6-month follow-up; 1839 (97.4%) at 12-month follow-up
	Age	7-11 yrs
	Sex	Both boys and girls
	Other characteristics	Chinese
Intervention	Description	The intervention had 4 components: *1*) school-level policies, *2*) health education activities, *3*) improvement of physical activity, and *4*) improvement of school lunches. 1) Throughout the intervention period, students were told not to drink sugar-sweetened beverage or eat unhealthy snacks in schools, and drinking water was advocated. They were also told not to play electronic products (e.g., smart phones and tablet computers) in schools. Children were encouraged to perform at least 60 minutes of MVPA each day. 2) A total of four health education lessons were delivered to children in the first semester, with one 40-min lesson delivered once every 2 weeks. Students were asked to keep diaries of behaviors in relationship to diet and physical activity for a week (from Monday to Sunday) once a month. 3) ensuring sufficient time and intensity of physical activity in PE course (duration, frequency, and intensity described below). Sport equipment was provided to support extracurricular PA. Sport club was offered to students with overweight 4) practical suggestions to the managers of school lunch to improve children's dietary intake at school three times during the intervention (at baseline, midpoint, and end of the intervention).
	Duration of intervention	12-months
	Frequency of PA	3 times/week (PE curriculum), 3 times/week (sport club for students with OW)
	Duration of PA	135 min/week (PE curriculum), 90 min/week (sport club for students with OW)
	Intensity of PA	MPA or VPA
	Type of PA	PE courses were implemented according to national PE criteria in China. Instruction manuals were distributed for extracurricular activities, which provided suggestions on types of activities (e.g., rope jumping and shuttlecock kicking) children could engage in.
	Parent involvement	Yes

		Parents were involved in discussions and interviews. Additionally, extracurricular activities for overweight/obese children were encouraged by parents.
	Setting	School
	Who delivered the intervention	Classroom teachers (health education), PE teachers (PA)
	Theoretical framework	Analysis Grid for Environments Linked to Obesity, Social Cognitive Theory, National PE criteria.
	Control	Regular school activities
	Intervention fidelity	The quantity of intervention delivery was 80%–100% for intervention elements among most intervention schools.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (WHO); knowledge and behaviour related to energy balance (questionnaire); dietary intake (questions based on the validated Block Kids Food Screener); duration of MVPA (7-day physical activity questionnaire (PAQ))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Llaurado et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools with 18 classrooms in the intervention group and 11 schools with 23 classrooms in the control group
	Follow-up	Only post-intervention
	Country	Spain
	Period	2011-2013; 22 months during first, second and third academic year
Participants	Number of participants at baseline and follow-up (intervention/control)	413 individuals in the intervention group and 503 individuals in the control group at baseline; 320 individuals in the intervention group and 370 individuals in the control group at follow-up
	Age	8.04±0.6 yrs at baseline
	Sex	Both boys and girls
	Other characteristics	Ethnicity-78% Western European
Intervention	Description	The intervention program consisted of three components: 1) classroom practice by the Health Promoter Agents (HPA) to highlight

		eight healthy lifestyle habits, termed educational intervention activities; 2) teaching practice by the HPA using specially desgined booklets which focused on the same lifestyle topics presented as educational activities; 3) parental activities to be included with that of their children. The educational acitvities focused on lifestyle topics to improve nutritional food item choices, healthy habits such as teeth-brushing and hand-washing and, overall, adoption of activities that encourage physical activity (walking to school, playground games) and to avoid sedentary behavior. The intervention was carried out in 12 activities which were disseminated over 12 sessions (1h/activity/session) and implemented as four activities per school year. The activities were implemented every two weeks over two-month period each school year.
	Duration of intervention	30-months (three school years).
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Educational nutritional activities. The intention was to have parents and their children interact in the healthy nutrition and lifestyle choices.
	Setting	School, classrom.
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Obesity prevalence (IOTF); BMI z-score (WHO); Dietary habits and lifestyle (questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Llaurado et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	High schools in Reus (intervention group), Salou, Cambrils and Vilaseca (control group).
	Follow-up	4 years

	Country	Spain
	Period	2007-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	1550 allocated to intervention and 800 allocated to control; 349 individuals in the intervention group and 154 individuals in the control group at follow-up
	Age	13-15 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- Caucasian (Spanish)
Intervention	Description	The intervention program consisted of three components: 1) classroom practice to highlight eight healthy lifestyle habits including PA and nutrition, termed educational intervention activities; 2) teaching practice using specially-designed booklets (as teaching aids) which focused on the same lifestyle topics presented as educational activities 3) parental activities to be included with that of their children. All the activities had the same following format: 5–10 min of funny theory about nutritional characteristics or health benefits; 15 min of play based on the theory of this activity (for example, memory cards); 30 min of experimental activity (children played and tasted the food that related to the activity); and 5–10 min of discussion and to answer questions. These intervention activities were based on 12activities (1 h/activity/session) conducted 4 per year every15 days in the third trimester of a Spanish academic course (April to June) over 15 weeks per academic year
	Duration of intervention	28-months (3x15 weeks over 3 academic years)
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes, educational nutritional activities.
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school curriculum
	Intervention fidelity	“The fidelity of the schools was great”
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	OB prevalence measured as BMI (according to IOTF and World Health Organization criteria); BMI z-score (WHO); dietary habits (enKid questionnaire); after-school PA in

		hours/week and sedentary lifestyles (AVall questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Lloyd et al. 2012
Methods and setting	Study design	Exploratory cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools with 3 classes in the intervention group and 2 schools with 4 classes in the control group
	Follow-up	6 months and 12 months after the intervention
	Country	UK
	Period	October/November 2008 – October/November 2010
Participants	Number of participants at baseline and follow-up (intervention/control)	80 individuals in the intervention group and 122 individuals in the control group at baseline; 74 in the intervention group and 119 in the control group at first follow-up; 73 in the intervention group and 114 in the control group at second follow-up
	Age	9-10 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- mix in the South West, with the majority of the population being white; Socio-economic status for the area is higher than average; within Exeter, there are some areas with quite severe deprivation."
Intervention	Description	The Healthy Lifestyles Programme (HeLP) is school-based intervention that aims to deliver a general healthy lifestyle message encouraging a healthy energy balance. Within this context, three key behaviours are emphasised: a decrease in the consumption of sweetened fizzy drinks, an increase in the proportion of healthy snacks (HS) to unhealthy snacks consumed and a reduction in television (TV) viewing and other screen-based activities.
	Duration of intervention	12-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes. Assist with goals setting.
	Setting	School and family environment.

	Who delivered the intervention	Not specified.
	Theoretical framework	Information, Motivation and Behavioural Skills Model.
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); body fat SDS (Tanita SC330 portable body composition analyser); physical activity (GT1M Actigraph); television (TV) viewing/screen time (Children's TV Viewing Habits Questionnaire); food intake (Food Intake Questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Lloyd et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	16 schools in the intervention group and 16 schools in the control group
	Follow-up	9 and 15 months
	Country	UK
	Period	2013-2014
Participants	Number of participants at baseline and follow-up (intervention/control)	676 individuals in the intervention group and 648 in the control group baseline; 628 individuals in the intervention group and 616 in the control group follow-up
	Age	9.8+-0.3 yrs (9-10)
	Sex	Both boys and girls
	Other characteristics	Socio-economic status: >half of the schools in the trial with at least the national average proportion of pupils eligible for free schools meals (19% at the time of recruitment of schools); average Child index of multiple deprivation=16 060 (12347–21957)
Intervention	Description	The programme delivered a general healthy lifestyle message with a focus on behaviours such as the consumption of sugar-sweetened beverages, healthy and unhealthy snacking, physical activity, and reducing screen time. An overarching message promoted was the 80/20 rule, which recommended eating healthily and being active at least 80% of the time . It included dynamic and interactive activities such as physical activity workshops, education sessions delivered by teachers with short homework tasks, drama sessions, and setting goals to modify behaviour (with parental

		support and one-to-one discussions with HeLP coordinators).
	Duration of intervention	12-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Dance, games
	Parent involvement	Yes, via parent events
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	All schools in the intervention group completed or nearly completed the whole programme and the quality of delivery in all schools was at or above the established appropriate level. 629 (93%) of the 676 children in the intervention group were categorised as compliers (ie, they received at least four of the five drama sessions and the one-to-one goal-setting discussion in phase 3) 353 (52%) of the 676 children had family attending at least one parent event.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time.	BMI SDS score (LMS method); body fat% (measured); WC (measured); physical activity (measured using accelerometry); self-reported scores for the number of different types of energy-dense snacks, healthy snacks, healthy foods (positive food markers), and unhealthy foods (negative food markers) consumed per day (Food Intake Questionnaire (FIQ))
Adverse outcomes	State the outcome and the method of assessment	1 adverse event related to child's eating and activity behaviour (over-exercising and restricting food intake)

Authors and year		Lubans et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	Post-intervention and 23 weeks after intervention
	Country	Australia
	Period	2011

Participants	Number of participants at baseline and follow-up (intervention/control)	118 individuals in the intervention group and 108 individuals in the control group at baseline; 109 individuals in the intervention group and 104 individuals in the control group at follow-up
	Age	10.72 +- 0.6 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The **Fit4Fun programme** included three major components that were based on the HPS Framework: **Curriculum programme:** The programme was designed to improve the knowledge, skills and understanding of students in relation to HRF and also focused on developing skills in assessing and monitoring HRF components. **Family partnership:** Children, their parents and family members were given an 8-week home activity programme designed to improve HRF levels using a range of engaging and enjoyable fitness activities, small-sided games and fitness challenges. **School environment:** Schools were provided with activity task cards outlining the rules and organization of a range of fun and vigorous games (e.g. small-sided invasion games, skipping challenges) and a variety of equipment for use during break-times.
	Duration of intervention	8-weeks (HPE curriculum program) & 8-weeks (home activity program)
	Frequency of PA	1 time/week; 3 times/week; /
	Duration of PA	60 min/week; 60 min/week (3x20 min); /
	Intensity of PA	Not specified
	Type of PA	Range of fun and vigorous games (e.g. small-sided invasion games, skipping challenges) and a variety of equipment for use during break-times. The break-time activities were optional for students and involved enjoyable games, activities and fitness challenges.
	Parent involvement	There were goal setting activities and reflection tasks for students to complete with their parents at the end of each week, enabling them to set personal fitness goals, monitor their achievement and to reflect on their progress.
	Setting	School and home
	Who delivered the intervention	The member of the research team (an experienced physical educator);
	Theoretical framework	Social Cognitive Theory and Competence Motivation Theory

	Control	The control group participated in their usual 60 min/week HPE lesson over the 8-week intervention period delivered by their normal classroom teacher.
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI Z-score (Fitnessgram); CRF (measured using the 20 m shuttle run test); Muscular fitness (measured using the Standing jump, 7-stage sit-up, basketball throw and push-up tests); Flexibility (measured using the sit and reach test); Physical activity (Yamax SW700 pedometers)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Lucertini et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group A; 1 school in the intervention group B; 1 school in the control group
	Follow-up	3 months post-intervention
	Country	Italy
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	38 individuals in the intervention group A; 37 individuals in the intervention group B and 26 individuals in the control group at baseline and at follow-up
	Age	9.5 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - Caucasian (Italian)
Intervention	Description	A six-month, twice-a-week PE program. Before the workout period of each class, children were randomly divided into two groups performing alternatively basic motor abilities (BMA) and health-related abilities (HRA) exercises, dealing predominantly with basic motor skills, coordination, rhythm, etc. and predominantly with endurance, strength, flexibility, etc., respectively. Both experimental groups underwent the same exercise program, except for the HRA phase, although HRA workout was designed to approximately produce the same training load for both experimental groups. Group A trained strength and endurance with specifically designed cardiovascular and resistance devices (the ‘‘Kid’s System’’, Panatta Sport, Apiro, MC, Italy), while

		group B by means of either traditional or non-conventional devices (e.g. light dumbbells, elastic bands, plastic water bottles, etc.).
	Duration of intervention	6-months
	Frequency of PA	2 times/week.
	Duration of PA	120 min/week
	Intensity of PA	
	Type of PA	Group A trained strength and endurance with specifically designed cardiovascular and resistance devices (the ‘‘Kid’s System’’, Panatta Sport, Apiro, MC, Italy), while group B by means of either traditional or non-conventional devices (e.g. light dumbbells, elastic bands, plastic water bottles, etc.).
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	A and B groups were supervised by two specialised PE teachers
	Theoretical framework	Not specified.
	Control	Program not structured and lead by teacher generalist.
	Intervention fidelity	Children’s attendance and participation was higher than 75%
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; fitness- tests from EUROFIT and (Italian Olympic Committee (2003) batteries; basic motor abilities – motoric tests; health-related abilities – tests
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Lynch et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Classroom
	Number of clusters	4 classrooms in the intervention group and 4 classrooms in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2014
Participants	Number of participants at baseline and follow-up (intervention/control)	29 individuals in the intervention group and 22 individuals in the control group at baseline and at follow-up
	Age	8 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-71% free or reduced-price lunch; ethnicity-white (non-Hispanic) = 47%, black (non-Hispanic) = 20%, Hispanic = 19%, Asian/Pacific Islander = 14%, limited

		English proficient = 34.5%, free or reduced-price lunch = 70.9%
Intervention	Description	Lesson Topic 1. Weight trends in America & Plate Method 2. 5- Fruits and Vegetables 3. 2- Hours or Less of Recreational Screen Time 4. 1- Hour of Physical Activity 5. 0- Sugary Drinks 6. 9- Hours of Sleep & Healthy Breakfast 7 .Portion Sizes & Healthy Snacks 8. Wrap Up/Review Duration of intervention 4 months
	Duration of intervention (months or weeks)	Not specified
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Nursing student, a public health nurse, or a patient education specialist
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; number of steps/day (pedometer)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		MacKelvie et al. 2003
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	7 schools in the intervention group and 7 schools in the control group
	Follow-up	Only post-intervention
	Country	Canada
	Period	1999-2001
Participants	Number of participants at baseline and follow-up (intervention/control)	87 individuals in the intervention group and 92 individuals in the control group in Y1 analysis; 32 individuals in the intervention

		group and 43 individuals in the control group in y2 analysis
	Age	5th and 6th grade (8.8–11.7 years old)
	Sex	Girls only
	Other characteristics	Ethnicity-34% Hong Kong Chinese, 57%, white, 5% East Indian, and4% other
Intervention	Description	Program provided a progressive, 10 to 12-minute program of diverse weight-bearing exercises during regularly scheduled PE classes (2 times per week) and on 1 other day during the week. Teachers facilitated circuit-training that included 5 different jumping activities with ground-reaction forces that ranged from 3.5 to 5 times body weight. Children progressed from 50 to 100 jumps per session across 3 (10-week) levels of difficulty.
	Duration of intervention (	2 x 7 months (two school years).
	Frequency of PA	3 times/week
	Duration of PA	30 – 36 min/week
	Intensity of PA	Not specified.
	Type of PA	Weight-bearing exercises. Circuit training that included 5 different jumping activities with ground-reaction forces that ranged from 3.5 to 5 times body weight
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	regular PE programme
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; %body fat (DXA); dynamic power (long and vertical jump); dietary intake of calcium (food frequency questionnaire); Moderate to vigorous physical activity during the previous 7 days (was determined by a modified version of the Physical Activity Questionnaire for Children (PAQ-C))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		MacKelvie et al. 2004
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	7 schools in the intervention group and 7 schools in the control group
	Follow-up	Only post-intervention

	Country	Canada
	Period	September–October 1999 - June 2000 - September–October 2000 - June 2001
Participants	Number of participants at baseline and follow-up (intervention/control)	31 individuals in the intervention group and 33 in the control group at baseline and at follow-up
	Age	4th, 5th and 6th (8.8–12.1 yrs)
	Sex	Boys only
	Other characteristics	Ethnicity- approximately 34% Hong Kong Chinese, 57% North American/Western European Caucasian, 5% Southeast Asian, and 4% other ethnic origin or mixed ethnicity.
Intervention	Description	Program provided a progressive, 10 to 12-minute program of diverse weight-bearing exercises during regularly scheduled PE classes (2 times per week) and on 1 other day during the week. Teachers facilitated circuit-training that included 5 different jumping activities with ground-reaction forces that ranged from 3.5 to 5 times body weight. Children progressed from 50 to 100 jumps per session across 3 (10-week) levels of difficulty.
	Duration of intervention	2 x 7 months (two school years).
	Frequency of PA	3 times/week
	Duration of PA	30 – 36 min/week
	Intensity of PA	Not specified.
	Type of PA	Weight-bearing exercises. Circuit training that included 5 different jumping activities with ground-reaction forces that ranged from 3.5 to 5 times body weight
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	regular PE programme
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Bone strength - narrow neck (NN), intertrochanteric (TR) region and femoral shaft regions by applying the Hip Structure Analysis program to proximal femur dual energy X-ray absorptiometry scans (DXA, Hologic QDR 4500); total body, lumbar spine, and proximal femur BMC and BA by DXA and derived total body lean mass and fat mass from total body scans; physical activity (Physical Activity Questionnaire for Children, PAQ-C); calcium intakes- 861 vs. 852 mg/day, food frequency (Questionnaire)

Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Madsen et al. 2015
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	US
	Period	2011-2012; 2012-2013
Participants	Number of participants at baseline and follow-up (intervention/control)	583 (77%) in intervention schools and 296 (75%) in control schools provided parental consent and enrolled in the study; at follow-up 78% of students with baseline accelerometer data n=450; 77% of students with baseline fitness data n=461 and baseline dietary surveys n=400; and 78% of students with baseline BMI n=676
	Age	3rd, 4th and 5th grade
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 19 Asian, 20 Black, 150 Latino, 31 Multiracial, 17 White, 38 other
Intervention	Description	Intervention school received one part-time registered dietitian (RD) coach and one full-time Playworks coach. The RD coach delivered a 12- week nutrition and energy balance education curriculum that included food tastings, PA games to reinforce nutrition messages, and strategies to help students meet their nutrition and PA goals. The Playworks coach structured recess activities before and during school hours to encourage active participation from all students. The Playworks coach also led a PA session with individual classes every other week and led four afterschool sports leagues throughout each year.
	Duration of intervention	24-months
	Frequency of PA	Not specified.
	Duration of PA	Recess PA 45 min (anything else not specified).
	Intensity of PA	Not specified.
	Type of PA	Class games, recess games. Other not specified.
	Parent involvement	Yes. via newsletters and lectures for parents.
	Setting	School + community

	Who delivered the intervention	Registred dietitian and Playwork coach.
	Theoretical framework	Social Cognitive Theory.
	Control	Delayed intervention
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-scores (2000 CDC Growth Charts); Physical activity (accelerometer Actigraph GT1M or GT3X; cardiorespiratory fitness- 1-mile run); fruit and vegetable consumption (digital images); dietary behaviours (School Physical Activity and Nutrition Questionnaire and the Child Food Consumption Questionnaire); dietary knowledge (6 questions); school food offering
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Magnusson et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	3 schools in the intervention group and 3 schools in the control group
	Follow-up	Only post-intervention
	Country	Iceland
	Period	2006-2008
Participants	Number of participants at baseline and follow-up (intervention/control)	128 individuals in the intervention group and 138 individuals in the control group at baseline; 90 individuals in the intervention group and 76 individuals in the control group at follow-up
	Age	7 yrs at baseline
	Sex	Both boys and girls
	Other characteristics	Ethnicity - about 97% of native children-Caucasian-white; obesity and overweight baseline - 16 (13%) in the intervention group and 22 (16%) in the control group; Mothers with university degree - 62/119 (52%) in the intervention and 73/116 (63%) in the control; Fathers with university degree - 50/114 (44) in the intervention and 48/104 (46) in the control; Families in lowest category for income - 11/100 (11) in the intervention and 12/86 (14) in the control
Intervention	Description	The primary objective of the physical activity intervention was to progressively increase the amount of physical activity behavior at school such that all children in the intervention schools would have the opportunity to engage in some form of physical activity for a minimum of 60

		minutes during school hours. The students enrolled were to have opportunities to engage in physical activity during PE lessons, recess and also during classes where physical activity was to be integrated into various subjects on the general curriculum. This included more frequent outdoor teaching, organized fieldtrips, promotion of activecommute to and from school, one extra physical education lesson per week and more. The main focus of the dietary intervention was on increasing fruit and vegetable intake, with both educational material and homework assignments
	Duration of intervention	20-months (2 school years).
	Frequency of PA	5 times/week.
	Duration of PA	30 to 60 min/day.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	PE teachers and classroom teachers.
	Theoretical framework	Social Cognitive Theory.
	Control	Regular school activities.
	Intervention fidelity	Teacher-reported mean PA during shool rnged from 35-70 min/day.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; %body fat (DXA); Cardiorespiratory fitness (W/kg) (Monark ergometer bike using the study protocol from the European Youth Heart study); WC (mesured); skinfolds (measured) (mm)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Mandigout et al. 2001
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 school control group
	Follow-up	Only post-intervention
	Country	France
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	35 individuals in the intervention group and 50 individuals in the control group at baseline and at follow-up
	Age	10-11 yrs
	Sex	Both boys and girls

	Other characteristics (SES, ethnicity, OW_ prevalence…)	Ethnicity-Caucasian
Intervention	Description	The training was predominantly aerobic and consisted of one interval (repeated work-recovery bouts over short distances: 10 x 100 m, 6 x 200 m, 4 x 600 m) and one continuous long-distance (around 15– 20 min, 1500–4500 m) running session, and one session with other aerobic activities (swimming, soccer, basket- ball).
	Duration of intervention	13-weeks
	Frequency of PA	3 times/week
	Duration of PA	180 min/week
	Intensity of PA	>80% maximal HR
	Type of PA	Endurance running training programme
	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Body fat (skinfolds- Durnin eq); sexual maturation of the children was evaluated at the pre and post-test only from the puberty stages set out by Tanner; VO2max (continuous and progressive exercise test to exhaustion on bicycle ergometer)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Martinez-Vizcaino et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	10 schools in the intervention group and 10 schools in the control group
	Follow-up	Only post-intervention
	Country	Spain
	Period	September 2010 – May 2011
Participants	Number of participants at baseline and follow-up (intervention/control)	489 individuals in the intervention group and 581 individuals in the control group at baseline; 420 individuals in the intervention group and 492 individuals in the control group at 1- academic year follow-up
	Age	7-10 yrs
	Sex	Both boys and girls
	Other characteristics	Spanish children
Intervention	Description	The program included two extra-curricular 90-minute PA sessions during the weekdays and one

		150-minute session on Saturday morning each week.
	Duration of intervention	9 months
	Frequency of PA	3 times/week
	Duration of PA	330 min/week
	Intensity of PA	The children's average heart rate in each session was 151 beats/min
	Type of PA	Basic sports games, traditional games, and other outdoor activities such as cycling
	Parent involvement	Yes, promoting healthy lifestyles at home (wall calendar with tips on PA, and with green stickers to indicate the days that children attended the MOVI-2 program and red for when they failed to attend)
	Setting	School
	Who delivered the intervention	Monitors with technical qualifications in PA and sports, physical education teachers, or PA science graduates, specifically engaged and adequately trained for the program
	Theoretical framework	Socio-Ecological Model
	Control	Regular school activities (Regular PE 2 h/week)
	Intervention fidelity	66.7% of schoolchildren attended more than 70% of the program sessions
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (Triceps skinfold thickness); WC (measured); % body fat (BIA); Systolic and diastolic blood pressures (OMRON-M5-I automatic tensiometer); blood samples (analysed); Energy expenditure (using oxygen consumption as measured by a portable gas analyser (Cosmed® K4b2, Rome,Italy)); Daily PA (accelerometry in a subsample of 200 randomly selected children from eight of the participating schools (2 CG and 6 IG))
Adverse outcomes	State the outcome and the method of assessment	Dizziness during baseline venipuncture occurred in 2% of the children at baseline, and in 1.1% of the children at the end of the study. No other adverse events were reported by students during health examinations. Two minor ankle sprains occurred during the sessions of the program (9 months incidence risk: 0.4 %). One boy was expelled from the program for aggressive behavior toward peers; his parents and the School Board made the decision by consensus.

Authors and year		McKay et al. 2000
Methods and setting	Study design	Cluster RCT

	Unit of allocation	School
	Number of clusters	10 schools - Schools were stratified by student number per school as either large, medium or small. Within each tier, schools were randomized to either the exercise of control group
	Follow-up	Only post-intervention
	Country	Canada
	Period	1997-1998
Participants	Number of participants at baseline and follow-up (intervention/control)	210 at baseline; 63 individuals in the intervention group and 81 individuals in the control group at follow-up
	Age	6.9-10.2 yrs
	Seks	Both boys and girls
	Other characteristics	Ethnicity-30% Asian, 70%White
Intervention	Description	Teachers chose an activity from a variety of games, circuit training, or dances. Activities included a minimum of 10 minutes of loading, and were consistent with the 5 movement categories mandated in the Canadian Integrated Resources Package for Physical Education (dance, gymnastics, individual and dual activities, alternate environment activities, and games). To ensure a baseline amount of loading, children also performed 10 tuck jumps at the beginning of each PE class and once weekly in the classroom. Children were instructed to jump using both legs together and to grab their knees, bringing them as close to the chest as possible. Children rested for 1 second between jumps to maintain the quality of each jump.
	Duration of intervention	8-months
	Frequency of PA	3 times/week
	Duration of PA	From 30 to 90 min/week
	Intensity of PA	Not specified
	Type of PA	School-based jumping program: tuck jumps and incorporated jumping, hopping, and skipping.
	Parent involvement	Parents were asked to complete a health history questionnaire for their children.
	Setting	School (2x within PE, 1x in the classroom)
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Not specified
	Control	Regular school activities.
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	Body fat (DXA); bone mineral (bone densitometry scans); calcium intake and physical activity (questionnaire); health

		history (health history questionnaire completed by parents)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		McMannus et al. 2008
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 school in the educational program (EP), 1 school in no-educational program (noEP) and 1 school in the control group (C)
	Follow-up	6 months after the end of the intervention
	Country	Hong Kong
	Period	2006
Participants	Number of participants at baseline and follow-up (intervention/control)	67EP, 61noEP and 69C at baseline; 63EP, 60noEP and 66C at follow-up
	Age	10.4 +- 0.85 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	All groups have the same PA (only difference was that two groups use Polar for feedback, and one of this two groups had educational program 2 weeks before the program started). Content included heart-rate monitor skills plus education about heart health, goal-setting and role-play. Heart-rate monitor skills and goal-setting included information about activity targets (light, moderate, vigorous), daily activity accumulation to achieve a 30–60 min of moderate-to-vigorous intensity activity (MVPA), and how to use a heart-rate monitor for feedback about progression to this goal. The content was taught using an active games approach, which allowed appropriate physical activity modeling. A take-home booklet reinforced the taught content
	Duration of intervention	6-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Not specified
	Theoretical framework	Health Belief Model, Social Cognitive Theory, and the Diffusion of Innovation Theory

	Control	Regular school activities
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (BIA); WC (measured); heart rate (The Polar Team System (Polar Electro Oy, Finland)); weekday physical activity (heart rate telemetry at baseline (1 week), during heart-rate feedback (2 weeks), during no heart-rate feedback (2 weeks) and 6-months later (1 week)); Attraction to physical activity (the Children's Attraction to Physical Activity Scale (CAPA)); Systolic blood pressure (SBP) and diastolic blood pressure (DBP) (were measured manually); Peak oxygen uptake (peakVO2) (was assessed from a walk-run treadmill test to volitional exhaustion)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Meinhardt et al. 2013
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Post-intervention and 3 months post intervention
	Country	Switzerland
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	54 individuals in the intervention group and 48 individuals in the control group at baseline and at follow-up
	Age	11.9 (10.3–13.9) girls and 12.3 (10.1–14.1) boys
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The intervention took place during 2 of 3 regular PE classes and consisted of 45 minutes of individualized strength training for the whole body following the recommendations of the American Academy of Pediatrics, Committee on Sports Medicine and Fitness.
	Duration of intervention	19-weeks
	Frequency of PA	2 times/week.
	Duration of PA	90 min/week
	Intensity of PA	60% of 1 RM (repetition maximum)
	Type of PA	Strength exercise.
	Parent involvement	No.
	Setting	School.

	Who delivered the intervention	PE teacher.
	Theoretical framework	Not specified.
	Control	Regular school activities.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Lean body mass (LBM) and fat mass (FM) (measured by dual energy radiograph absorptiometry); physical activity energy expenditure (PAEE) (objectively measured for 7 consecutive days by a body-fixed triaxial accelerometer (RT3, Stayhealthy, Monrovia, CA)); The maximum strength of the lower body (was determined on a seated leg press and for the upper body on a Cybex smith press by 1 repetition maximum testing)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Meiring et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	South Africa
	Period	2012
Participants	Number of participants at baseline and follow-up (intervention/control)	25 individuals in the intervention group and 12 individuals in the control group at baseline; 12 individuals in the intervention group and 10 individuals in the control group at follow-up
	Age	9.7+-1.2 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 100% black; socio-economic status- low-middle income
Intervention	Description	Each exercise session involved completing an exercise circuit consisting of five activities. A warm up of five minutes consisted of stretching the upper and lower body. Each activity was then performed for five minutes before moving on to the next activity in the circuit. A competition within two or three of the activities was held for the next 10 minutes. A cool-down was then performed for another

		five minutes which again involved upper and lower body stretches
	Duration of intervention	20-weeks
	Frequency of PA	2 times/week
	Duration of PA	90 min/week
	Intensity of PA	Not specified
	Type of PA	Sprinting, running and jumping to catch a 1kg medicine ball, ladder hopping, weight-bearing exercise, jumping rope
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	PE Teacher
	Theoretical framework	Not specified
	Control	Regular school programme
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	% body fat (DXA); BMI percentile-for-age (was calculated using software available from the WHO); Bone mineral content and bone area (DXA); Scans of 2.3 mm thickness of the non-dominant lower leg were made at the 4%, 38% and 65% sites of the tibia (using pQCT); analysis of urinary cross-linked N-telopeptides of Type I collagen (NTX)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Meng et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	3 schools in the nutrition intervention group, 3 schools in the physical activity intervention group and 3 schools in the control group in Beijing; in other 5 cities: 3 schools in the combined nutrition education and PA intervention and 3 schools in the control group (15 schools in combined intervention and 15 schools in the control group in other 5 cities)
	Follow-up	Only post-intervention
	Country	China
	Period	2009-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	590 individuals in the physical activity group; 615 individuals in the nutrition group and 490 individuals in the control group in Beijing;

		3356 combined intervention and 3280 in the control group in other 5 cities
	Age	70% 7-10 yrs; 30% 10-14 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status- cca 11% low income; Urban area
Intervention	Description	Three means of intervention were included in the present study: nutrition education, physical activity intervention and combined intervention. A classroom-based physical activity program for elementary students named "Happy 10" was used in PA intervention. In each school day, the students were conducted "Happy 10" led by teachers to do a 10-minute segment moderate intensity, age- and space-appropriate exercises. Furthermore, education about physical activity was provided to students, parents, health workers and teachers Within nutrition intervention classes on nutrition and health were given 6 times for the students, 2 times for the parents and 4 times for teachers and health workers. The menu for students of school lunch cafeteria was evaluated periodically and specific nutrition improvement was suggested accordingly
	Duration of intervention	10-months (one school year).
	Frequency of PA	5-10x/week
	Duration of PA	100 min/week.
	Intensity of PA	MPA.
	Type of PA	Game, dance or rhythmic gymnastics.
	Parent involvement	Involvement in classes about nutrition, health and PA.
	Setting	School (classroom).
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (Working Group for Obesity in China); OW+OB prevalence (Working Group for Obesity in China)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Meszaros et al. 2009

Methods and setting	Study design	CBA
	Unit of allocation	Classroom
	Number of clusters	NR
	Follow-up	Only post-intervention
	Country	Hungary
	Period	2002-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	116 boys in the intervention group and 405 boys in the control group at baseline and at follow-up
	Age	6.5-7.5yrs
	Sex	Only boys
	Other characteristics	/
Intervention	Description	Eight sessions (of 45 minutes each) in the morning and two afternoon sessions (of 90 minutes) for each 10-day cycle of school education. In the morning sessions these children practised the general requirements of the PE curriculum, the afternoon sessions focussed on the development of cardio-respiratory fitness and special skills.
	Duration of intervention	48 months
	Frequency of PA	5 times/week
	Duration of PA	270 min/week
	Intensity of PA	Not specified
	Type of PA	In the morning PE curriculum, the afternoon sessions focussed on the development of cardio-respiratory fitness and special skills
	Parent involvement	Yes
	Setting	School
	Who delivered the intervention	PE specialists
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (skinfolds); speed and coordination skills (30m dash); cardio-respiratory endurance (400m run); explosive strength and co-ordination skills (standing long jump)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Meyer et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Class

	Number of clusters	16 classes from 9 schools in the intervention group and 12 classes from 6 schools in the control group
	Follow-up	Post- intervention and 3 years post-intervention
	Country	Switzerland
	Period	2005-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	297 individuals in the intervention group and 205 individuals in the control group at baseline; 191 individuals in the intervention group and 110 individuals in the control group at follow-up
	Age	1th and 5th grade; 6.9 (0.3); 10.9 (0.5) yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 15-30% migrants, 70-85% Swiss
Intervention	Description	Briefly, children in both groups had three physical education lessons per week (45 minutes each) given by the usual classroom teachers. The intervention group had two additional physical education lessons (45 minutes each) on the remaining school days that were taught by physical education teachers. The curriculum for all physical education lessons for the intervention group was prepared by a team of expert physical education teachers and the same curriculum aiming at increasing quality of physical education and quantity of at least moderately intense physical activity was provided to all intervention classes. In addition, three to five short activity breaks (two to five minutes each) were introduced every day during academic lessons, comprising motor skill tasks such as jumping or balancing on one leg. The children also received daily physical activity homework of about 10 minutes.
	Duration of intervention	11-months
	Frequency of PA	2 times/week
	Duration of PA	90 min/week
	Intensity of PA	≥ MPA
	Type of PA	PE program; Motor skill tasks such as jumping or balancing on one leg
	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Socio-ecological conceptual model
	Control	Regular school programme
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment	BMI and WC (measured); body fat (skinfolds); Aerobic fitness (20 m shuttle run

	weight related outcomes, PA, fitness, sedentary time	test); physical activity (accelerometer (MTI/CSA 7164/GT1M, Actigraph, Shalimar, FL, USA) + questionnaire); quality of life (questionnaire); blood pressure (measured); blood samples (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Morris et al. 2013
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 4 schools in the control group
	Follow-up	3 months after the start of the intervention and post-intervention
	Country	England
	Period	2008-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	177 individuals in the intervention group and 201 individuals in the control group at baseline; 167 individuals in the intervention group and 144 in the control group at follow-up
	Age	9.75 ± 0.82 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-60% white, 20% Asian, 10% black; Socio-economic status - low Index of Multiple Deprivation = 44%
Intervention	Description	Intervention comprised of: preparation for and participation in 3 highlight events (a dance festival, a walking event and a running event); an interactive website for pupils, teachers and parents; and vacation activity planners
	Duration of intervention	7-months
	Frequency of PA	Once (dance festival (DF), walking event (WE) and a running event (RE))
	Duration of PA	DF / , WE 3km, RE 1 mile
	Intensity of PA	Not specified
	Type of PA	Dancing, walking, running
	Parent involvement	The “Great Activity Universe” was described in a pamphlet sent to parents and teachers at the start of the intervention. In addition to the website parents also received regular correspondence about the programme and events. Parents were invited to attend several events including a seminar explaining the programme, the GreatFun2Dance finale, and the GreatFun2Walk event. In addition, twelve

		telephone interviews were conducted with parents (1–3 from each class at each intervention school) to establish their views of the programme and its impact.
	Setting	School
	Who delivered the intervention	Specific team leader (or their representative) of the Great Activity programme, appointed by Great Run.
	Theoretical framework	Social Cognitive Theory
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-scores (1990 UK reference); body fat (skinfolds); WC (measured); physical activity (Digiwalker SW200 pedometer, 54% ActiGraph GT1M accelerometer); food and beverage intake (one-on-one interviews); knowledge of healthy lifesyles (10-item multiple choice test); perceived sport competence (subscale from the Physical Self Perception Profile (PSPP-C; Whitehead, 1995))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Muller et al. 2019
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 schools in the PA intervention, 1 school in the PA + HE intervention; 1 schools in the PA + HE + NU intervention, 1 schools in HE + NU intervention and 4 schools in the control group
	Follow-up	Only post-intervention
	Country	South Africa
	Period	February 2015 to May 2016 (16 months)
Participants	Number of participants at baseline and follow-up (intervention/control)	82 individuals in the intervention PA, 148 individuals in the intervention PA + HE, 70 individuals in the intervention PA + HE + NU, 97 individuals in the intervention HE + NU and 76/70/121/82 individuals in control groups at baseline; 67 individuals in the intervention PA, 136 individuals in the intervention PA + HE, 61 individuals in the intervention PA + HE + NU, 74 individuals in the intervention HE + NU and 37/31/71/41 individuals in control groups at follow-up
	Age	4th grade classes
	Sex	Both boys and girls

	Other characteristics	Ethnicity - The study population consisted of coloured children (mixed race ancestry), usually Afrikaans speaking, and black African children, mainly Xhosa speaking; socio-economic status - middle SES
Intervention	Description	Multidimensional physical activity intervention programme consisted of four components (i) two 40 min PE lessons per week; (ii) one weekly 40 min moving-to-music lesson; (iii) regular in-class PA breaks incorporated into the main curriculum; and (iv) enhancement of the school environment (e.g., installation of activity stations and a variety of painted games). The physical education classes were taught outside on either grass or cemented areas and most children wore light sports clothing. Sports equipment for the lessons was donated to the schools. In addition to the physical activity intervention, two supplementary programmes were conducted in selected schools. The first one was a health and hygiene education programme to increase children's awareness for communicable diseases and the second one a nutrition education and supplementation programme to contribute to the awareness of healthy diet
	Duration of intervention	20-weeks (two times 10 weeks).
	Frequency of PA	Daily
	Duration of PA	At least 120 min/week.
	Intensity of PA	Not specified.
	Type of PA	Dancing and other non-specified activities
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Teachers designated to provide the physical education were assisted by a trained physical education coach for one of the two weekly lessons, while the teachers thereafter taught the subsequent lesson on their own. Dance lessons were provided by students.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Height and BMI (defined as weight [kg]/height [m]2) were standardised according to WHO guidelines, resulting in HAZ (height for sex and age) and BMIZ (BMI for sex and age) scores; Cardiorespiratory fitness (20 m shuttle

		run test); body fat (skinfold thickness); Hb concentration (measured once to the nearest 0.01 g dL□1 with a HemoCue® Hb 301 system (HemoCue®AB; Ängelholm, Sweden)); Kato-Katz technique was used on the stool samples to identify and count the number of soil-transmitted helminth eggs that were reported for each species separately
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Muros et al. 2015
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 school in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	Spain
	Period	2012
Participants	Number of participants at baseline and follow-up (intervention/control)	41 in the control group, 28 in the physical activity (PA) intervention group; 21 in the nutritional education (NE) intervention group, 25 in the PA and NE intervention group, 20 in the PA, NE and replacement to extra virgin olive oil intervention group
	Age	10.6±0.5 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The intervention consisted of 60 minutes sessions of physical activity held twice a week as well as nutritional education sessions.
	Sedentary time, physical activity or both	PA
	Duration of intervention	6-months
	Frequency of PA	2 times/week
	Duration of PA	120 min/week
	Intensity of PA	Vigorous extracurricular physical activity (VEPA) [80% of maximum heart rate (MHR) for 35 to 40 minutes, 60% to 70% of the MHR for 10 to 15 minutes, and 50% to 60% for 5 to 10 minutes]
	Type of PA	Motor skills, games and sports
	Parent involvement	Yes. For parents, there were 6 classes of nutritional education, each lasting

		approximately 2 hours. One session was provided each week for the first 6 weeks of intervention.
	Setting	School
	Who delivered the intervention	Experts in education and sports science
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Pupils were considered fit to participate in the study if they participated in over 75% of the school physical activity sessions, attended the 2 sessions on nutritional education, and had at least 1 parent attend over 75% of the parental educational sessions. Out of a total of 75 pupils, 58 fulfilled these conditions (77.3%).
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time.	BMI; WC (measured); VO2max (estimated using a 20 m incremental-maximum shuttle run field test); venous blood parameters (measured); systolic and diastolic blood pressure (OMROM M7 monitor (Omrom Health Care, Ukyo-ku, Kyoto, Japan); dietary changes (2 dietary intake diaries)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Nader et al. 1999
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	56 schools in the intervention group and 40 schools in the control group
	Follow-up	3 years follow-up
	Country	US
	Period	1991-1997
Participants	Number of participants at baseline and follow-up (intervention/control)	2989 individuals in the intervention group and 2117 individuals in the control group, 1991 trough 1997
	Age	6^{th}, 7^{th} and 8^{th} grade
	Sex	Both boys and girls
	Other characteristics	Ethnicity- The ethnic composition of the baseline cohort of students was 69% white, 14%Hispanic, 13% African American, and 4% other
Intervention	Description	The CATCH intervention consisted of the Eat Smart school food service program, CATCH PE (physical education), classroom curricula, and parental involvement programs.

		Eat Smart was a school-level intervention designed to incorporate the current dietary recommendations into the schools' food service program." The goal was to provide children with reduced fat, saturated fat, and sodium in meals while maintaining recommended levels of essential nutrients and calories, as well as maintaining school meal participation. CATCH PE was designed to increase the amount of time students spent in enjoyable moderate-to-vigorous physical activity (MVPA) at school during PE, as well as to teach students appropriate activities for other times of the day that could be maintained throughout life.
	Duration of intervention	30-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	CATCH intervention program (Eat Smart & CATCH PE)
	Parent involvement	Not specified
	Setting	School- and family-based
	Who delivered the intervention	Not specified
	Theoretical framework	Social Cognitive Theory
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Blood samples (measured); Systolic and diastolic blood pressure and heart rate (Dinamap automatic device); body fat (triceps and subscapular skinfolds); BMI (measured); psychosocial variables (The Health Behavior Survey); food intake (The Food Checklist); physical activity (The Self-Administrated Physical Activity Checklist)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Neumark-Sztainer et al. 2009
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	4 months post-intervention

	Country	USA
	Period	2006-2007
Participants	Number of participants at baseline and follow-up (intervention/control)	108 children and 73 parents at baseline; 96 children (51 in the intervention group and 45 in the control group) and 61 parents (30 in the intervention group and 31 in the control group) at follow-up
	Age	10.3+-1.1 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 55% black, 15% Asian, 7% white, 22% other Socio-economic status- 90% free or reduced price lunch; 43% OW at baseline
Intervention	Description	Ready. Set. ACTION!' is an after-school theatre program designed to reach ethnically diverse and low-income elementary school children and their parents with messages of relevance to obesity prevention. Fourteen 2-hour after-school theater sessions were conducted. Each session included (i) a 'check- in which children were given an opportunity to share any behavioral changes they had made over the past week (such as eating more fruits and vegetables. (ii) easy-to-prepare healthy snacks; (iii) a movement component with activities that are fun, easy and require minimal resources (e.g. dancing or walking) and (iv) theatrical ACTivities
	Duration of intervention	Not specified
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Dance.
	Parent involvement	Yes. Weekly Fun and Fitness packs were sent home that included a healthy food with a simple recipe or fitness incentives for the family + two family events
	Setting	School and home
	Who delivered the intervention	Not specified
	Theoretical framework	Social Cognitive Theory
	Control	Theater-based intervention, which involved performing a play focused on environmental health issues using a prepared script
	Intervention fidelity	More than half of the children (59%, n = 33) had consistent attendance and participated in at least 75% of the initial theater sessions. Only a third of the children attended at least 75% of the booster sessions following the play performance (39%, n = 22).

Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (CDC); Dietary intake (was assessed using a 1-day 24-hour recall); children were individually interviewed at school by trained research staff; Physical activity (was assessed with the Past Day Physical Activity Recall); Television viewing (questions); Response to satiety cues (multiple choice); Child personal factors (multiple choice)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Nogueira et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 schools in the control group
	Follow-up	Post-intervention and 1 years post-intervention
	Country	Australia
	Period	2004-2005
Participants	Number of participants at baseline and follow-up (intervention/control)	175 individuals in the intervention group and 136 individuals in the control group at baseline; 155 individuals in the intervention group and 85 individuals in the control group at follow-up
	Age	10.6+-0.6 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The exercise intervention program was based on capoeira and a combination of medium- to high-impact manoeuvres for upper and lower limb loading, performed continuously for 10 minutes, 3 times per week. Initially (first 2 months), a typical session was composed of learning how to perform the ginga, followed by around 60 jumps, 20 kicks, and 15 cartwheel and handstand attempts. Repetition and intensity was progressively increased over the course of the year, such that a typical session in the final stages would entail a warm up with the ginga, followed by an average of 120 jumps, 30 kicks and 20–30 inverted movements such as handstands or cartwheels. Children were occasionally given small prizes such as sports balls and game vouchers to reward participation and performance.
	Duration of intervention	9-months

	Frequency of PA	3 times/week
	Duration of PA	30 min/week
	Intensity of PA	MVPA
	Type of PA	Capoeira -specific movements and combination for upper and lower limb loading
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Researcher
	Theoretical framework	Not specified
	Control	Usual school activities
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); Parameters of bone strength (quantitative ultrasonometry); Muscle power (maximal vertical jump test using a yardstick); Aerobic capacity (20-m shuttle run test); Both resting heart rate (bpm) and resting blood pressure (mm Hg) (were measured using standard procedures inside the school hall after a resting interval of 10 minutes)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Orntoft et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	9 schools
	Follow-up	One week post intervention
	Country	Denmark
	Period	August – December 2015
Participants	Number of participants at baseline and follow-up (intervention/control)	402 individuals in the intervention group and 144 individuals in the control group at baseline; 386 individuals in the intervention group and 140 in the control group at follow-up
	Age	11-12 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - Caucasian (Danish)
Intervention	Description	Two times per week regular PE teaching content was substituted with football content provided by FIFA programme. Each session consisted of a 45 min play football period (teaching footballskills and playing 3v3 football games) and a 45 min play fairperiod (teaching a health message and healthy behaviours related to an NCD)
	Duration of intervention	11-weeks

	Frequency of PA	2 times /week.
	Duration of PA	45 min/week.
	Intensity of PA	Not specified.
	Type of PA	Ball games.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Teacher.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Systolic blood pressure (measured), mean arterial blood pressure (measured); BMI; %body fat (DXA); physical performance (YYIR1C, 20m sprint, horizontal jump length, flamingo balance test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Pablos et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in total - each school as intervention or control
	Follow-up	Only post-intervention
	Country	Spain
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	82 individuals in the intervention group and 76 individuals in the control group at baseline; out of 190 children, 30 children were excluded because of missing administrative data or absence from school when the measurements were taken. Complete data were collected for 158 children total.
	Age	10.66 ± 0,7 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- Spanish (Caucasian); socio-economic status- middle socioeconomic status, determined using the PISA index of economic, social and cultural status
Intervention	Description	The intervention was in the form of a free extracurricular activity. It lasted for 8 months and was carried out in the form of sessions twice a week lasting for a total of 150 minutes per week. All the sessions were led by the same specifically-trained teacher. The physical

		activities gradually increased in intensity and duration throughout the intervention. The intensity level of the activities was intended to be moderate to high.
	Duration of intervention	8-months
	Frequency of PA	2 times/week
	Duration of PA	150 min/week
	Intensity of PA	MVPA
	Type of PA	Themed games for the first 22 sessions and modified sports for the rest of the sessions, which provided the motivational ingredient without restrictive rules or technical demands that could exclude less able students.
	Parent involvement	Signing homework worksheets. Three 45-minute talks for parents and teachers about healthy habits for school children.
	Setting	School.
	Who delivered the intervention	Specifically-trained teacher.
	Theoretical framework	Not specified.
	Control	Daily activities without participating in the healthy habits program.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; blood semples (measured using validated portable Accutrend automated analyzers); blood pressure (Blood pressure was measured using a digital sphygmomanometer); The Cardiovascular Fitness Indicator (was assessed using 1 item of the Eurofit physical fitness test battery); health habits (Inventory of Healthy Habits); physical activity level (activity monitor (GT3X+,ActiGraph LLC, Pensacola, FL, USA))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Perez Solis et al. 2014
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 schools in the control group
	Follow-up	Only post-intervention
	Country	Spain
	Period	2006-2008
Participants	Number of participants at baseline and follow-up (intervention/control)	151 individuals in the intervention group and 231 individuals in the control group at baseline; 120 individuals in the intervention

		group and 220 individuals in the control group at follow-up
	Age	8.2+-1.5 yrs
	Sex	Both boys and girls
	Other characteristics	OW+OB>40% at baseline
Intervention	Description	Activities consisted of (1) workshops on healthy nutrition for students, (2) educational talks for the parents, (3) workshop on healthy cooking and nutrition, (4) monthly teachers meetings to study healthy lifestyle, (5) printed informational materials for parents, (6) promotion of physical activity, e.g. of traditional outdoor games. The use of mobile phones was prohibited during school-time
	Sedentary time, physical activity or both	PA
	Duration of intervention	20-months (2 school years).
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	Traditional outdoor games for children.
	Parent involvement	Yes, through workshops and talks.
	Setting	School.
	Who delivered the intervention	Teaching staff of the school under the guidance of the paediatricians of the research team.
	Theoretical framework	Not specified.
	Control	Regular school activities.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (WHO); OW+OB prevalence (IOTF); abdominal obesity prevalence (WC); physical activity (Escala de Actividad Física-questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Plachta-Danielzik et al. 2011
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	14 of 32 schools in the intervention group; the following years former intervention schools served as control
	Follow-up	8 years
	Country	Germany
	Period	Within KOPS intervention 1996-2001; intervention 2-3 weeks within the second term of the first school year

Participants	Number of participants at baseline and follow-up (intervention/control)	4997 at baseline; 240 individuals in the intervention group and 952 individuals in the control group at follow-up
	Age	median (IQR) = 6.3 (5.9–6.5) yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status - low/middle/high: 46.8/20.7/32.5%
Intervention	Description	All first graders of 'intervention schools' were addressed by 6 nutrition units performed within the second term of the first school year. Messages were i) to eat fruit and vegetable every day, ii) to reduce intake of high fat foods, iii) to keep active at least 1 h a day, and iv) to decrease TV consumption to less than 1 h per day. Messages were conveyed by use of nutrition fairy tales, interactive games as well as by preparing a healthy breakfast. After each unit, running games were offered for 20 min on the school yard.
	Duration of intervention	2-3 weeks
	Frequency of PA	2/week
	Duration of PA	20 min
	Intensity of PA	Not specified
	Type of PA	running games
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Nutritionist
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI SDS (German BMI reference percentiles); FM z score (BIA, KOPS cohor)t; WC z score (KOPS cohort); prevalence of overweight (German BMI reference percentiles); food intake (food frequency questionnaire); blood pressure (age-specific 95^{th} percentile for systolic and/or diastolic blood pressure by Second Task Force on Blood Pressure Control in Children)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Rausch Herscovici et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 2 schools in the control group

	Follow-up	Only post-intervention
	Country	Argentina
	Period	2008
Participants	Number of participants at baseline and follow-up (intervention/control)	405 at baseline; 205 individuals in the control group and 164 in the control group at follow-up
	Age	9.6+-0.8 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status- neighborhoods in which macroeconomic conditions are compatible with very-low, low, and lower-middle income standards
Intervention	Description	The participating grades took part in four workshops: three for the children (Healthy Eating, Body in Motion, and Healthy Body); and one for their parents/ caregivers.
	Sedentary time, physical activity or both	PA
	Duration of intervention	6-months (4 workshops x 40 min over 6 months)
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	The fourth workshop aimed to provide dietary education to the children's parents/ caregivers and emphasized the importance of physical activity.
	Setting	School
	Who delivered the intervention	Not specified
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Because the children's workshops took place during school hours, attendance was the same it would be for a normal school day and was not considered exclusion criteria. Parents' and/or caregivers' attendance was 53% and was not considered exclusion criteria.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Recasens et al. 2019

Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	16 schools
	Follow-up	8 years follow-up post-intervention
	Country	Spain
	Period	2006-2008 intervention
Participants	Number of participants at baseline and follow-up (intervention/control)	272 individuals in the intervention group and 237 individuals in the control group at baseline 2006 and at follow-up 2008; 225 in the intervention and 201 in the control at follow-up 2010; 216 in the intervention group and 181 in the control at follow-up 2012; 156 in the intervention and 122 in the control at follow-up 2016
	Age	1st and 2nd grade primary school children
	Sex	Both boys and girls
	Other characteristics	Ethnicity - Caucasian (Spanish)
Intervention	Description	The intervention promoted healthy eating habits and physical activity in the school setting through the investigation, vision, action and change (IVAC) educational methodology. Every classroom used 3 h a week to develop activities related to health food habits and/or physical activity. Activities related to healthy habits, integrated into regular content (e.g. math, science, language, knowledge of the environment) through mechanisms such as posters, food tables, games, crafts, cooking workshops or games on the school playground.
	Sedentary time, physical activity or both	Both
	Duration of intervention	20-months (2 school years)
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	the families received periodic newsletters with news about project progress, books and reading recommendations related to diet and physical activity for families and children, as well as monthly recipes using healthy seasonal foods adapted for the whole family
	Setting	School
	Who delivered the intervention	Classroom teachers
	Theoretical framework	investigation, vision, action and change (IVAC) educational methodology
	Control	Regular school activities
	Intervention fidelity	Not specified

Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Children's weight and height (measured 2006, 2008, 2010, 2012 and 2016) and levels of physical activity (questionnaire); BMI cut-point values (IOTF)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Reed et al. 2008
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 2 schools in the control group
	Follow-up	Only-post intervention
	Country	Canada
	Period	2003-2004
Participants	Number of participants at baseline and follow-up (intervention/control)	178 individuals in the intervention group and 90 individuals in the control group at baseline; 156 individuals in the intervention group and 81 individuals in the control group at follow-up
	Age	9-11yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Teachers in intervention schools were asked to deliver 15 min of moderate to intense physical activity daily to achieve 75 min of extra physical activity per week (in addition to 2×40 min PE classes).
	Duration of intervention	12-months
	Frequency of PA	5 times/week
	Duration of PA	75 min/week
	Intensity of PA	MVPA
	Type of PA	Not specified
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Active school framework
	Control	Regular school activities(PE 2 × 40 min)
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; Cardiovascular fitness (Leger's 20-m incremental shuttle run); Blood pressure (automated sphygmomanometer and appropriately sized cuff after 5-10 min rest in a supine position); Blood samples (from antecubital vein) ; Physical activity (PAQ-C); Physical maturity (line drawings and

		descriptions of pubic hair and breast stage (girls) based on Tanner Staging)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Resaland et al. 2011
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	Norway
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	125 individuals in the intervention group and 131 individuals in the control group at baseline; 92 in the intervention group and 82 in the control group at follow-up
	Age	9.2+-0.3 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- >95% white
Intervention	Description	The intervention consisted of a 60-min daily PA lesson and was implemented over two school years for each of the two age groups in the I-school.Each lesson was planned to include a variety of activities that were enjoyable and exciting for the children. Approximately 5 of the 60 min on teachers' explanations, organizing the children and various other lowintensity activities. For the remaining 55 min, the teachers were told to carry out moderate to vigorous-intensity PA, of which 15 min was planned to be at vigorous intensity, meaning that the children should be sweating and out of breath. The vigorous PA component was tried and accomplished by selecting a variety of activities such as running, relay racing, obstacle courses and various forms of active play of high intensity. Nevertheless, most activities were non-competitive.
	Duration of intervention	20-months (2 school years)
	Frequency of PA	5 times/week
	Duration of PA	300 min/week
	Intensity of PA	MVPA; at last 15 min of VPA daily
	Type of PA	Ballgames (accounting for 19.4% of the PA time over the 2 intervention years) were the

		most frequent activity, with football and basketball as the two most dominant. Brisk walking (13.1%) was usually carried out every school day, and often at a relatively fast pace. Active play (12.1%) included a variety of fun activities and games. Skiing (10.7%) was mainly cross country, and the children spent 11 full school days skiing and thereby compensating for the 5 min lost every day to explanations, organizing, etc., in the other activities. Gymnastics (9.6%) included a variety gymnastics exercises. Relay race (8.5%) also included completing obstacle courses. The term others (10.7%) describes miscellaneous activities, such as orienteering, cycling, jumping rope and ice skating.
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Expert PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	On average, the mean (SD) absence from school was 12 (9) days over the 2 years, corresponding to 4% mean absence annually.Only one child from I group was excluded because of an absence of >15%
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; WC (measured); blood sampling, blood pressure (measured); VO2 peak (MetaMax I analyzer)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Robbins et al. 2012
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group ad 1 school in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2009
Participants	Number of participants at baseline and follow-up (intervention/control)	38 individuals in the intervention group and 35 individuals in the control group at baseline; 37 individuals in the intervention group and 32 in the control group at follow-up
	Age	11.5 (0.8)

	Sex	Girls only
	Other characteristics	Ethnicity- 65% black; 24% hispanic; 8% white; Socio-economic status- 76% free or reduced lunch
Intervention	Description	The intervention involved two components: (1) a 90-min after-school physical activity club offered at the middle school 5 days a week for 6 months (total of 98 sessions) and (2) a face-to-face motivati onal, individually tailored counseling session with a registered (school) nurse during the school day every other month over the 6 months. Each Physical Activity Club session was to include a five-minute warm-up including stretching; 60 minutes of MVPA; a five-minute cool-down including stretching; and 20- minute group discussion on healthy eating and physical activity one day per week. A healthy snack (e.g., fruit, vegetable, smoothie, low-fat cheese or yogurt) was served at each session. The Physical Activity Club instructors encouraged the girls to exercise at their own pace, but to increase the intensity over time, and engage in MVPA on their own outside the club
	Duration of intervention	6-months
	Frequency of PA	5 time/week
	Duration of PA	350 min/week
	Intensity of PA	MVPA
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Physical activity club instructors
	Theoretical framework	Health Promotion Model
	Control	Not specified
	Intervention fidelity	The Physical Activity Club was conducted over 24 weeks; but, due to several no-school days, girls had the opportunity to attend on 98 different days, resulting in the club being available on average 4.1 days per week during the intervention. The 37 girls in the intervention group attended an average of 1.6 days per week.
Outcomes	State the outcome and the method of assessment	BMI; BMI z-score (CDC); WC (measured); %body fat (BIA); Perceived benefits of and barriers to physical activity

	weight related outcomes, PA, fitness, sedentary time	(measured as the mean response to the 12-item Perceived Benefits scale); Perceived physical activity self-efficacy (17-item Perceived Physical Activity Self-Efficacy scale); Enjoyment of physical activity (16-item Physical Activity Enjoyment scale); Minutes of MVPA per hour (The Actigraph GT1M, a small, lightweight accelerometer); Cardiovascular fitness (Progressive Aerobic Cardiovascular Endurance Run (PACER), 20-m shuttle run)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Robinson, T. N.; 1999
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 school in the control group
	Follow-up	2-months follow-up
	Country	US
	Period	September 1996 – April 1997
Participants	Number of participants at baseline and follow-up (intervention/control)	106 individuals in the intervention group and 121 in the control group at baseline; 92 individuals in the intervention group 100 individuals in the control group at follow-up
	Age	8.9 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Children in 1 elementary school received an 18-lesson (of 30 to 50 minutes), 6-month classroom curriculum to reduce television, videotape, and video game use. The entire curriculum consisted of approximately 18 hours of classroom time. Lessons included self monitoring and self reporting of TV, videotape, and video game use; following by TV turnoff for 10 days. After turnoff children were encouraged to follow a 7-hour per week budget. Additional lessons taught children to become intelligent viewers. To help with budgeting, each household also received an electronic televi-sion time manager. This device locks onto the power plug of the television set and monitors and budgets viewing time for each member of the

		household through use of personal identification codes.
	Duration of intervention	6-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes Newsletters for parents to motivate their children were distributed to parents. Parents were asked to estimate the amount of time their children spent watching Tv, videotapes, and videogames during school day and weekend.
	Setting	School
	Who delivered the intervention	Regular classroom teachers
	Theoretical framework	Bandura's Social Cognitive Theory
	Control	Regular school activities
	Intervention fidelity	Teachers reported teaching all lessons, although data determining whether the lessons were delivered as they were intended were not collected. Ninety-five (90%) of 106 stu-dents in the intervention school participated in at least some of the television turnoff and 71 (67%) completed the entire 10 days without watching television or videotapes or playing videogames. During the budgeting phase of the intervention, 58 (55%) of the students turned in at least 1 signed parent confirmation that they had stayed below their television and videotape viewing and video game playing budget for the previous week. Forty-four parents (42%) returned response cards reporting they had installed the TV Allowance
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; subcutaneous body fat (triceps skinfold); Waist and hip circumferences (measured); The waist-to-hip ratio (calculated as a measure of body fat distribution); food and sedentary behaviour parameters (reports); The maximal, multistage, 20-m,shuttle run test (20-MST) was used to assess cardiorespiratory fitness
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Ronsley et al. 2013
Methods and setting	Study design	CBA
	Unit of allocation	School

	Number of clusters	2 schools in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	Canada
	Period	September 2009- June 2010
Participants	Number of participants at baseline and follow-up (intervention/control)	118 individuals in the intervention group and 61 individuals in the control group at baseline and at follow-up
	Age	10.9+-3.5 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-The Tsimshian Nation (Aborigin)
Intervention	Description	Healthy Buddies™ includes 3 main components: physical activity (PA) (‘‘Go Move!’’), healthy eating (‘‘Go Fuel!’’), and healthy body image (‘‘Go Feel Good!’’). Healthy Buddies™ includes 3 main components: physical activity (PA) (‘‘Go Move!’’), healthy eating (‘‘Go Fuel!’’), and healthy body image (‘‘Go Feel Good!’’). Briefly, the program is a whole school model, based on prescribed learning outcomes from the BC Ministry of Education, that includes 21 lessons and 6 fitness loops, each of which is 30 minutes in length. At the beginning of each lesson, the older students are taught the concepts by their teachers. Designation of ‘‘older’’ and ‘‘younger’’ buddy classes are decided on an individual basis by school administrators. The older students then teach the younger students (their ‘‘buddies’’) the lesson. Healthy eating is targeted through lesson plans about nutritious and non-nutritious foods and beverages. Fitness loops are done twice weekly and are designed to be done with 2 classes in the gymnasium at 1 time (1 older class and their younger ‘‘buddy’’ class). Each loop includes a circuit of stations containing exercises that are designed to be done by children of every fitness level, be fun and promote vigorous exercise (examples include jump rope, hoola-hoop, stretches, sprints, push-ups, and sit-ups). Healthy body image is targeted through teaching about healthy growth and development, media awareness and through social skill development facilitated by the buddy system.
	Duration of intervention	10-months
	Frequency of PA	2 times/week
	Duration of PA	60 min/week
	Intensity of PA	VPA

	Type of PA	Structured aerobic fitness sessions, called fitness loops. Each fitness loop incorporated a circuit, with a series of stations, designed around a theme (eg, transportation fitness loop)
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teacher; Students (from 4th to 7th grade) acted as educators, teaching their kindergarten to 3rd grade friends.
	Theoretical framework	Not specified; Peer-teaching model
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (CDC); WC (measured); prevalence of overweight (CDC); Blood pressure (measured); knowledge of healthy living (The Healthy Buddies Questionnaire); food intake (The Food Frequency Questionnaire); physical activity (PAQ-C and PAQ-A)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Rosario et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	3 schools in the intervention group and 4 schools in the control group
	Follow-up	Only post-intervention
	Country	Portugal
	Period	October 2008 - March 2009
Participants	Number of participants at baseline and follow-up (intervention/control)	233 individuals in the intervention group and 231 individuals in the control group at baseline; 151 individuals in the intervention group and 143 individuals in the control group at follow-up
	Age	8.3+-1.2 yrs
	Sex	Both boys and girls
	Other characteristics	Portugise
Intervention	Description	Teachers of the intervention group had 12 sessions of three hours each with the researchers during six months, which included the following contents: session 1, how to promote health and prevent disease, lifestyle determinants of health, obesity; session 2, key

		concepts in food and nutrition; sessions 3 and 4, dietary guidelines (the Portuguese Food Wheel), healthy eating advice for children, covering the five main food groups, and interventions to help children and their families to consume healthy foods and plan well-balanced meals and snacks; session 5, teach children about the importance of water, and teaching strategies to replace consumption of sugar-sweetened beverages with water; sessions 6 and 7, appropriate physical activity levels and healthy eating behaviours such increasing fruit and vegetable intake and decreasing energy-dense micronutrient-poor foods; session 8, teaching strategies and learning theory in the classroom; session 9, strategies to reduce screen exposure time; session 10, global assessment of the training program; sessions 11 and 12, healthy cooking and strategies to get children and their families involved in healthy cooking. After each session, teachers delivered the learnt contents and developed creative and engaging classroom activities about the addressed topic.
	Duration of intervention	6-months.
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Trained teachers.
	Theoretical framework	Health Promotion Model and Social Cognitive Theory.
	Control	Not specified.
	Intervention fidelity	The implementation of the program occurred as planned. All the children of the intervention schools had contact with trained teachers. Teachers taught the components of the program as prescribed and the researchers were always available to answer any question. In addition, teachers reported they were enthusiastic about the training, and had a total attendance in the sessions with the researchers.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; The prevalence of underweight, normal weight, overweight and obesity (IOTF); Dietary intake (24-h dietary recall obtained by nutritionists and/or trained interviewers); physical activity (parents were asked five questions with four answer choices (4-point

		scale) ranging from 1 to 4 about children's activity)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Rush et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	62 schools in the intervention group and 62 schools in the control group
	Follow-up	Only post-intervention; 2 years after baseline
	Country	New Zeland
	Period	2004-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	692 individuals in the intervention group and 660 individuals in the control group at baseline and at follow-up
	Age	5–7 years old and 10–12 years old
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Each school programme is individualised to the school, and is based on a needs assessment informed largely by the school's stock-take and individual key priorities identified by the specific school. Team Energize staff 'modelled' classes and supported the usual class teacher. Classes modelled included fundamental movement skill training, ideas for 'huff and puff' fitness activities, modified games, and ball activities and sport-related games, where keeping children moving as much as possiblethroughout each session was the focus. Teachers requested and were provided with ideas for management and control of children during physical activity sessions. Energizers promoted active transport, lunchtime games and bike days. Energizers were also available to assist each school with arange of healthy-eating initiatives. These included canteen makeovers to remove pastry-based pies and 'big cookies'and add filled rolls, fruit and low-fat yogurt. 'Homeplay challenge', aimed to increase movement and water intake and reduce sedentary time in the home. Activities also targeted the local community through events such as gala open days and edible gardens.

	Duration of intervention	10-months (one school year)
	Frequency of PA	Not specified
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Sports games, active play, active lunchtime, active transport, bike days.
	Parent involvement	Yes, via educationallessons and evenings with dieticians
	Setting	School + community
	Who delivered the intervention	Energizers (trained nutrition and physical activity specialists).
	Theoretical framework	Not specified.
	Control	No intervention
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	% body fat (BIA); BMI standard deviation score (SDS) (calculated using the British 1990 reference population); %BF SDS (using the McCarthy–Cole fat Centiles and BP SDS using the Jackson BP centiles; resting blood pressure (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Sacchetti et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Classroom
	Number of clusters	26 3rd-grade classes
	Follow-up	Only post-intervention
	Country	Italy
	Period	2006-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	247 individuals in the intervention group and 250 in the control group at baseline; 212 in the intervention group and 216 in the control group at follow-up
	Age	8-9 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Extra hours of PE consisted of 60 minutes a day, moderate or vigorous physical activity in order to prevent obesity and cardiovascular risk factors (for intervention group)
	Duration of intervention	36-months
	Frequency of PA	5 times/week
	Duration of PA	300 min/week
	Intensity of PA	MPA or VPA
	Type of PA	Exercises, games, circuits,

	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school-based PE (2 PE lessons of around 50 minutes a week)
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; physical activity (self-administered questionnaire, modified from the Physical Activity Questionnaire for children aged 8-14 (PAQ-C)); physical fitnessm (Sit & Reach test, 2 kg medicine-ball forward throw test, standing long jump test, 20 m running speed test, forward roll test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Safdie et al. 2013
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	8 schools in the basic intervention, 8 schools in the plus intervention and 11 schools in the control; 1 plus intervention school lost to follow up after year 1
	Follow-up	Post-intervention, during intervention at the end of 7 months and 11 months
	Country	Mexico
	Period	2006-2008
Participants	Number of participants at baseline and follow-up (intervention/control)	886 at baseline; 252 in the basic intervention group, 224 in the plus intervention group and 354 in the control group at follow-up (analysis)
	Age	9.7+-0.7 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-low; Ethnicity-Hispanic
Intervention	Description	The basic program was limited to using existing school infrastructure and resources. The plus program included additional financial investment and human resources. The aim of the nutrition intervention component was to improve the prevailing food environment by increasing availability of healthy food and beverages (particularly water), by reducing the availability of energy-dense foods and SSB, and reducing the

		number of eating opportunities during the school day. The PA intervention included: Promotion of PA during recess and free time using an activity box, improving the quality of PE, improving sport infrastructure and providing equipment. In plus schools only, PE teachers were hired to teach one additional PE class per week (50 min) and to offer 15 to 20 minutes of moderate physical activity (calisthenics) referred to as "activation period" after the morning civics ceremony four days of each week. In the 2. intervention year morning PA was introduced to basic schools also.
	Duration of intervention (months or weeks)	18-months
	Frequency of PA	5 x/week (plus program)
	Duration of PA	110-120 min/week (plus program)
	Intensity of PA	MPA (plus program)
	Type of PA	Calisthenics (plus program)
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Specialized PE teachers (plus program)
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	The changes in MVPA in children during PE classes and recess were not significantly different from control schools; over 30% of the scheduled PE classes were cancelled.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; prevalence of overweight and obesity (IOTF); level of physical activity (SOFIT(System for Observing Fitness Instruction Time) a standardized direct observation instrument); physical activity (steps taken) at school (Nl-1000 pedometers)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Sallis et al. 1997
Methods and setting	Study design	Non-RCT
	Unit of allocation	Class
	Number of clusters	2 schools in specialist-led PE; 2 schools in teacher-led and 3 schools in control group
	Follow-up	Only post-intervention

	Country	USA
	Period	1990-1993
Participants	Number of participants at baseline and follow-up (intervention/control)	1538 at baseline; 264 students in specialist-led, 331 in teacher-led, and 360 in control conditions at follow-up
	Age	9.5 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 82%white, 12% Asian/Pacific Islander, 4% Latino, 2% African American
Intervention	Description	**Physical education program**: SPARK physical education classes were designed to promote high levels of physical activity, teach movement skills, and be enjoyable. SPARK lesson had two parts: health-fitness activities (15 minutes) and skill-fitness activities (15 minutes). **Self-management program:** The self-management program taught behaviour change skills to help children generalize regular physical activity outside of school. Self-management was taught in weekly 30-minute classroom sessions, and skills included self-monitoring, goal setting, stimulus control, self-reinforcement, self-instruction, and problem solving.
	Duration of intervention	20-months (2 school years)
	Frequency of PA	3 times/week
	Duration of PA	90 min/week
	Intensity of PA	Not specified
	Type of PA	Ten health-related activity units included aerobic dance, aerobic games, walking/jogging, and jump rope. Nine sport units that developed skill-related fitness included basketball and soccer.
	Parent involvement	Homework and monthly newsletters were intended to stimulate parent-child interaction and support for physical activity
	Setting	School
	Who delivered the intervention	Three certified physical education specialists; Trained classroom teacher
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Body fat (triceps and subscapular skinfolds); Out of-school physical activity (1-day recall in a checklist format); physical activity (accelerometer); health-related physical fitness (Fitness and anthropometric measures, Adaptations of the FHTFNESSGRAM protocols); Cardiovascular endurance (the mile-run test); muscular strength and

		endurance (the number of bent knee sit-ups in 60 seconds); upper body strength (The number of pull-ups); flexibility (sit-and-reach test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Salmon et al. 2008
Methods and setting	Study design	Group RCT
	Unit of allocation	Class
	Number of clusters	1 class in the BM intervention, 1 class in the FMS intervention, 1 class in the BM/FMS intervention and 1 class in the control group
	Follow-up	Post-intervention, 6-month follow-up and 12-month follow-up
	Country	Australia
	Period	March to November 2002
Participants	Number of participants at baseline and follow-up (intervention/control)	66 individuals in the BM intervention, 74 individuals in the FMS intervention, 93 individuals in the BM/FMS intervention and 62 individuals in the control group at baseline; 59, 72, 84, 63 post-intervention; 59, 60, 78, 49 at 6-month follow-up; 60, 69, 84, 55 at 12-month follow-up
	Age	Average age 10 years 8 months
	Sex	Both boys and girls
	Other characteristics	Australian; low socioeconomic areas
Intervention	Description	The primary goal of the intervention ('Switch-Play') was to develop and compare three approaches towards the achievement of healthy weight maintenance among 10-year-old children: (1) behavioural modification (2) fundamental movement skills development; or (3) through a combination of these two strategies. (A) Behavioral modification lessons were delivered in the classroom and incorporated: self-monitoring; the health benefits of physical activity; awareness of the home and community physical activity, and sedentary behaviour environments; decision-making and identifying alternatives to screen behaviours that included designing their own physical activity games; intelligent TV viewing and reducing viewing time; advocacy of reduced screen time through poster displays and role plays; use of pedometers; and group games;

		Children completed a weekly contrac tundertaking to switch off one television programme perweek over the 4-week period. (B) The Fundamental movement skills lessons were delivered either in the indoor oroutdoor physical activity facilities at each school. Through games and activities developed for this intervention, these lessons focused on mastery of six skills including three object control skills (overhand throw, kick and strike) and threelocomotor skills (run, dodge and vertical jump).
	Duration of intervention	9-months.
	Frequency of PA	19 sessions
	Duration of PA	40 – 50 min/session.
	Intensity of PA	Not specified.
	Type of PA	The FMS intervention focused on six skills, including three object control skills (overhand throw, kick and strike) and three locomotor skills (run, dodge and vertical jump).
	Parent involvement	in BM condition parents were encouraged to help their child maintain the switch-off of TV.
	Setting	School
	Who delivered the intervention	All intervention components were delivered by one intervention specialist (a qualified Physical Education teacher) across all three schools.
	Theoretical framework	Social cognitive theory and behavioural choice theory
	Control	Regular school activities
	Intervention fidelity	For the BM and FMS lessons there was an average attendance of 88% among the children. For the activities where children had to complete a task at home (i.e. the physical activity and sedentary behaviour self-monitoring sheets) the children completed 57 and 62% of the sheets, respectively. However, 92% of tasks undertaken in class were completed. Out of the 838 'Switch- Off' contracts developed for children in the BM or BM/FMS conditions to complete over the 4-week period, 588 were returned signed by a parent (70% participation rate). There was not a substantial decline in the percentage of contracts being returned from week one (75%) to week four (69%).
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; Children were categorized as healthy or overweight/obese (IOTF definitions); Physical activity (Manufacturing Technology Inc. (MTI), Florida, USA, Actigraph Model,

		AM7164-2.2C accelerometers); Self-reported screen behaviours (questionnaire); Self-reported enjoyment of physical activity (assessed with a modified version of an existing instrument, using a five-point Likert scale); Fundamental movement skills (an established protocol was used to assess children's FMS); food intake (food-frequency questionnaire consisting of 22 common food/drink items that were identified from National Nutrition Survey (NNS))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Santos et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	10 schools in the intervention group ad 10 schools in the control group
	Follow-up	Only post-intervention
	Country	Canada
	Period	October 2009 - May 2010 (one school year)
Participants	Number of participants at baseline and follow-up (intervention/control)	340 individuals in the intervention group and 347 individuals in the control group at baseline; 340 individuals in the intervention group and 307 in the control group at follow-up
	Age	6 to 12 yrs
	Sex	Both boys and girls
	Other characteristics	Canadian
Intervention	Description	The program content focused on physical activity, promoting healthy foods, and having a healthy body image using the slogans: "Go Move!" (activity), "Go Fuel!" (nutrition), and "Go Feel Good!" (body image). The "Go Move!" aspect included two 30-minute structured aerobic fitness sessions per week, called fitness loops, with the student pairs. The "Go Fuel!" component included lessons about distinguishing nutritious from unhealthy (nutrient- poor, energy-rich) foods and beverages. As part of the "Go Feel Good!" component, students were taught to value themselves and classmates based on individual traits rather than peer influence.
	Duration of intervention	10-months (one school year).
	Frequency of PA	2 times/week.
	Duration of PA	60 min/week.

	Intensity of PA	Vigorous
	Type of PA	Aerobic fitness sessions.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); BMI z-score (CDC); healthy living (questionnaire); Physical activity (daily logs of step counts obtained from a waist-mounted pedometer (StepsCount SC-01) worn for 7 days); Cardiorespiratory fitness (Léger 20-m shuttle run in the older students only)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Scherr et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 intervention schools and 2 control schools
	Follow-up	Only post-intervention
	Country	USA
	Period	2012-2013 academic year
Participants	Number of participants at baseline and follow-up	249 individuals in the intervention group and 235 individuals in the control group
	Age	Fourth grade students: 9-10 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity: mostly Asian/Pacific Islander; Caucasian/white, and Latino/hispanic Household income <$40,000: 18% in the control and 19.5% in the intervention group
Intervention	Description	The goals of the SHCP included (1) increasing Five overlapping components comprised the SHCP: (1) nutrition education and promotion, (2) family and community partnerships, (3) supporting regional agriculture, (4) foods avail-able on the school campus, and (5) school wellness committees and policies. These components were addressed through the implementation of nutrition education, cooking demonstrations, school gardens, family newsletters, health fairs, salad bars, procurement of regional produce, and school-site wellness committees.
	Duration of intervention	9-months

	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	via family newsletters and health fairs.
	Setting	School.
	Who delivered the intervention	UCCE nutrition educator.
	Theoretical framework	Social-ecological model.
	Control	Regular programme.
	Intervention fidelity	Not specified.
Outcomes		BMI percentile; BMI Z-score; waist-to-height ratio; nutrition knowledge; basic science process skills; vegetable identification and preferences; reported fruit and vegetable intake
Adverse outcomes		NR

Authors and year		Serbescu et al. 2006
Methods and setting	Study design	RCT
	Unit of allocation	School
	Number of clusters	Randomisation at individual level
	Follow-up	Only post-intervention
	Country	Romania
	Period	The intervention ran from early December 2003 to early May 2004
Participants	Number of participants at baseline and follow-up (intervention/control)	198 individuals in the intervention group and 172 individuals in the control group at baseline and at follow-up
	Age	B: 9.59+-0.8 yrs G: 9.69+-0.4 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-urban, middle class; ethnicity-Caucasian
Intervention	Description	Extra-curricular training programme consisted of 10 min of warm-up (mild running, stretching and callisthenic exercises); 30 min workout: moderate to vigorous activities (lower-limb-strengthening exercises; various games comprising high-impact running games, speed courses, slaloms, plyometric jumps, jumps over various obstacles, drop jumps, broad jumps, object manipulations, gymnastic routines, climbing); and 10 min of cool-down.
	Duration of intervention	6-months
	Frequency of PA	2 times/week

	Duration of PA	100 min/week
	Intensity of PA	MVPA
	Type of PA	impact-loading and weight-bearing exercises
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	All children achieved the minimal acceptance rate of 75%
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (skinfolds); enhancement in motor test performance (EUROFIT tests)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Sevinc et al. 2011
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	From the low- and high-value SES regions, 3 schools each (a total of 6 schools) were selected by using a simple random sampling method. These schools were randomly divided into 3 groups consisting of 1 school from the low and 1 school from the high SES level. Of these groups, 2 were again randomly selected as intervention groups and the remaining 1 as the control group. As a result, intervention group 1, intervention group 2, and the control group, each consisting of 2 schools, were formed.
	Follow-up	Only post-intervention
	Country	Turkey
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	1932 individuals in the intervention 1, 1989 individuals in the intervention 2, 2926 individuals in the control group at baseline and at follow-up
	Age	Grades were grouped as 1-3 and 4-7
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Turkish; socio-economic status - 3132 (50.8%) of them were the children of low-income families, 1812 (29.4%) were from middle-income families, and 1220 (19.8%) of them were from high-income families.

Intervention	Description	There were 2 intervention groups 2. First intervention group had extra PE hoursand healthy nutrition education. Second intervention group had healthy nutrition education only.
	Duration of intervention	8-months
	Frequency of PA	3 x /week.
	Duration of PA	180 min/week.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Yes. via healthy nutriton education.
	Setting	School.
	Who delivered the intervention	Personnel of the Health Training Division of the City Health Administration.
	Theoretical framework	Not specified.
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Shofan et al. 2011
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	Two adjacent elementary schools, each school consisting of 350 students from the same socio-economic background were chosen
	Follow-up	Only post-intervention
	Country	Israel
	Period	2004-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	91 individuals in the intervention group and 27 in the control group at baseline; 91 individuals in the intervention group and 25 in the control group at follow-up
	Age	9-11 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	At baseline, the normal physical education classes consisted of two lessons of 45 min each of medium intensity training with an estimated aerobic component of 25%. During the 2 years of the program, the study group received eight nutritional education lessons and double the physical education hours as compared with the

		control group. This activity was directed as intense aerobic activity designed to increase the aerobic component by 50%. At regular parents meetings, which occurred once a month for one hour per session for 10 months a year, the pediatrician and the dietitian encouraged healthy dietary habits.
	Duration of intervention	24-months
	Frequency of PA	2 times/week.
	Duration of PA	180 min/week.
	Intensity of PA	High
	Type of PA	Aerobic activity.
	Parent involvement	Yes. Participated in monthly meetings where they were taught about healthy dietary habits.
	Setting	School.
	Who delivered the intervention	Not specified for PA. Pediatrician and dietitian for diet topics.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Siegrist et al. 2011
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 4 schools in the control group
	Follow-up	Only post-intervention
	Country	Germany
	Period	2006-2007
Participants	Number of participants at baseline and follow-up (intervention/control)	486 in the intervention group and 340 in the control group at baseline; 427 in the intervention group and 297 in the control group at follow-up
	Age	8.4+ 0.7 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status was assigned as the highest academic level achieved by either parent (low: <9 years, middle: 10–12 years, and high: >13 years of school education); 7.9% children were underweight,78.2% were of normal weight, 7.1% were overweight

		and 6.8% were obese baseline
Intervention	Description	School environmental settings (e.g. the physical environment, organization of school breaks, playing during school time, and sports facilities) were altered to promote more physical activity. These changes were designed to increase physical movement, promote healthier food availability and choices (more vegetables and fruits and less energy-dense food), and reduce media consumption The program consisted of monthly lessons lasting 45 min with three parts: a warm-up of 10 min with running, playing running games at high intensity, 30 min exercises to improve body awareness and selfesteem with conversation in class about health-related topics, and 5 min relaxation exercises.
	Sedentary time, physical activity or both	PA
	Duration of intervention	10-months
	Frequency of PA	1 time/month
	Duration of PA	45 min/month
	Intensity of PA	Not specified
	Type of PA	Running, playing running games, exercises to improve body awareness, relaxation exercises
	Parent involvement	Yes, attended two educational health-related lessons
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time.	BMI; BMI SDS (LMS method); WC (measured); moderate to vigorous physical activity (measured as the number of days per week in which physical activity was performed for 60 min minimum (questionnaires)); media use (questionnaires); Physical fitness (measured by the Munich fitness test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Siegrist et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School

	Number of clusters	8 schools in the intervention group and 7 schools in the control group
	Follow-up	Only post-intervention
	Country	Germany
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	426 children in the intervention group and 366 individuals in the control group at baseline; 243 individuals in the intervention group and 191 individuals in the control group at follow-up
	Age	11.1 ± 0.6 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- Caucasian
Intervention	Description	Weekly lifestyle lessons aimed to increase physical activity in and outside of school by regular physical exercise in sports lessons and additional physical activity in school (active breaks during the lessons, active school breaks). Furthermore the school prevention program intended to improve the eating pattern (less sweetened drinks, more healthy meals at school, healthy breakfast) and the health behavior (reduction of media use and inactivity) of the pupils.
	Duration of intervention	18-months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Receiving newsletters regarding the topics of the lifestyle lessons and were invited to a parental training program (2–3 times a year).
	Setting	School.
	Who delivered the intervention	School teachers.
	Theoretical framework	Social cognitive theory.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI SDS (LMS method); blood samples (measured); diameters of retinal arterioles and venules (were measured using a Static Retinal Vessel Analyser); Physical activity (was assessed by two validated questions to determine the amount of moderate-to-vigorous physical activity); Physical fitness (was measured by a 6-item-test battery. The standardized test comprised 6 items (step test, jump-and-reach, flexed arm hanging, ball bouncing, goal throwing, stand-and-reach)).

Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Simon et al. 2014
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 4 schools in the control group
	Follow-up	30 months follow-up
	Country	France
	Period	Baseline survey took place between September and October 2002; annual surveys at the end of each of the 4 school years of intervention (between May and June)
Participants	Number of participants at baseline and follow-up (intervention/control)	479 individuals in the intervention group and 475 individuals in the control group at baseline; 374 individuals in the intervention group and 358 in the control group completed the trial; 275 in the intervention and 256 in the control at 30-month follow-up
	Age	The study participants had an initial mean (s.d.) age of 11.6(0.6) years; (range 9.9–13.8 years)
	Sex	Both boys and girls
	Other characteristics	French
Intervention	Description	A multilevel program, directed at modifying the personal, social and some environmental determinants of PA, is used to promote PA inside and outside school, including during everyday life. (A) The program includes an educational component focusing on PA and sedentary behaviours. The choice of physically active options in everyday life, such as active commuting to and from school or climbing stairs instead of taking the elevator, is emphasized. The fun of being physically active, the pleasure of sharing activities with friends, the health-related benefits, and the fact that PA helps staying fit and in good shape are underlined (B) New opportunities for PA during school hours (lunch pause, breaks) and after-school hours are offered, considering the obstacles to being active (lack of time, poor accessibility or unsafe recreational areas, inappropriate open time, nobody to drive the adolescents to

		and from the activities, cost, lack of physical capacity, etc.). Various physical activities attractive to youth are organized: either informal (organized games during breaks), innovative (hip-hop, dance, capoeira, etc.) or more academic, but in all cases, without any restrictive competitive aspect or intensity guidelines. Also, sporting events as well as bicycle and on-foot school transfers supervised by the intervention staff are organized. (C) Policy makers of local communities are requested to provide a supportive environment that promotes enjoyable PA. Low-cost or free of charge entry to safe accessible facilities, such as swimming pools and sport areas, have been proposed to implement ICAPS activities. To overcome the distance and transport barrier and to reassure the parents, transfers to the PA areas have been organized and supplementary busses made available when necessary.
	Duration of intervention	40-months (four school years).
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Various types.
	Parent involvement	Meetings are regularly organized with the parents, teachers and educators. These actors are encouraged to provide support to enhance the PA level of the adolescents by themselves adopting a physically active lifestyle, by limiting the time devoted by their child to sedentary pursuits and by letting him/her walk or cycle to school, for example. To renew interest, regular information on the ongoing actions and results are given with the help of parents' organizations and the academic staffs.
	Setting	School + community + home
	Who delivered the intervention	Sport-qualified instructors.
	Theoretical framework	Socio-Ecological Theory.
	Control	Control students followed their usual school curriculum without any intervention.
	Intervention fidelity	In the first six months, all the students were exposed to at least two educational classes or debates devoted to PA, organized in groups of 15 pupils on school time with teacher collaboration. Concerning PA, a mean of 10 different weekly activities was provided on each site. About 50% of the students participated in at least one weekly activity. Parental attendance at the meetings was low,

		especially in poor economic environments (25% to 40% of the parents, depending on the school).
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score and fat mass index (FMI calculated as fat mass (kg) divided by the square of the height (m2)) were used as adiposity indicators; Overweight (IOTF gender-age-cutoffs); Self-reported LPA (Modifiable Activity Questionnaire for adolescents); time spent per week in supervised leisure PA (LPAT excluding physical education classes) and regular participation in sports clubs (yes/no) were considered; Time spent in front of the TV/video (TVT) and in active commuting between home and school/worksite was recorded; TVT was expressed in minutes per day or in two categories (less or more than 2 h per day). Active commuting was categorized in less or more than 20 min per day. Self-efficacy, intention and social support toward exercise (inverse scores were considered so that higher scores indicate better outcomes) were assessed using the Stanford Adolescent Heart Health Program's questionnaire
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Skoradal et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	9 schools in the intervention group and 3 schools in the control group
	Follow-up	1 week
	Country	Faroe Island
	Period	2017
Participants	Number of participants at baseline and follow-up (intervention/control)	292 in the intervention group and 100 in the control group at baseline; 33 of the 392 children did not complete the full test battery (at follow-up)
	Age	11.1+-0.3yrs (range 10-12)
	Seks	Both boys and girls
	Other characteristics	/
Intervention	Description	Intervention was set to substitute mathor english lessons with PA. Football-based games and activities were implmented to teach the children football skills, teamwork, and respect. Small-

		sided games (3v3, 4v4) were included in every session.
	Duration of intervention	11-weeks
	Frequency of PA	2 times/week
	Duration of PA	90 min/week
	Intensity of PA	Not reported
	Type of PA	Football elements
	Parent involvement	No
	Setting	School
	Who delivered the intervention	FIFA 11 trained teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (Bioelectrical Impedance Analysis); FFM (Bioelectrical Impedance Analysis); Resting blood pressure and heart rate (measured); Physical performance (horizontal jumping and postural balance performance)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Sollerhed et al. 2008
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 schools in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	Sweden
	Period	2000-2003
Participants	Number of participants at baseline and follow-up (intervention/control)	58 individuals in the intervention group and 74 individuals in the control group at baseline and at follow-up
	Age	6-9 yrs at baseline and 9-12 years at follow-up
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The PE time was expanded from one or two lessons a week (one lesson- 40 min including change and shower) to four lessons, with every lesson being guaranteed to last for 40 min. Time for change and shower was not included in the 40 min. The four lessons were scheduled on 4 days. On the 5th day, classes had outdoor physical activities with their classroom teacher for about 1 h. Obese children had the possibility to have one extra voluntary lesson a week, with special attention paid to motor skills and self-esteem

	Duration of intervention	36-months
	Frequency of PA	5 times/week
	Duration of PA	220 min/week
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers (half-time) and partly by ordinary classroom teachers who were not specially trained for physical education teaching
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI ratio (compared to IOTF cut-off); WC (measured); actual physical performance (11 physical tests that comprised the physical indeks); aerobic fitness, muscular strength in the upper body, hands, abdomen and legs, flexibility, balance and motor skills (most of the tests are from the EUROFIT test battery); Endurance performance (running test for 6 min); learned motor skills (rope skipping and ball bouncing)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Spruijt-Metz et al. 2008
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 3 schools in the control group
	Follow-up	3 months post-intervention
	Country	US
	Period	Five to seven consecutive school days at each school early in the Spring Semester
Participants	Number of participants at baseline and follow-up (intervention/control)	136 girls in the intervention group and 110 girls in the control group at baseline and follow-up
	Age	12.5 yrs
	Sex	Girls only
	Other characteristics	Ethnicity - Asian/Asian American (15.7%), Latino (72.8%), Other (3.9%), White (7.6%)
Intervention	Description	A media-based physical activity intervention was delivered to students during five to seven in-class sessions for five to seven consecutive school days for two hours each day. Students received information about physical activity and sedentary behavior, participated

		in learning activities (“teachable moments”) that supported engagement in physical activity and reduction of time spent watching TV, sitting in front of the computer, or ‘just sitting around’.
	Duration of intervention	5 – 7 days (1 week)
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Teachers.
	Theoretical framework	Self Determination Theory and the Theory of Meanings of Behavior.
	Control	Not specified.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI percentile (CDC); body fat (BIA); A modified previous day physical activity recall (PDPAR) instrument was used to assess physical activity and sedentary behavior in blocks of 30-minute bouts throughout the day; Meanings of physical activity (Meanings of Physical Activity Scale (MPAS)); Motivation for physical activity (Exercise Self-Regulation Questionnaire (SRQ-E))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Stock et al. 2007
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 school in the control group
	Follow-up	Post-intervention
	Country	Canada
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	235 individuals in the intervention group and 151 individuals in the control group at baseline; 228 individuals in the intervention group and 132 individuals in the control group at follow-up
	Age	1^{st} -3^{rd} grade and 4^{th} -7^{th} grade
	Sex	Both boys and girls
	Other characteristics	Ethnicity- predominantly white; Socio-economic status-slightly lower than the average for British Columbia

Intervention	Description	The program's content is based on 3 main components of healthy living: being physically active, eating healthy foods, and having a healthy body image. The program's slogan ("Go Move!", "Go Fuel!", and "Go Feel Good!") emphasizes these 3 themes. At the beginning of the school year, students in 4th through 7th grade were paired with kindergarten through 3rd-grade buddies. Each week, students in 4th through 7th grade at the intervention school received a 45-minute healthy-living lesson through direct instruction from the intervention teacher. Students in 4th through 7th grade then acted as peer educators, teaching a 30-minute lesson to their kindergarten through 3rdgrade buddy. The buddy pairs spent 2 sessions per week doing 30- minute structured aerobic fitness sessions, called fitness loops. Each fitness loop incorporated a circuit, with a series of stations, designed around a theme (eg, transportation fitness loop). Students were encouraged during the fitness loops to exercise vigorously, using self-measured parameters of physical exertion (eg, sweating, red in the face, etc). The intervention school also participated in a school-wide healthy-living theme day, midway through the year. Each classroom prepared an activity and buddy pairs rotated through the different activities.
	Duration of intervention	21-weeks
	Frequency of PA	2 times/week
	Duration of PA	60 min/week
	Intensity of PA	VPA
	Type of PA	Structured aerobic fitness sessions, called fitness loops. Each fitness loop incorporated a circuit, with a series of stations, designed around a theme (eg, transportation fitness loop)
	Parent involvement	Not specified
	Setting	School
	Who delivered the intervention	Teacher; Students (from 4th to 7th grade) acted as educators, teaching their kindergarten to 3rd grade friends.
	Theoretical framework	Not specified; Peer-teaching model
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment	BMI; fitness- measured by 9-minute run; knowledge about healthy living- questionnaire; self-competence- 28-item self-

	weight related outcomes, PA, fitness, sedentary time,	report instrument; body image perception- modified version of Figure Rating Scale; eating attitudes- The Children's Eating Attitude Test (ChEAT)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Story et al. 2003
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	US
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	26 individuals in the intervention group and 28 individuals in the control group
	Age	9 yrs
	Sex	Girls only
	Other characteristics	Ethnicity - "Approximately 83% of parents were African-American only, 6% were biracial, and 11% were Caucasian." Socio-economic status - "The majority of households were low-income, with 54% of parents reporting incomes of less than $30,000 per year. Approximately 44% of homes were female-headed households. The average BMI for parents was 32.8 kg/m2. The majority (92%) of parents were overweight (BMI 25–29.9) or obese (BMI > 30)."
Intervention	Description	The after-school intervention was conducted twice a week for 12 weeks, and focused on increasing physical activity and healthy eating. A major component of the afterschool intervention was increasing physical activity levels with a variety and choice of activities, such as dancing (ethnic, hip hop, aerobic), double-dutch jump rope, relay races, active African-American games, tag, and step aerobics.
	Duration of intervention	12-weeks
	Frequency of PA	2 times/week.
	Duration of PA	120 min/week.
	Intensity of PA	MVPA.
	Type of PA	Dancing (ethnic, hip hop, aerobic), double-dutch jump rope, relay races, active African-American games, tag, and step aerobics.

	Parent involvement	The after-school intervention messages were reinforced by family activities, including weekly family packets sent home to the parents; family night events; phone calls by GEMS staff to parents, to encourage them, and to check their progress on their family goals they set; and organized neighbourhood walks.
	Setting	School.
	Who delivered the intervention	Trained African-American GEMS staff.
	Theoretical framework	Social Cognitive Theory.
	Control	Participants attended monthly Saturday morning meetings (3 meetings during the 12-week period), which included arts and crafts, self-esteem activities, creating memory books, and a workshop on African percussion instruments.
	Intervention fidelity	Girls in the intervention group attended a mean of 21 of 24 sessions
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); %body fat (DEXA); physical activity (The Computer Science Application(CSA) accelerometer); The GEMS Activity Questionnaire(GAQ), developed by the GEMS research group, was used as a self-reported measure of physical activity; Dietary Intake (24-hour recalls (the first one face-to-face, the second by telephone) on non-consecutive days (one weekday and one weekend day, when possible)); A 12-item measure assessing behaviour intentions for choosing healthy food items was included; Self-efficacy for Healthy Eating (9-item self-efficacy measure was developed); diet Knowledge (6-item measure); Fruit and Vegetable Snack Accessibility (2-item measure); parent encouragement for Healthy Eating (5-item measure); Physical activity (PA) psychosocial variables (measured); Body image/weight concern (question); Parent-reported diet variables; Parent-reported activity variables
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Story et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School

	Number of clusters	6 schools in the intervention group and 8 schools in the control group
	Follow-up	3 weeks; 27 weeks
	Country	USA
	Period	2006-2007
Participants	Number of participants at baseline and follow-up (intervention/control)	267 individuals in the intervention group and 187 individuals in the control group at baseline; 91.85% at follow-up
	Age	5.8 +- 0.5 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-American Indian; 32% of boys and 25% of girls were overweight/obese baseline
Intervention	Description	The goals of the intervention were to: Increase physical activity at school to at least 60min/day. This was accomplished through a variety of approaches, including school PE, class walks outdoors, in-class action breaks, and active recess. The in-class "action breaks" were teacher-led, fun, active movements and dancing accompanied by American Indian music, counting, reciting the alphabet, using Lakota words, etc. Class walks of 20min were scheduled at least twice a week. Active daily recess to provide moderate-to-vigorous physical activity was promoted, and playground equipment, such as balls and jump ropes were provided to intervention schools. PE teachers were trained by a CATCH PE expert to incorporate CATCH PE. Food-service staff at the intervention schools were trained during each of the two years on specific goals, including to: offer 1% white milk instead of 2% or whole milk, eliminate chocolate or other flavored milks, serve recommended portion sizes, purchase and use lower-calorie/fat foods, offer low-fat salad dressing in a portion-controlled container, provide more fruits and vegetables, and offer second helpings only on fruits and vegetables.
	Duration of intervention	12-months
	Frequency of PA	5 times/week
	Duration of PA	300 min/week
	Intensity of PA	MPA or VPA
	Type of PA	Walking, active play, dancing.
	Parent involvement	Yes, attending Family Nights setting specific behavioral goals with trained Bright Start research staff regarding changes that could be made in the home environment to foster healthy eating and physical activity

	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	The means for total physical activity (min/day) in intervention schools were 64.2 (SD = 9.7) in kindergarten and 64.3 (SD = 12.3) in first grade, with school-specific means ranging from 51.4 to 89.6min/day. The mean physical activity from class walks was 12.9min/day (SD = 8.9) in kindergarten and 8.5min/day (SD = 3.9) in first grade. Corresponding means for action breaks were 9.6min/day (SD = 9.6) and 5.7min/day (SD= 3.3) for kindergarten and first grade, respectively. Across the intervention schools, the mean number of days per week that school was held during the intervention period was 4.0 (SD = 0.3) in kindergarten and 4.3 (SD = 0.3) in first grade.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; BMI z score (CDC); body fat % (BIA); prevalence of overweight and obesity (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Taylor et al. 2008
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 3 schools in the control group
	Follow-up	After 1 year at the half time of the intervention, after 2 years immediately post-intervention and 2 years after the end of the intervention (4 years after baseline)
	Country	New Zeland
	Period	2003-2005
Participants	Number of participants at baseline and follow-up (intervention/control)	727 individuals at baseline; 280 (73.5%) in the intervention group and 274 (79.2%) in the control group at follow-up
	Age	7.5 ± 1.6 yrs
	Seks	Both boys and girls

	Other characteristics	Ethnicity-82.6% white, 16.5% Maori, and 1% Pacific Islanders
Intervention	Description	APPLE was a multifaceted intervention with the aim of increasing physical activity, increasing the intake of fruit and vegetables, and reducing the intake of sugary drinks. Community Activity Coordinators were employed to increase noncurricular activity at recess, lunchtime, and after school; curricular-based activities. Development of resources facilitating short bursts of activity in class and the increased availability of sports equipment in an effort to encourage "free play."
	Duration of intervention	24-months
	Frequency of PA	Not reported
	Duration of PA	Not reported
	Intensity of PA	Not reported
	Type of PA	Not reported
	Parent involvement	Yes
	Setting	School and community
	Who delivered the intervention	PE teachers, Activity coordinators, community volunteers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z score (2000 CDC); prevalence of overweight (2000 CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Taylor et al. 2007
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 3 schools in the control group
	Follow-up	After 1 year at the half time of the intervention and post-intervention
	Country	New Zeland
	Period	2003-2005
Participants	Number of participants at baseline and follow-up (intervention/control)	727 individuals at baseline; 151 in the intervention group and 137 in the control group at follow-up
	Age	7.7 ± 1.6 yrs

	Sex	Both boys and girls
	Other characteristics	Ethnicity-82.6% white, 16.5%Maori, and 1% Pacific Islanders
Intervention	Description	APPLE was a multifaceted intervention with the aim of increasing physical activity, increasing the intake of fruit and vegetables, and reducing the intake of sugary drinks. Community Activity Coordinators were employed to increase noncurricular activity at recess, lunchtime, and after school; curricular-based activities. Development of resources facilitating short bursts of activity in class and the increased availability of sports equipment in an effort to encourage "free play."
	Duration of intervention	24-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes
	Setting	School and community
	Who delivered the intervention	PE teachers, Activity coordinators, community volunteers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (2000 CDC); WC (measured); prevalence of overweight (2000 CDC); PA (measured with accelerometers & PA Questionnaire for Older Children); systolic blood press (measured); food intake (questionnaire); television viewing (individual report)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Tarp et al. 2018
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 4 schools in the control group
	Follow-up	Post-intervention and 5 years post-intervention
	Country	Denmark
	Period	2008-2010

Participants	Number of participants at baseline and follow-up (intervention/control)	At long term follow up in 2015, n= 312 participants had complete data (33% of children providing necessary baseline data)
	Age	7.8+-1.3 yrs
	Sex	Both boys and girls
	Other characteristics	Based on summary-level statistics from the National Danish Registry of Statistics, parents at schools participating in the project had approximately 15% higher household income, but did not differ in educational level, as compared with non-participating school. There were no differences in summary-level income or the educational attainment of parents between intervention and control schools; The prevalence of overweight or obesity was 8.4% at baseline
Intervention	Description	Curricular physical education was increased from 90 to 270 min per week distributed across at least three school days.
	Duration of intervention	84-months.
	Frequency of PA	>=3 times/week.
	Duration of PA	270 min/week.
	Intensity of PA	Not specified.
	Type of PA	Play, exercise and games. The focus on technical and coordinative skills was increased as children entered adolescence.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	PE teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities (PE 90 min per week).
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	WC (measured); OB or OW prevalence (IOTF); blood samples (measured); Resting blood pressure (measured using appropriate sized cuffs by a Vital Signs Monitor 300 series with Flexiport); Cardiorespiratory fitness (was assessed using a field-test (Andersen-test) lasting 10 min with fifteen seconds of intermittent running and pausing); BMI (measured); Physical activity levels (were assessed by questionnaires and accelerometry in 2015 only)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Treu et al. 2017

Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	8 schools in the standard intervention group; 9 schools in the enhanced intervention group and 9 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2010-2011
Participants	Number of pa rticipants at baseline and follow-up (intervention/control)	416 individuals in the standard intervention group, 512 individuals in the enhanced intervention group and 559 individuals in the control group at baseline and at follow-up
	Age	8.7+-0.4 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-significant differences in distribution of ethnicity among all three groups; 65-70% white, 10% black in the intervention groups; 46%black, 38% white in control group
Intervention	Description	This study used a quasi-experimental design with three treatment groups: a low-dose ‘‘standard intervention’’ (SI) group that received a nutrition education program and a classroom-based physical activity program for students; a higher-dose ‘‘enhanced intervention’’ (EI) group that received these two programs for students along with additional nutrition and physical activity components for these students and their parents; and a control group that offered its usual programming to its students. ABC for Fitness offers brief ‘‘bursts’’ of physical activity in the classroom, each of a few minutes in length, spread over the school day. Classroom teachers offered 30 daily minutes of activity bursts throughout the school year.
	Duration of intervention	10-months (1 school year)
	Frequency of PA	5 times/week
	Duration of PA	150 min/week
	Intensity of PA	Not specified
	Type of PA	Warm-up, cool-down, hopping, running in place, jumping jacks, or dancing to music.
	Parent involvement	Additional nutrition and physical activity components for these students and their parents
	Setting	School, (family for EI group)
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Not specified
	Control	Regular school activities

	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score (CDC); Aerobic capacity (VO2max) – (Progressive Aerobic Cardiovascular Endurance Run protocol)); abdominal strength (measured by Curl-ups, upper body strength by the 90-degree Push-ups, back extensor strength by the Trunk Lift), and flexibility (by the Back Saver Sit & Reach); Knowledge of Healthful Food Choices (Children's ability to choose ''better for you'' foods was assessed by using a standardized test instrument based on nutrition labels of food items developed specifically for the ND program); Classroom Behaviour (classroom teachers recorded the number of incidents); Data on the number of children using medication for asthma and/or ADHD were collected by school nurses; Academic Performance (AIMSweb standardized tests)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		The Healthy study group 2010
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	21 schools in the intervention group and 21 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2006-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	6358 individuals at baseline and 4603 at follow-up
	Age	11.3±0.6 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-54.2% Hispanic,18.0% black, 19,3% white, 8,5% other; BMI>85th percentile 58,4% Hispanic, 18,4% black, 15,5% white, 7% other in the intervention group and 53,5% Hispanic, 15,7% black, 21,6% white and 9,2% in the control group at the baseline
Intervention	Description	The intervention had 4 components: nutrition, physical activity, behavioural knowledge and skills, communications and social marketing. The physical-education component was designed to increase the amount of time students spent in moderate-to-vigorous

		physical activity, defined as activit y suff icient to raise the heart rate to 130 beats or more per minute. The core activities consisted of basketball, soccer (speedball embedded) and team handball. In total, the majority of the lessons had the potential to achieve 30 −40 min of MVPA in a 45- min class.
	Duration of intervention	36-months
	Frequency of PA	3 times/week
	Duration of PA	90 min/week
	Intensity of PA	Moderate or vigorous PA, heart rate > 130 bpm
	Type of PA	MVPA
	Parent involvement	Yes, but not specified
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z score (CDC 2000); WC (measured); fasting measurements of weight, height, waist circumference, blood pressure, glucose level, and insulin level (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Thivel et al. 2011
Methods and setting	Study design	RCT
	Unit of allocation	School
	Number of clusters	14 schools in the intervention group and 5 schools in the control group
	Follow-up	Only post-intervention
	Country	France
	Period	January – June 2003
Participants	Number of participants at baseline and follow-up (intervention/control)	229 individuals in the intervention group and 228 individuals in the control group
	Age	6-10 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – French
Intervention	Description	In the intervention schools, a physical activity program was organized for 6 months and consisted of 120 min of supervised physical exercise in addition to 2 h of Physical Education classes per week. The sessions consisted of a 10-min warm-up followed by

		psychometric activities and exercises to improve coordination, flexibility, strength, speed, and endurance. The main objective of the sessions was to increasethe time spent in PA and minimize inactivity.
	Duration of intervention	6-months
	Frequency of PA	2 times/week.
	Duration of PA	120 min/week.
	Intensity of PA	Not specified.
	Type of PA	Exercises to improve coordination, flexibility, strength, speed, and endurance.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Sports science students as part of their training; they were themselves supervised by a member of the investigation staff.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Obesity (French reference curves for BMI); The sum of the four skinfolds and fat free mass were determined. Ground tests were used to assess aerobic (20-m shuttle run test) and anaerobic (cycling peak power) fitness
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Vandongen et al. 1995
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools in the control group, 5 schools in the physical fitness group, 5 schools in the school nutrition group, 5 schools in school nutrition + physical fitness group, 5 schools in home nutrition group and 5 schools in school nutrition + home nutrition group
	Follow-up	Only post-intervention
	Country	Australia
	Period	1990
Participants	Number of participants at baseline and follow-up (intervention/control)	1147 at baseline; 158 in physical fitness group, 162 in physical fitness + school nutrition group; 199 in school nutrition group, 126 in school + home nutrition group, 181 in home nutrition group and 145 in control group at follow-up

	Age	10-12 yrs
	Sex	Both boys and girls
	Other characteristics	NR
Intervention	Description	The study consisted of six groups: 1) physical fitness, 2) physical fitness + school nutrition, 3) school nutrition, 4) school nutrition + home nutrition, 5) home nutrition, 6) control. 15 minutes of fitness activities that incorporated the principles of interval trainingand gradual progression were offered daily. In addition, 6 x 30 min classroom sessions aimed at providing the children with the rational basis for their activity programs and exercise in general were delivered during the first term. The school-based nutrition program consisted of 10 1-hr lessons, which aimed to improve knowledge, attitudes and eating habits. The home-based nutrition program presented 5 nutrition messages using comics delivered through the school.
	Duration of intervention	9-months
	Frequency of PA	5 times/week
	Duration of PA	75 min/week
	Intensity of PA	MVPA
	Type of PA	Physical fitness programs: Running, relays, skipping and “health hustles”
	Parent involvement	Only in the home-nutrition group (Parents were involved in child nutrition education by assisting with homework exercises and helping to prepare healthy recipes)
	Setting	School
	Who delivered the intervention	Researchers, classroom teachers and specialists in health and PE
	Theoretical framework	Not specified
	Control	Regular school activities.
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (skinfolds (triceps and subscapular)); blood pressure, cholesterol (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Vilchis-Gil et al. 2016
Methods and setting	Study design	Non-RCT
	Unit of allocation	School

	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	After 6 months during intervention and post-intervention
	Country	Mexico
	Period	2013-2014
Participants	Number of participants at baseline and follow-up (intervention/control)	226 individuals in the intervention group and 181 in the control group at baseline; 193 in the intervention group and 154 in the control group at follow-up
	Age	7.9+-1.2 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Hispanic; Socio-economic status-low 26%; medium 33%, high 41%
Intervention	Description	Three educational in-person parents and children sessions were held at 2-month intervals to promote healthy eating habits and exercise. To reinforce the information, a website provided extensive discussion on a new topic every 2 weeks, including school snack menus and tools to calculate body mass index in children and adults. Text messages were sent to parents' mobile phones reinforcing the information provided
	Duration of intervention	12-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Parents were involved by in-person sessions and via SMS. Guidelines for parents were developed with information on how to prepare a healthy school lunch, including numerous examples.
	Setting	School
	Who delivered the intervention	Two Nutritionists and a Physical Educator
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z score (WHO); WC (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Wadalovska et al. 2019

Methods and setting	Study design	Non-RCT
	Unit of allocation	Classroom
	Number of clusters	32 classes in the intervention group and 16 classes in the control group
	Follow-up	33 weeks
	Country	Poland
	Period	2015-2016
Participants	Number of participants at baseline and follow-up (intervention/control)	319 students in the intervention group and 145 in the control group at baseline and at follow-up
	Age	11-12 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-The Family Affluence Scale (FAS), mean (95%CI)= 5.3 (5.1, 5.5)
Intervention	Description	The education program covered five topics about diet and lifestyle lasting three weeks (total of 15 h). Program was provided as talks and workshops focused on activating participants. Each topic lasted 4 h of school lessons (approximately 180 min) and included various forms of education from fun to "scientific" cognition .
	Duration of intervention	3-weeks
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	Regular school
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Academic researchers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; waist-to-height ratios –WHtR (measured); Screen time ("How much time do you spend watching TV or on the computer or in front of a computer on an average day of the week?"); Physical activity (2 questions > one of three answers describing their PA at school (low, moderate, vigorous) and during leisure time (low, moderate, vigorous))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Wang et al. 2018

Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	16 vs. 16 primary schools and 8 vs. 8 junior high schools within intervention vs. control group in this study
	Follow-up	Only post-intervention
	Country	China
	Period	From September 2013 to June 2014 (one academic school year)
Participants	Number of participants at baseline and follow-up (intervention/control)	10447 eligible participants, 10091 students were successfully recruited (response rate=96.6%) at baseline, and 9858 (97.7%) of them completed the follow-up survey immediately after the intervention
	Age	9.0+-0.1 yrs (4^{th} grade) and 12.0+-0.01 yrs (7^{th} grade)
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	Intervention consisted of four components: 1) Classroom curricula: knowledge of obesity and its hazards to health, the benefits of sufficient PA for body weight control, and skills to maintain sufficient PA, reduce screen time and take physically active transportation in daily lives. 45 min for each classroom curriculum was delivered monthly 2) School environment: posters and slogans, easily-accessed measuring instruments, news leaflets regarding program progress, sent quarterly. 3) Family involvement: health classes for parents each semester, homeworks, three one-week activites in second semester (Physical housework week, Walk-to-school week, No-TV week). 4) Fun programs/events: composition writing with a focus on obesity and its hazards to health, PA and its impact on body weight control in the first semester, painting class with the theme of PA events in daily life in second semester.
	Duration of intervention	10-months (one school year).
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Families (parents) were involved in this study via three ways. First, one health class was prepared for parents in each semester. Second, parents were assigned homework and asked to complete it with their children Third, with assistance from parents, three

		special 1- week activities were developed for all intervention students in the second semester, including: Physical housework week; Walk-to- school week; No-TV week:
	Setting	School + home.
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	Control group continued standard education provision
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Students' demographic characteristics, PA, obesity and healthy lifestyle-related knowledge and dietary behaviors (questionnaires); A validated item-specific PA questionnaire, Children Physical Activity Item Questionnaire (CPAIQ), was used to collect information on students' PA over the past seven days, including the name of each PA, frequency and duration; Consumption of red meat, vegetables, fast food and soft-drinks in the past seven days were assessed using items selected from a validated food frequency questionnaire (FFQ); BMI; BMI-Z score: the deviation of the value for an individual from the mean value divided by the standard deviation based on the recommendation for Chinese children; Weight status - overweight and obesity (specifically recommended age- and gender-specific references for Chinese children)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Waters et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	12 schools in the intervention group and 10 schools in the control group
	Follow-up	Only post-intervention
	Country	Australia
	Period	January 2006 - June 2009
Participants	Number of participants at baseline and follow-up (intervention/control)	1594 individuals at the intervention group and 1628 individuals in the control group at baseline; 1426 individuals in the intervention group and 1539 in the control group at follow-up
	Age	5-12 yrs
	Sex	Both boys and girls

	Other characteristics	Ethnicity-Australian; socio-economic status-Of the 31 Melbourne municipalities, this area ranked seventh in social disadvantage at the time of the study. This municipality also has one of the highest levels of residents who belong to the Catholic and Islamic faiths (36% and 10%, respectively, compared to 30% and 4% across Melbourne). However, there is marked variation in demographic and economic background cross the municipality, and it has shifted over time towards a higher socio-economic profile as housing demand and inner-urban location has resulted in families with higher median incomes moving into the area.
Intervention	Description	Schools were supported to develop fun ‘n healthy pro- grams according to the fixed requirement of a whole school combined focus on increasing fruit, vegetable and water consumption, increasing physical activity and encouraging positive self-esteem in children. Three full time CDWs provided support to 4 schools each in the first 2 years. This then reduced to 2 full time CDWs providing targeted support to schools based on need. This support ensured that the strategies followed health promotion principles in creating a supportive and sustainable environment, customised for the school community to achieve changes in relation to the school system, policy, curriculum, environment, and child behavior and health outcomes. PA strategies implemented in more than 4 schools: Changed playground New sports equipment Class/school exercise sessions After school sports class Active Transport Policy–Bike sheds/racks PE teacher Ride/walk to school Soccer club clinics
	Duration of intervention	42-months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	.
	Setting	School, home.

	Who delivered the intervention	Intervention staff were employed by Merri Community Health Services.
	Theoretical framework	Health Promoting Schools Framework.
	Control	Regular school activities
	Intervention fidelity	Not specified .
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI-z-score (WHO); Fruit and vegetable intake and sweet drink consumption (parental report and child report using questionnaire, direct assessment of school foods and 24 hour food record); Participation in sedentary activity, physical activity and activity intensity (parental and child report); Child experience (child report and child focus groups); Impacts on the school, home and community environments (School report, Principal exit interviews, Teacher-reported school- and class-based nutrition and physical activity initiatives and level of support, Observational measure: SOPLAY (System for Observing Play and Leisure Activity in Youth), Parental report through parent questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Webber et al. 2008
Methods and setting	Study design	RCT
	Unit of allocation	Children in 6 schools at each of the 6 field centers
	Number of clusters	/
	Follow-up	spring 2003, 2005 and 2006
	Country	USA
	Period	2003-2006
Participants	Number of participants at baseline and follow-up (intervention/control)	During 2003 spring, a total of 1721 (79.7%) consented and participated in the measurement. During 2005 spring, 3504 (85.0%) consented and participated in the measurements. During 2006 spring, 3502 (89.5%) consented and participated in the measurements.
	Age	6th graders in 2003 and 8th graders in 2005
	Sex	Only girls
	Other characteristics	Ethnicity-The study population was diverse with the largest percentage of African-American girls in Louisiana and South Carolina and the largest percentage of Hispanic girls in California and Arizona. Socio-economic status-not stated

Intervention	Description	The intervention was designed to establish more opportunities, improve social support and norms, and increase self-efficacy, outcome expectations, and behavioral skills to foster greater MVPA. Intervention linked school and community agencies to develop and promote physical activity programs for girls. These programs were delivered both on and off school property, in most cases either before or after school. Community partners included the YMCA or YWCA, local health clubs, and community recreation centers. Examples of programs include lunch-time Dance Dance Revolution, after-school step-aerobics class, before-school open gym, basketball camp, touch football, and weekend canoe programs. Programs did not replace physical education class. TAAG physical education class promoted MVPA for at least 50% of class time and encouraged teachers to promote physical activity outside of class. Physical education teachers were trained by TAAG interventionists on class management strategies, skill-building activities, the importance of engaging girls in MVPA during class, and the provision of appropriate equipment and choices of physical activity. TAAG promotions used a social marketing approach to promote awareness of and participation in activities through media and promotional events. TAAG promotions also provided schoolwide messages designed to increase the acceptance and support for physical activity for all girls. TAAG health education included six lessons designed to enhance behavioral skills known to influence physical activity participation.
	Duration of intervention	36-months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	TAAG physical education class promoted MVPA for at least 50% of class time.
	Type of PA	Lunch-time Dance Revolution, after-school step-aerobics class, before-school open gym, basketball camp, touch football, and weekend canoe programs.
	Parent involvement	Not specified.
	Setting	School and community

	Who delivered the intervention	TAAG staff and teachers.
	Theoretical framework	operant learning theory, social cognitive theory, organizational change theory, and the diffusion of innovation model in a social-ecologic framework
	Control	Regular school activities
	Intervention fidelity	Across schools and sites, 93% and 89% of health education lessons were taught in Years 1 and 2, respectively, with 91% and77% of 7th- and 8th-grade girls, respectively, receiving the lessons. the average number of programs created from linking schools with community agencies was 4.7, 7.6, 6.3, and5.9 programs per school. Average program attendance per session by semester was 18.1, 11.5, 16.1, and 13.9 attendees/session.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical activity (Actigraph accelerometers (MTI model 7164)); BMI (measured); triceps skinfold (measured); Percent body fat (was estimated from anthropometric measures using an equation); Class-level physical activity in physical education class (was measured by the system for observing fitness instruction time (SOFIT))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Weber et al. 2017
Methods and setting	Study design	Non-RCT
	Unit of allocation	Class
	Number of clusters	4 classes in the intervention group and 6 classes in the control group
	Follow-up	Only post-intervention
	Country	Germany
	Period	School year 09/2012–06/2013
Participants	Number of participants at baseline and follow-up (intervention/control)	90 individuals in the intervention group and 134 individuals in the control group at baseline for body composition and fitness; 70 in the intervention group and 125 in the control group at follow-up for body composition; 70 in the intervention group and 122 in the control at follow-up for fitness; 20 in the intervention and 17 in the control group for accelerometer monitoring; 71 in the intervention group and 114 in the control group for dietary intake and knowledge

	Age	3rd and 4th grade children
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Type	Extra PE hours, Lifestyle curriculum.
	Description	The children of the intervention group participated in the sport lessons for 2 additional school hours weekly, with each school hour lasting 45 min and offered a very diverse exercise program with extensive motor training and a high amount of moderate-intensity exercise time. The children additionally received 10 school lessons of nutritional education, i.e., about one school lesson monthly, per school year. Extra-curricular PA, which formed the third part of the intervention program and were conducted once per school year, included a soccer training session in the youth academy center of a German soccer league team, an aqua fitness training session, a visit of an interactive musical on human health, and a visit of a bakery where the children baked their own bread. The intention of these activities were, first, to involve the parents within the otherwise mainly school-focused intervention and, second, to additionally get the children enthusiastic about physical activity and balanced nutrition.
	Sedentary time, physical activity or both	PA
	Duration of intervention	10-months.
	Frequency of PA	2 times/week.
	Duration of PA	90 min/week.
	Intensity of PA	MPA
	Type of PA	Psycho-motoric activity games, activity stories, and dances with the aim to improve strength, endurance, and coordination skills.
	Parent involvement	Yes in extracurricular out-of-school activities.
	Setting	School.
	Who delivered the intervention	The sport lessons were conducted by qualified trainers
	Theoretical framework	Not specified.
	Control	Control group underwent a test on physical fitness and motor skills but received no intervention.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (BIA); Physical fitness and motor abilities (assessed by trained personnel using the ‘CHECK!’ test); dietary knowledge and behaviour (questionnaires); physical activity (accelerometer)

Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Williamson et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 primary schools only, 6 primary & secondary together and 6 control schools
	Follow-up	Only post-intervention
	Country	USA
	Period	2006-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	2060 (713 in the primary intervention group, 760 in the primary & secondary intervention group and 587 in the control group) at baseline; 1429 at follow-up
	Age	10.5+-1.2 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-70% African American, 30% White
Intervention	Description	The study had two programs: The primary prevention program consisted only of providing campaign materials in the classroom, hallways, and other locations within the school via media (e.g., posters). The primary prevention program has three components: 1) healthy diet promotion, 2) physical activity promotion, and 3) a program for families. Healthy Diet Promotion—Several changes in the food environment compatible with conventional nutrition recommendations Physical Activity promotion program is designed to increase physical activity and decrease sedentary behavior in three school settings: the classroom, recess, and physical education (PE). In the classroom, these goals will be met by incorporating regular 5 minute physical activity breaks after 30 minutes of instruction (30 minute rule), providing suitable indoor physical activity equipment (Physical Activity Centers – "PACs"), by engaging in educational activities that increase physical activity, and by placing LA Health posters in the classroom that are designed to promote decreased sedentary behavior and increased physical activity. Teachers are encouraged to increase physical activity during recess by provision of outdoor equipment supplied in PACs. The Sports, Play

		and Active Recreation for Kids (SPARK) curriculum will be provided to support PE teachers Primary Prevention Program for Families- Bi-monthly newsletters will be sent home with the student providing campaign-specific information, suggestions on how to alter the home environment, and specific activities that children are to complete at home with their parents. The secondary prevention program incorporates all three components of the primary prevention plus the secondary prevention program, which has two components: 1) classroom curriculum and 2) internet counseling and education. (synchronous (online) internet counseling and asynchronous e-mail) communications for children and their parents)
	Duration of intervention (months or weeks)	28-months
	Frequency of PA	5 times/week
	Duration of PA	multiple bouts of 5 min activity/day
	Intensity of PA	MVPA
	Type of PA	Not specified
	Parent involvement	Yes. via newsletters
	Setting	School
	Who delivered the intervention	Not specified
	Theoretical framework	Social Learning Theory
	Control	Not specified
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z score (NHANES 2013); body fat % (BIA); Behavior Related to Energy Balance (digital photography method); PA (self-Administered Physical Activity Checklist (SAPAC))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Wooten et al. 2018
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	24 schools (16 2-days/week intervention+ 8 3-days/week intervention)
	Follow-up	Only post-intervention
	Country	USA
	Period	2015-2016

Participants	Number of participants at baseline and follow-up (intervention/control)	442 individuals in 2-days/week intervention group, 217 individuals in 3-days/week intervention group and 396 in the control group at baseline; 274 in 2-days/week intervention group, 151 in 3-days/week intervention group and 282 in the control group at follow-up
	Age	8.5+-1.3 yrs and 9.4+-1.3 yrs; range 5-12
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 30% racial/ethnic minorities; Socio-economic status-"30% economically disadvantaged"; 35% and 30% and 30% OW+OB at baseline
Intervention	Description	Build Our Kids Success (BOKS) is a before school physical activity program. The 60-minute, 12-week program includes a core curriculum delivered by trained volunteers. Curriculum provides a day to day lesson plan to get kids moving for 40-45 minutes before and after the school day. All BOKS classes focus on a functional fitness skill of the week (ex. squat, push up, plank) and follow the same format including team oriented games. The lesson ends with short nutritional talk to provide kids with the tools to make smart healthy food choices.
	Duration of intervention	12-weeks
	Frequency of PA	2 or 3 times/week.
	Duration of PA	120 or 180 min/week.
	Intensity of PA	Not specified.
	Type of PA	Mostly endurance and coordination exercise
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Trained volunteers.
	Theoretical framework	Social Contextual Theory of Behavior Change.
	Control	Did not participate in intervention activities.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (CDC); overweight and obesity categories (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Xu et al. 2015
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School

	Number of clusters	4 schools in the intervention group and 4 schools in the control group
	Follow-up	Only post-intervention
	Country	China
	Period	2010-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	638 individuals in the intervention group 544 individuals in the control group at baseline; 605 individuals in the intervention group and 503 in the control group at follow-up
	Age	4th grade
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Asian
Intervention	Description	CLICK-Obesity Study - Both control and intervention schools conducted their routine health education classes, while intervention schools additionally implemented the specially developed intervention components, comprising: a) classroom curriculum (including education on healthy eating and sufficient physical activity), b) school environment support, c) family involvement (including parents/guardians health classes), and d) fun programs/events.
	Duration of intervention	12-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Through a specifically developed health education class program, parents/guardians were educated to adopt healthy lifestyles and behaviors at home and asked to encourage their children to follow healthy lifestyle and behavior guidelines at home. The specific interactive events/activities were designed to ask students and parents to complete home assignments regarding healthy lifestyle and obesity prevention together. For example, students and parents were asked to measure body weight and height and then calculate the BMI for each other at home.
	Setting	School
	Who delivered the intervention	Not specified
	Theoretical framework	Theory of Triadic Influence, Comprehensive School Health Program Model
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment	BMI; prevalence of overweight and obesity (Group of China Obesity Task Force);

	weight related outcomes, PA, fitness, sedentary time	knowledge about health related factors (questionnaire); frequencies of physical activity (Chinese version of the International PA Questionnaire(CHN-IPAQ)); dietary intake (food frequency questionnaire (FFQ))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Yang et al. 2017
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 elementary schools and 1 middle school in the intervention group; 1 elementary school and 1 middle school in the control group
	Follow-up	Only post-intervention
	Country	Korea
	Period	May 2014 until follow-up measurements in April 2015.
Participants	Number of participants at baseline and follow-up (intervention/control)	820 individuals at baseline; the final number of total participants was 768 (control - 350, intervention - 418)
	Age	4^{th} graders in the elementary schools (aged 9-10 years) and 7^{th} graders in the middle schools (aged 12-13 years)
	Sex	Both boys and girls
	Other characteristics	Korean
Intervention	Description	The participants in the intervention group received environmental intervention in addition to the usual school curriculum. In each classroom, educational dietary and exercise videos and the daily lunch menu were presented 5-10 minutes a day by IPTV service for 1 academic year. Various design materials were also painted along the school staircase and hallway to encourage physical activities by the students. For students who are already overweight or obese (BMI $\geq$ 85th percentile), a once-weekly obesity care program was held during the 12-week summer vacation. Intensive exercise was not mandatory, but the program was intended to provide an extension of the school environment to continue learning and provide a place to exercise during vacation.
	Duration of intervention	12-months.
	Frequency of PA	daily for classroom PA; 1 x week for vacation program

	Duration of PA	10 min/week (classroom PA). 50 min/week (Vacation obesity program).
	Intensity of PA	Not specified.
	Type of PA	Aerobic activity, stretching, and correction of posture (active breaks). Circuit training, interval training, or traditional Korean martial art (Vacation obesity program).
	Parent involvement	Parents twice underwent an education program about how to manage children with obesity. (Vacation obesity care program).
	Setting	School.
	Who delivered the intervention	IPTV service – internet protocol televison. Not specified by whom.
	Theoretical framework	Not specified.
	Control	Regular school curriculum
	Intervention fidelity	Among the 113 overweight and obese students in the intervention group, only 30 (26.5%) participated in this program at least once. Among these, only 12 students (10.6%) completed the vacation program according to the completion criterion of over 70% attendance.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI z-score and percentile (2007 Korean standard growth table); The waist size and blood pressure were measured by an experienced nurse. The waist circumference (WC) measurement was performed with the participant standing erect with his/her arms at the side and feet together; The blood pressure (BP) (mercury sphygmomanometer (Model CL4114, Youngpoong Medical, Seoul, Korea) using an appropriate cuff); standard methods of PAPS to evaluate cardiovascular endurance, flexibility, muscular/endurance strength, and agility. All of the evaluation processes were performed by a specialized organization (Welltizen, Seoul, Korea)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Yin et al. 2012
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	9 schools in the intervention group and 9 schools in the control group
	Follow-up	Measurements at 1, 9, 13, 21, 25, and 33 months

	Country	US
	Period	Recruitment at 2003 – for three years
Participants	Number of participants at baseline and follow-up (intervention/control)	312 individuals in the intervention group and 289 individuals in the control group at baseline; 255 in the intervention group and 259 in the control group at y-1-post-test; 219 in the intervention group and 226 in the control group at y-2-post-test; 195 in the intervention group and 205 in the control group at 3-y-post-test
	Age	2nd-3rd grade students
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 66% African-American; Socio-economic status- 65% qualified for reduced price or free school lunches
Intervention	Description	An 80-minute period that provided 20 minutes of warm-up and skills instruction, 40 minutes of continuous MVPA, and 10 minutes of calisthenics and cool-down.
	Duration of intervention	8-months
	Frequency of PA	5 times/week
	Duration of PA	400 min/week
	Intensity of PA	HR > 150 bpm for 40min/session,
	Type of PA	Different activity theme (fitness, basketball, soccer, etc.)
	Parent involvement	No
	Setting	School
	Who delivered the intervention	FitKid instructors who were mostly certified school teachers and professional staff from the intervention schools.
	Theoretical framework	Not specified
	Control	Regular free “health screenings,”, and diet/PA information to all participants
	Intervention fidelity	Attendance rate was under 50%
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	% body fat (measured by dual-energy X-ray absorptiometry); cardiorespiratory fitness (measured by heart rate in response to a submaximal step test); non fasting total and high-density lipoprotein cholesterol (HDL-C) and resting blood pressure (BP) (measured)
Adverse outcomes	State the outcome and the method of assessment	Adverse events: year 1 – 20 mild, 3 moderate, 1 severe year 2 - 4 mild, 6 moderate, 2 severe year 3 – 5 mild, 2 severe

CHARACTERISTICS OF EXCLUDED STUDIES

Authors and year		Akdemir et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	Turkey
	Period	2008-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	674 individuals in the intervention group and 675 individuals in the control group at baseline; 647 individuals in the intervention group and 641 individuals in the control group at follow-up
	Age	10.4+-2.3 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-region with higher than average SES
Intervention	Description	In intervention school educational activities focusing on “healthy nutrition and active lifestyle” as well as the “causes of and preventive strategies for obesity” were provided to students and their families. Education was provided in a total of five sessions for the students, three times before and two times after the semester break. The sessions were provided with one month intervals and lasted for 40 minutes. During the educational activities, “Specific Nutritional Guidelines for Turkey” was used as the reference. Also the book entitled “Nutritional Education and Counseling” was used as an additional Resource.
	Duration of intervention	three education sessions before and two times after the semester break
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes, via brochure and 2h education program of “healthy nutrition and active lifestyle”
	Setting	School
	Who delivered the intervention	Researchers

	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI; overweight and obesity prevalence (WHO); systolic and diastolic blood pressure (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Alexander et al. 2014
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2011
Participants	Number of participants at baseline and follow-up (intervention/control)	749 individuals at baseline; 272 in the intervention group and 289 in the control group at follow-up
	Age	1st and 2nd grade children
	Sex	Both boys and girls
	Other characteristics	Ethnicity- >80% Hispanic; Socio-economic status- >95% subsidised meals
Intervention	Description	Daily recess time (which was previously free time) was stru-ctured into organized play two days per week; One additional physical education class organised daily; Weekly cooking classes, a structured nutritional curriculum, and parental counseling..
	Duration of intervention	6-months
	Frequency of PA	5 times/week
	Duration of PA	150 min/week
	Intensity of PA	Not specified
	Type of PA	Relay races and obstacle course games
	Parent involvement	Yes, monthly group activities regarding nutrition, obesity, and physical activity.
	Setting	School
	Who delivered the intervention	PE Specialist teachers
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI

Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Bilinska et al. 2017
Methods and setting	Study design	CBA
	Unit of allocation	Schools
	Number of clusters	68 schools
	Follow-up	Only post intervention
	Country	Poland
	Period	2010-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	5,293 children (2,679 girls and 2,614 boys)
	Age	7-11 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The aim of the educational program was to establish the habit of a healthy lifestyle and change inappropriate behaviors. Extensive educational program (including promoting physical activity, healthy diet and other health behaviors), directed to the students but also to their parents and teaching staff. Children from the research group also participated in extra physical activities. These were group physical activities carried out at school, including, among others, general development exercises, corrective exercises, dance, and classes at a swimming pool under advice by physiotherapists. It was an additional method to activate the children and educate them about the possibility of active leisure time.
	Duration of intervention	12-months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Group physical activities carried out at school, including, among others, general development exercises, corrective exercises, dance, and classes at a swimming pool
	Parent involvement	Yes via educational activities
	Setting	School.
	Who delivered the intervention	Not specified.
	Theoretical framework	Not specified.
	Control	Control group received education on pro health- related behaviors.

	Intervention fidelity	
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; prevalence of overweight and obesity (IOTF)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Bogart et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 5 schools in the control group
	Follow-up	2 years post-intervention
	Country	USA
	Period	2009-2013
Participants	Number of participants at baseline and follow-up (intervention/control)	1354 individuals in the intervention group and 1919 individuals in the control group at baseline; 829 individuals in the intervention group and 539 individuals in the control group at follow-up
	Age	12.2+-0.7 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - 75% Latino; Socio-economic status - 89% national school lunch program (a proxy for low income); 18.2% overweight + 30.0% obese at baseline
Intervention	Description	Lifestyle curriculum consisted of a 5-week, middle school– based obesity prevention intervention combining school-wide environmental changes, and encouragement to eat healthy school cafeteria foods, and peer-led education and marketing. Specifically, using role-plays, seventh-grade student peer leaders were taught skills for approaching other students during lunchtime activities, as well as family members at home, to promote SNaX messages (regarding cafeteria food, water, sugar-sweetened beverages, fruits/ vegetables, and physical activity/inactivity) with a motivational interviewing (nonconfrontational and encouraging) style. Each peer leader was asked to recruit a partner (another student) to assist with lunchtime activities, which directly exposed more students to intervention messages. The social marketing aspect also included taste tests of cafeteria foods, delivered by peer leaders, and a short film shown to the

		entire seventh-grade class that encouraged physical activity (eg, through a dance video) and healthy eating. The environmental changes included offering a greater variety of sliced/bite-sized food and freely available chilled filtered water at lunch; posters promoting physical activity, cafeteria food, and healthy eating; and nutritional postings about cafeteria food.
	Duration of intervention	5-weeks
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Take home activities with their children (like worksheet about healthy nutrition)
	Setting	School and home
	Who delivered the intervention	Not specified
	Theoretical framework	Not specified
	Control	Wait list control
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Carlin et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	3 schools in the intervention group and 3 schools in the control group
	Follow-up	Post-intervention and 12 weeks after
	Country	Northern Ireland
	Period	2014
Participants	Number of participants at baseline and follow-up (intervention/control)	101 individuals in the intervention group and 98 in the control group at baseline; 100 individuals in the intervention group and 97 individuals in the control group at follow-up
	Age	12.4 ± 0.6 yrs
	Sex	Both boys and girls
	Other characteristics	/

Intervention	Description	Participants were provided with the opportunity to attend a number of structured 10–15-min walks spread across the school week before the first bell, at mid-morning break and at lunch time.
	Duration of intervention	12-weeks
	Frequency of PA	5 times/week
	Duration of PA	50-75 min/week
	Intensity of PA	MPA
	Type of PA	Walk
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Pupils (aged 15–17 years) trained as walk leaders
	Theoretical framework	Not specified
	Control	Normal PA habits
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; WC (measured); physical activity (Actigraph GT3 accelerometer); cardiorespiratory fitness (Queens College Step Test); self-efficacy for PA (questionnaire); Social support for PA and walking from male and female parents/guardians as well as friends (five-item Likert scale)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Cecchetto et al. 2017
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Class
	Number of clusters	2 classes in the intervention group and 2 classes in the control group
	Follow-up	Post-intervention and 12 weeks post-intervention
	Country	Brazil
	Period	March to November 2012
Participants	Number of participants at baseline and follow-up (intervention/control)	40 individuals in the intervention group and 39 individuals in the control group at baseline and at follow-up
	Age	7-11 yrs; 10.0 ± 1.1 years
	Sex (B&G;G only;B only)	Both boys and girls
	Other characteristics	Brazilian; Caucasian 75%, African 25%; socio-economic status - low socio-economic conditions
Intervention	Description	Intervention consisted of eight weekly Playful workshops lasting for 30-60 min. The workshops included collage, painting, games

		creation, physical activity, music and dance, and simulations of real life situations, all involving the importance of healthy habits for heart health, especially relating to healthy foods and physical activity.
	Duration of intervention	2-months
	Frequency of PA	/.
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	Investigator
	Theoretical framework	Not specified.
	Control	Usual curriculum.
	Intervention fidelity	All other children attended to all sessions and completed the study. For those children that could not attend in a specific day, another day was scheduled.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Knowledge about healthy habits and risk factors for cardiovascular disease (CARDIOKIDS questionnaire); BMI; Physical activity and food intake (Typical Day of Physical Activities and Food Intake questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Chesham et al. 2018
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention and 1 school in the control group
	Follow-up	Only post-intervention
	Country	Scotland
	Period	October 2015-June 2016
Participants	Number of participants at baseline and follow-up (intervention/control)	259 individuals in the intervention group and 132 individuals in the control group at baseline; 236 individuals in the intervention group and 118 in the control at follow-up
	Age	4-12 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity – Caucasian; Socio-economic status- Both schools had a range of levels of deprivation, although the majority of pupils were from higher socioeconomic quintiles.

Intervention	Description	The Daily Mile is a school-based physical activity intervention. It involves children going outside, at a time of the classroom teacher's choosing, for ~ 15 min of exercise at a pace self-selected by each individual child. This is done during normal classroom time and is in addition to time spent in physical education or scheduled breaks. Children often talk as they go and perform a mixture of walking and running
	Duration of intervention	Not specified.
	Frequency of PA	5 days/week.
	Duration of PA	75 min/week.
	Intensity of PA	Self-selected.
	Type of PA	Mixture of walking and running.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Classroom teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	MVPA and sedentary time (ActiGraph accelerometer); fitness (20-m shuttle run); body composition (skinfolds); BMI z scores relative for age (were calculated using UK 1990 reference dana)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Coleman et al. 2005
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 4 schools in the control group
	Follow-up	Post-intervention
	Country	US
	Period	CATCH was implemented in the fall of the 1998-1999 school year in 18 Title I elementary schools in El Paso and Las Cruces. In the second year (1999-2000), 22 Title I schools were added, and in the third year (2000-2001), 30 Title I schools were added.
Participants	Number of participants at baseline and follow-up (intervention/control)	423 individuals in the intervention group and 473 individuals in the control group; 152 individuals from intervention lost at follow-up
	Age	8-9 yrs

	Sex	Both boys and girls
	Other characteristics	Ethnicity - Schools that participated in the evaluation ranged from 95% to 99% Hispanic Socio-economic status - Schools also had 82% to 92% of their children eligible for free or reduced-cost meals or some other form of public assistance, and 33% to 72% of their children had limited English proficiency.; participating children were mostly Title I status (most were low-income students)
Intervention	Description	The intervention had 3 of the national CATCH programme components (Home component was not implemented): (1) CATCH PE was designed to increase the amount of time students spent in enjoyable moderate-to-vigorous physical activity (MVPA) at school during PE, as well as to teach students appropriate activities for other times of the day that could be maintained throughout life (2) Eat Smart is designed to provide tasty low-fat and low-sodium meals at school (3) classroom curriculum includes 15 lessons about healthy food choices an exercise choices Schools were allowed to implement each component of El Paso CATCH in a way that suited the school environment.
	Duration of intervention	24-months
	Frequency of PA	3x/week
	Duration of PA	90 min/week
	Intensity of PA	at least 40% MVPA
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Classroom teachers
	Theoretical framework	Social cognitive theory
	Control	Regular school activities
	Intervention fidelity	Emphasis was on adaptation rather than fidelity (using materials exactly as they were designed) of the CATCH intervention trial. Additionally, schools were allowed to implement each component of El Paso CATCH in a way that suited the school environment.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Fitness (9-minute timed run during PE classes in temperatures below 80°F); height, weight, waist and hip circumference (measured); triceps skinfold (measured); BMI; risk of overweight were defined as equal to or exceeding the 85th and 95th percentiles of

		body mass index (BMI) (calculated as weight in kilograms divided by the square of height in meters), respectively, for sex and age using the newest Centers for Disease Control and Prevention growth charts
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Dallolio et al. 2016
Methods and setting	Study design	Non-RCT
	Unit of allocation	Classroom
	Number of clusters	4 classes in the intervention group and 6 classes in the control group
	Follow-up	Only post-intervention
	Country	Italy
	Period	2013-2014
Participants	Number of participants at baseline and follow-up (intervention/control)	97 in the intervention group and 135 in the control group baseline and follow-up
	Age	8-10 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The intervention aimed to increase children's activity levels through PE lessons given by specialist PE teachers specifically trained for the purpose. The children of the intervention group followed four weekly sessions of MVPA of one hour each, held during the last hour of the school day in the facilities of the school, throughout the whole school year. This activity was carried out as an augmentation to the standard program of physical education, consisting of two lessons of around 50 minutes a week, taught by the ordinary classroom teacher.
	Sedentary time, physical activity or both	PA
	Duration of intervention	8-months
	Frequency of PA	4 times/week
	Duration of PA	240 min/week
	Intensity of PA	MVPA
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Specialist PE teachers specifically trained for the purpose

	Theoretical framework	Not specified
	Control	Regular school activities(PE 2 sessions of 50 minutes/week)
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	WHtR (measured); prevalence of overweight and obesity (IOTF); motor abilities and physical fitness (sit and reach test,standing long jump test, Harre circuit test, Yo-Yo Intermittent Recovery Level 1Test, Handgrip strength test); physical self-efficacy (Percived Physical Ability Scale for Children (PPAS-C))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		de Greef et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Classroom
	Number of clusters	6 second-grade classes and 6 third-grade classes in the intervention group; 6 second-grade and 6 third-grade classes in the control group
	Follow-up	Only post-intervention
	Country	Netherlands
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	181 individuals in the intervention group and 195 individuals in the control group at baseline and at follow-up
	Age	8.1±0.7 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	During each lesson, 10-15 minutes were spent on solving math problems followed by 10- 15 minutes on solving language problems. For example, the children had to solve a mathematical problem by giving the answer with the correct number of jumps (2 times 3 is 6 jumps). Learning activities were matched with the regular learning activities, resulting in a different program for second- and third-grade children.
	Duration of intervention	22-weeks
	Frequency of PA	3 times/week
	Duration of PA	30 min
	Intensity of PA	MVPA 64% time of PA
	Type of PA	Jumps other activities not specified
	Parent involvement	No

	Setting	School
	Who delivered the intervention	Six substitute teachers, who were hired and trained
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; Physical fitness (Eurofit physical fitness test battery)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		de Heer et al. 2008
Methods and setting	Study design	RCT
	Unit of allocation	Classroom
	Number of clusters	In the 6 schools, we randomized 85 classrooms (intervention, n=44; control, n= 41)
	Follow-up	Only post-intervention
	Country	US
	Period	2008
Participants	Number of participants at baseline and follow-up (intervention/control)	At baseline n=901 (intervention n=292; spillover n=251; control n=354); at follow up n=804 (intervention n=242; spillover n=236; control n=326). Allocation was unknown for 4 participants.
	Age	9.2+-0.9 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Hispanic; socio-economic status- The average percentage of children with low socioeconomic status was 72%, similar to the school district's average (70%).
Intervention	Description	The after-school program ran twice weekly for 12 weeks. Each session took place in the schoolyard or in the multipurpose room and comprised a 20-to 30-minute health education component followed by 45 to 60 minutes of physical activity. The physical activity component of the after-school program from the CATCH physical activity curriculum was adapted. The activities for the program emphasized cardiovascular activity and aerobic recreational games. Health education curriculum, includes modules on healthy eating, exercise, diabetes, and self-esteem.

	Duration of intervention	12-weeks
	Frequency of PA	2 times/week.
	Duration of PA	90 - 120 min/week.
	Intensity of PA	Not specified.
	Type of PA	The activities for the program emphasized cardiovascular activity and aerobic recreational games.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Senior-level student teachers from the University of Texas at El Paso Physical Education.
	Theoretical framework	Social Cognitive Theory.
	Control	Control group received fourth-grade health workbooks and incentives at pretest and follow-up measurements
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; aerobic capacity (with the Progressive Aerobic Cardiovascular Endurance Run (PACER) test, which requires participants to run up and down a 20-meter court); We adapted nutrition indicators (which consisted of self-reported dietary intentions (8 items) and dietary knowledge (10 items) from the previously validated After School Student Questionnaire, derived from the Health Behavior Questionnaire and the School-Based Nutrition Monitoring Student Questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Elinder et al. 2012
Methods and setting	Study design	CBA
	Unit of allocation	18 schools
	Number of clusters	9 schools in the intervention group and 9 schools in the control group
	Follow-up	Only post-intervention
	Country	Sweden
	Period	2009-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	478 individuals in the intervention group and 328 individuals in the control group at baseline; 418 individuals in the intervention group and 310 individuals in the control group at follow-up
	Age	aged 6–12 year; 2^{nd}, 4^{th} and 7^{th}
	Sex	Both boys and girls

	Other characteristics	At baseline: Overweight 15.1%, and obesity 3.2% (for all participants) NOTE! This includes 2,4 and 7 graders-there is separate analysis; Socio-economic status- socioeconomic status of inhabitants is slightly above the Swedish average
Intervention	Description	The programme is based on the social-ecological model of health targeting the individual student, the social and physical school environment and parents. The primary aim of the programme was to improve students' diet, physical activity and self-esteem and promote the development of healthy body weight. Each school formed local health teams consisting of 4–11 staff. Schools were asked to implement policies on nutrition, physical activity and mental health. Intervention activities related to physical activity: schoolyard and playground modification (3 schools); structured outdoor physical activities during school time (2 schools)); walking school bus lead by parents (1 school); collaboration with local sports clubs (1 school).
	Duration of intervention	24-months.
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Yes
	Setting	School.
	Who delivered the intervention	School staff (coached by the research team).
	Theoretical framework	Social Ecological Model.
	Control	Regular school activities. Children in the other nine schools that did not sign up to the programme served as the comparison group. Control schools reported that physical activity had been promoted during the period through improvements made in school yards and outdoor facilities and encouraging children to be active during leisure time.
	Intervention fidelity	The interviews with health teams showed that 27 of 56 measures (48%) were fully implemented after two years. One school did not succeed in implementing any measure fully.
Outcomes	State the outcome and the method of assessment	BMI (measured); BMI sds (IOTF, Sweeden standardrds and percentile curves); health behaviours (questionnaire); The physical

	weight related outcomes, PA, fitness, sedentary time	activity assessment (included five items which were likely targets for the intervention, accelerometer (Actigraph GT1M) worn for 7 days in 48 fourth grade and 38 seventh grade students); Leisure time sports participation, time spent outdoor, active commuting, recess activity, and membership of a club; TV-viewing (was assessed as hours in front of TV on school days and weekend days, respectively using four answering alternatives); Self-esteem (was evaluated in grade 4 and 7 with the global self-worth subscale of Harter's Self-Perception Profile for Adolescents)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Feng et al. 2015
Methods and setting	Study design	Non-RCT
	Unit of allocation	School and kindergarten
	Number of clusters	In Lubbock - 1 school in the intervention group and 1 school in the control group for baseline data; in San Elizario 41 intervention kindergarteners and 28 control kindergarteners provided baseline data, along with first and second grade students from one intervention elementary school and one control school.
	Follow-up	4, 10, 16 and 22 months after baseline
	Country	USA
	Period	January 2007 - November 2008 (18 months long intervention)
Participants	Number of participants at baseline and follow-up (intervention/control)	292 individuals in the intervention group and 221 in the control group at baseline; some students dropped out because of transfer, whereas new participants who gave consent were added at follow-up
	Age	6.7 ± 1.0 yrs; 5-9 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-Hispanic
Intervention	Description	Martial arts PE curriculum; Junior Master Gardeners curriculum was integrated in science classes
	Duration of intervention	18-months
	Frequency of PA	Not specified
	Duration of PA	Not reported for PA
	Intensity of PA	Not specified
	Type of PA	Martial arts curriculum

	Parent involvement	Yes
	Setting	School + home visit to parents of children with overweight
	Who delivered the intervention	PA part was delivered by PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC); Body fat (Tanita body composition analyzer (v. TBF300A, Tokyo, Japan)); WC (measured); Sugar Sweetened Beverage (parents report)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Franckle et al. 2017
Methods and setting	Study design	CBA
	Unit of allocation	Community
	Number of clusters	2 communities in the intervention group (28 schools) and 9 communities in the control group
	Follow-up	4 years pre baseline; at 12th month during intervention; at 6th month post-intervention
	Country	USA
	Period	2012-2014
Participants	Number of participants at baseline and follow-up (intervention/control)	2456 students in the intervention group at baseline and 2506 students in the intervention group at follow-up
	Age	4^{th} and 7^{th} grade
	Sex	Both boys and girls
	Other characteristics	Ethnicity- white 45%, Hispanic 35%; Socio-economic status-Approximately two-thirds of the student body in both intervention communities were defined as low-income
Intervention	Description	The Childhood Obesity Research Demonstration (CORD) project is a multilevel, multisector community intervention. This program promoted four main topics in school: 1. healthy food and drinks 2. to reduce screen time per day (no more than 2 hours per day) 3. get at least 1 hour of PA a day 4. to get enough sleep (10 hours per day 6-12 old). Intervention components in schools included evidence-based health education curricula (Eat Well, Keep Moving in grades 4–5 and Planet

		Health in grades 6–7). Food and Fun curriculum was delivered in afterschool programmes. Activities in other sectors most likely to affect the school-aged population included those implemented in health centers, afterschool programs, and the broader community
	Duration of intervention	24-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes
	Setting	School, Home and Community
	Who delivered the intervention	Teachers
	Theoretical framework	Childhood Obesity Research Demonstration (CORD) framework
	Control	Regular school programme
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Obesity prevalence (CDC); BMI; Dietary behaviours (4-point response scale); physical activity (Children were asked about the number of days in the past week that they participated in at least 30 minutes of moderate-to-vigorous PA); Screen time (Children's screen time was assessed using two questions); Sleep duration (Children recalled the times they went to bed and woke up the next morning on a usual weekday)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Fung et al. 2012
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	8 of the 10 APPLE Schools implemented a nutrition policy and all 10 APPLE Schools adopted policies ensuring all their students receive a minimum of 30 minutes of physical activity per school day
	Follow-up	Only post 2 year intervention
	Country	Canada
	Period	2008-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	306 individuals at baseline and 293 individuals at follow-up

	Age	5th grade students
	Sex	Both boys and girls
	Other characteristics	Canadian
Intervention	Description	School policy change; Full-time School Health Facilitators are responsible for implementing healthy eating and active living strategies while addressing the unique needs and barriers to health promotion in the school environment by engaging all stakeholders,including parents, staff and the community. School Health Facilitators contributed to the schools'health curriculum, engaged in developing cross curriculum links and taught across the curriculum. They facilitated professional development days for teachers and schoolstaff, organized parent information nights, nutrition pro-grams such as cooking clubs, after school physical activity programs, weekend events and celebrations, and circulated newsletters. 8/10 APPLE Schools implemented a nutrition policy and all 10 APPLE Schools adopted policies ensuring all their students receive a minimum of 30 minutes of physical activity per school day.
	Duration of intervention	24-months
	Frequency of PA	5 times/week
	Duration of PA	150 min/week
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Yes. Via newsletters. Also, they visited information nights, nutrition programs (cooking clubs), after school physical activity programs.
	Setting	School + community
	Who delivered the intervention	Teachers
	Theoretical framework	Comprehensive school health framework
	Control	No intervention
	Intervention fidelity	8/10 APPLE Schools implemented a nutrition policy and all 10 APPLE Schools adopted policies ensuring all their students receive a minimum of 30 minutes of physical activity per school day.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; BMI cut-points (IOTF); Dietary intake (Harvard Youth/Adolescent Food Frequency Questionnaire (FFQ)); Physical activity levels (Physical Activity Questionnaire for older Children (PAQ-C))
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Gatto et al. 2016

Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2012-2014
Participants	Number of participants at baseline and follow-up (intervention/control)	204 individuals in the intervention school and 171 individuals in the control school at baseline; 172 individuals in the intervention group and 147 in the control at follow-up
	Age	9.3 +-0.9 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 89%Hispanic/Latino; Socio-economic status- ~90% eligible for free lunch at school
Intervention	Description	LA Sprouts was taught in school gardens constructed on campus (16). Raised bed planter boxes were placed on unpaved, grassy areas of the school yard or on areas where asphalt was removed; gardening tools were provided. An outdoor modular kitchen was outfitted with cooking supplies. Classes were held once a week for 12 weeks during either the fall or winter/spring school semester. Separate classes were offered to each grade level. The classes consisted of a 45-min interactive cooking/nutrition lesson and a 45-min gardening lesson.
	Duration of intervention	12-weeks
	Frequency of PA	1/week
	Duration of PA	45min/week
	Intensity of PA	Low
	Type of PA	Gardening
	Parent involvement	Parallel classes were offered to parents bimonthly on mornings, evenings and weekends.
	Setting	School
	Who delivered the intervention	Educator with a nutrition or gardening background
	Theoretical framework	Bandura's 'self-efficacy'
	Control	Students at two control schools did not receive any nutrition, cooking or gardening information from investigators between pre-testing and post-testing, and schools were asked to refrain from augmenting their curriculum with similar lessons during the study period. Following post-testing, control schools received a delayed

		LA Sprouts intervention, including a school garden.
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI-z-score (CDC); body fat % (BIA); WC (measured); fasting blood samples (analysed); glucose (Yellow Springs Instruments analyser); Total cholesterol, high-density lipoprotein cholesterol {HDL} and triglyceride levels (were measured using enzymatic methods on a Stanbio Sirrus analyser); Low-density lipoprotein {LDL} (was calculated using the Friedewald equation); Homeostatic model assessment (HOMA-IR) (was calculated as a measure of insulin resistance); Metabolic Syndrome (was identified using the definition of Cook et al. which was adapted in adolescents using the National Cholesterol Education Programme's criteria for adults)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Gentile et al. 2009
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 5 schools in the control group
	Follow-up	Post-intervention and 6 months post-intervention
	Country	US
	Period	October 2005-November 2006 (13 months)
Participants	Number of participants at baseline and follow-up (intervention/control)	1,196 (93%) provided data at baseline, 1,156 (90%) at post-intervention, and 1,110 (86%) children at 6 months post-intervention. Data were provided by 1,076 children (84%) at both baseline and post-intervention, 1,029 (80%) at both baseline and 6-months post-intervention, and 992 (77%) at all three time points.
	Age	9.6 +-0.9 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- most (90%) were White, which is representative of their communities.
Intervention	Description	Family-, school- , and community-based intervention aimed at changing key behaviors (PA, television viewing/screen time, and nutrition) related to childhood obesity. The primary objectives were to: (1) increase

		the amount of PA; (2) reduce the amount television and video game time; and (3) increasefruit and vegetable consumption. The school component was designed to facilitate the family component of the intervention. Teachers were provided with a monthly teacher's packet which included: posters for the classroom; bulletin board ideas; activity/puzzle handouts for children to do during free time in classroom; a copy of the monthly calendar sent to families. The family component was designed to provide parents (and children) with materials and resources to facilitate the adoption of the healthy target behaviors. Monthly packets were provided containig: a printed brochure describing the project and highlighting the timeline; a printed calendar for the month to help motivate and remind parents about their progress on screen time, activity and nutrition goals designed to easily track each goal; a packet of screen time tickets for the child/parent to track screen time; an activity jar with tips for increasing physical activity; a screen time box with tickets to track the amount of screen time; a meal planner which the families could plan meals and make a grocery list; and recipes that primarily focused on increasing fruits and vegetables in creative and enticing ways that interested children were also provided. The community component included paid advertising (for example, bill-boards) and unpaid media emphasizing the key messages, community events and education workshops.
	Duration of intervention	8-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes, via family component
	Setting	School, family and community.
	Who delivered the intervention	Teachers.
	Theoretical framework	Social Ecological Model.
	Control	Exposed to the community intervention
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Habitual PA (pedometer (Digiwalker 200-SW)); BMI; Time spent viewing TV and playing video games (was assessed (independently) by both parents and children);

		Fruit and vegetable consumption (National Youth Risk Behavior Survey)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Greening et al. 2011
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 school in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	507 at baseline; 204 individuals in the intervention group and 246 individuals in the control group at follow-up
	Age	8.34+-1.30 yrs (range 6-10)
	Sex	Both boys and girls
	Other characteristics	Ethnicity-63% black, 37% white
Intervention	Description	Health education: Nutritional content of foods addressed in monthly nutritional events. Portion sizes and eating in moderation addressed. Health benefits of the monthly physical activity events were provided during the activity. Nutrition: Family- and school-based nutritional events on alternating months including: (i) healthy tailgating recipe contest, (ii) supermarket sweep requiring parent and student to locate healthy, low-nonfat food ingredients for recipes, (iii) healthy snack selection contest, and (iv) parent–child healthy holiday eating and activity log. PA: Family- and school-based physical activity events on alternating months including: (i) parent–child football toss contest, (ii) parent–child holiday activity log, (iii) parent–child softball throw contest, and (iv) field day of various activities including rope jumping, hula hoops, baseball throws, foot races.
	Duration of intervention	8-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified

	Parent involvement	The schoolchildren and parents prepared healthy recipes for the event. Parent–child softball throw contest at the beginning of the baseball season; parent–child football toss contest.
	Setting	School and community
	Who delivered the intervention	Trained professionals from the Department of Education and from local academic institutions (universities)
	Theoretical framework	Social Learning Theory
	Control	The control school followed the state's standard health curriculum, which included didactic nutrition education, health information incorporated into academic lessons, and weekly physical education classes.
	Intervention fidelity	Not Specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Body fat (BIA); WC (measured); prevalence of overweight and obesity (CDC); nutrition knowledge (Know Your Body Questionnaire); Fitness (Shuttle run, curl-ups and V sit; physical activity-21-item checklist); dietary habits (17-item Child Dietary Fat Questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Hendy et al. 2011
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	6 months post-intervention
	Country	US
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	457 children attended the 1st–4th grades at some time during the KCP application, data from 382 (83.6%) children were included in statistical analyses of the present report
	Age	1st, 2nd, 3rd and 4th grade
	Sex	Both boys and girls
	Other characteristics	Ethnicity- over 95% Caucasian; 112 children overweight
Intervention	Description	Kid's Choice Program (KCP) was designed to increase children's weight management

		behaviors, by awarding token rewards for three ‘‘Good Health Behaviors’’ including eating fruits or vegetables first at meals choosing low- fat and low-sugar healthy drinks and showing 5000 exercise steps recorded on pedometers
	Duration of intervention	3-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Optional. Parents could use weekly Parent Record to report children’s weight management behaviors in the home environment
	Setting	School.
	Who delivered the intervention	school staff.
	Theoretical framework	Social Cognitive Theory, Self Determination Theory, Group Socialization Theory.
	Control	The control group (called the ‘‘TIGERS’’) received stars punched into their nametags for each of three ‘‘Good Citizenship Behaviors’’ that included talking quietly during meals, keeping their meal area clean, and respecting others by not touching them or their things
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC); exercise steps (pedometers); including eating fruits or vegetables first at meals (FVFIRST), choosing low fat and low-sugar healthy drinks (HDRINK) (observer record)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Hoelscher et al. 2010
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	15 schools > CATCH basic plus (BP); 15 schools > CATCH basic plus+community (BPC)
	Follow-up	Only post-intervention
	Country	USA
	Period	2007-2008
Participants	Number of participants at baseline and follow-up (intervention/control)	554 individuals in BP group and 553 individuals in BPC group at baseline
	Age	9.9+-0.5 yrs

	Sex	Both boys and girls
	Other characteristics	Ethnicity- 66% Hispanic, 20% white, 14% black; Socio-economic status- 89% economically disadvantaged; 42% OW And OB at baseline
Intervention	Description	CATCH Community Action teams were asked to: (i) conduct a self-assessment using the CDC School Health Index to identify priority areas of action (n= 15 schools); (ii) attend three "Best Practices" workshops per year with all CATCH BPC schools (n = 15 attended ≥2 workshops; n = 13 attended all workshops); and (iii) select an activity each semester from a "CATCH Community Café" menu of evidence-based strategies for promoting PA and healthy eating in the school setting (n = 15 implemented ≥1 activities). Examples of specific activities implemented by schools included: providing opportunities for students to have a taste of healthful foods (n = 7 schools); implementa-tion of school gardening programs (n = 6 schools); implementation of PA breaks during class time (n = 5 schools); and implementation of after-school PA programs (n = 7 schools).
	Duration of intervention	48-months
	Frequency of PA	not reported
	Duration of PA	not reported
	Intensity of PA	not reported
	Type of PA	Not specified
	Parent involvement	Yes
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Social Ecological Model and Social Cognitive Theory
	Control	CATCH programme. The four core include: K-5 classroom curricula, a PE program, a child nutrition services component, and family involvement. Teacher-led activity breaks, which consisted of structured time during the week for PA and health education, with activities adapted from the CATCH Kids Club were provided. The PE programme had four main objectives: 1. involvement of students in at least 30 min of daily physical activity;

		2. involvement of students in MVPA for at least 40% of daily physical activity time; 3. providing students with many opportunities to participate and practise skills in physical activities that could be carried over into other times of the day and maintained later in life; and 4. providing students with a variety of enjoyable physical activities.
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Overweight and obesity prevalence (CDC); physical activity and dietary intake patterns (SPAN questionnaire); Moderate-to-vigorous PA during PE class: Student engagement in moderate-to-vigorous PA during PE class (was assessed using the System for Observing Fitness Instruction Time (SOFIT) method); Measures to assess the implementation of the CATCH program included a structured interview with the CATCH Champion and a self-administered questionnaire with 4th grade classroom teachers
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Honer et al. 2014
Methods and setting	Study design	Non-RCT
	Unit of allocation	Class
	Number of clusters	3 schools (10 classes) in the intervention group and 4 schools (8 classes) in the control group; Six classes contained boys and girls (four IG, two CG), seven classes contained only girls (three IG, four CG) and five contained only boys (three IG, two CG).
	Follow-up	Post-intervention and 3 months post-intervention
	Country	Germany
	Period	2010/2011 school year
Participants	Number of participants at baseline and follow-up (intervention/control)	297 individuals in the intervention group and 219 individuals in the control group at baseline and at follow-up
	Age	11.90 ±0.76 yrs
	Sex	Both boys and girls

	Other characteristics	Ethnicity - Caucasian (German)
Intervention	Description	The intervention was carried out within a timeframe of eight weeks and consisted of eight health-promotion PE lessons, each of which lasted 90 minutes and were held during regular PE time. In contrast to the regular PE lessons, health and fitness was the central pedagogical perspective for the IG lessons, which mainly consisted of strength and endurance training taught via numerous games and exercises. The lessons combined age-appropriate practical training, theoretical elements and some additional components (e.g. homework and bonus points for various assignments). The students were given the opportunity to experience the effects of regular training and to raise their awareness of the relationship between regular PA and health. After the intervention, teachers in the IG were instructed to carry out the shuttle-run test two more times. Th eaim of the shuttle-run test and of the documentation of the results by the students in their booklets was to foster their motivation to continue training beyond the intervention timeframe.
	Duration of intervention	8-weeks
	Frequency of PA	1 time/week.
	Duration of PA	90 min/week.
	Intensity of PA	Not specified.
	Type of PA	Lessons mainly consisted of strength and endurance training taught via numerous games and exercises.
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	Teachers.
	Theoretical framework	behaviour change techniques categorised by Abraham and Michie
	Control	Regular school activities
	Intervention fidelity	„Lesson observations showed that teachers implemented the lessons to a satisfactory extent.“
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical activity - MVPA (measured using two questions to examine whether young people meet the current recommendation for an hour or more of MVPA on most days); Students' motor performance (measured using the German motor performance testDMT6-18); BMI; The generic German questionnaire KINDL-R measures children's HRQOL in terms of subjective perception of physical, mental, social,

		psychological and functional aspects of well-being and health
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Ickovics et al. 2019
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	12 schools
	Follow-up	Only post-intervention
	Country	US
	Period	2011-2015
Participants	Number of participants at baseline and follow-up (intervention/control)	Of 756 students enrolled in study schools, 698 completed baseline surveys and physical assessments (92.3% participation rate). 595 students at follow-up (85.2% retention)
	Age	10.9+-0.6 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- Racial/ethnic categorization generally reflected distribution of students in the district: 47.2% Hispanic, 35.0% black, and 17.8% white/other. Socio-economic status-no notable school-level differences in size or relevant socioeconomic characteristics. Free lunch is available to all students in the district because eligibility is high overall, exceeding 60% in all schools (mean=71.4%).
Intervention	Description	Policy interventions related to nutrition and physical activity were implemented and evaluated, leading to four conditions: nutrition only, physical activity only, nutrition and physical activity (dual), or control. Physical activity interventions included promotion of active transport (walk/bike) to school, integrating physical activity into classroom lessons, and fitness challenges. Additionally, nutrition interventions included cafeteria-based nutrition promotion to encourage healthy food choices, taste-testing new foods, and providing alternatives for use of food during celebrations.
	Duration of intervention	36 months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Not specified.

	Parent involvement	Yes, via newsletters.
	Setting	School.
	Who delivered the intervention	Teachers.
	Theoretical framework	Not specified.
	Control	Health-focused messages not related to obesity prevention were implemented, with obesity prevention delivered at the end of the trial.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical measurements (obtained by trained research assistants according to WHO Expanded STEPS protocol); BMI (measured); BMI-percentile (CDC); Nutritional habits (Youth Risk Behavior Survey and School-Based Nutrition Monitoring Questionnaire); Physical activity behaviors (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Jurak et al. 2013
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	9 primary schools
	Follow-up	Seven years post intervention
	Country	Slovenia
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	216 individuals in the intervention group and 229 individuals in the control group at baseline; 160 individuals in the intervention group and 164 in the control group at follow-up
	Age	Intervention 7.76+-0.33; control 7.71+-0.32
	Sex	Both boys and girls
	Other characteristics	Ethnicity - Caucasian (Slovenian)
Intervention	Description	The programme is delivered in the first four years of schooling, and includes three standard PE lessons (45 minutes per lesson) delivered by general teachers and two extra lessons of PE per week, delivered with the joint teaching of a specialist PE teacher and a generalist teacher. The lesson content and structure are determined by the specialist teachers. In addition, the enhanced programme includes a wider selection of PE content (e.g. other sports), which can also be conducted outside of school.

	Duration of intervention	48-months
	Frequency of PA	2 times/week.
	Duration of PA	90 min/week.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Specialist PE teacher jointly with teacher generalist.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	SLOFIT test battery- 8 motor tests (arm plate tapping, standing long jump, polygon backwards, sit-ups, standing reach touch, bent arm hang, 60-meter run, 600-meter run) and 3 anthropometric measurements (body height, body weight and triceps skinfold)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Karczewski et al. 2016
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	Only post-intervention
	Country	USA
	Period	2009-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	107 participants with complete baseline data on all study variables were used in the study; 76 in the follow-up
	Age	8.5+-1.0 yrs (7-11)
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 58% black, 42% Latino; socio-economic status- >95% free or reduced lunch
Intervention	Description	Participants in the intervention program received 3 intervention sessions per week throughout the course of the year. Each session included nutrition and health instruction, as well as 60 minutes of soccer practice, and a character building discussion.
	Duration of intervention	24-weeks
	Frequency of PA	3 times/week
	Duration of PA	180 min/week

	Intensity of PA	Not specified
	Type of PA	Soccer practice
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	community-based participatory research (CBPR) model
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Kocken et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	23 schools in the intervention group and 22 schools in the control group
	Follow-up	First follow-up after 6 months period during intervention and second follow-up post-intervention
	Country	Netherlands
	Period	2009-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	615 individuals in the intervention group and 497 in the control group baseline; 568 in the intervention group and 496 in the control group at T1; 367 in the intervention group and 496 in the control group at T2
	Age	9.2+-0.6 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-15% from non-Western countries; overweight prevalence-22.2% in the control group and 19.1% in the intervention group at baseline
Intervention	Description	The program consisted of seven lessons in the first school year and nine in the second year. Methods that were used included theory lessons, practical lessons, homework assignments, and involvement of parents in homework. Examples of themes that were addressed were physical activity, computer use, nutrition, and energy balance by using

		experiments, assignments, videos and classroom discussions. The intervention was focused on the main behavioral changes: decreasing consumption of high-energy or high-fat foods and sugar-sweetened drinks; promoting a healthy breakfast; increasing consumption of fruits and vegetables; reducing television viewing and computer gaming/browsing; and increasing physical activities at school and outside school hours. The behavioral determinants of the TPB that were targeted were: knowledge (theory lessons and practical assignments), attitude (group discussions, food diaries), social norm (group discussions and homework assignments) and perceived behavioral control (modeling through assignments e.g., preparing a healthy meal and physical activity games).
	Duration of intervention	20-months (2 school years)
	Frequency of PA	Not reported
	Duration of PA	Not reported
	Intensity of PA	Not reported
	Type of PA	Classroom and PA activities
	Parent involvement	via joint homework assignments
	Setting	School
	Who delivered the intervention	School teachers
	Theoretical framework	The Intervention Mapping (IM) procedure; Theory of Planned Behavior; Framework of the effective US intervention programs “Planet Health” and “Eat Well and Keep Moving”
	Control	Regular school activities; total time spent on education about healthy nutrition and physical activity per year was on average 3.3 h (SD = 3.9).
	Intervention fidelity	The average total duration of the EF! lessons per year was 7.6 h (SD = 2.8) during 16 weeks per school in the intervention group. In the control schools,); most children completed their homework without parents
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (IOTF); WC (measured); prevalence of overweight and obesity (IOTF); physical activity (one-dimensional accelerometer-the ActiGraph)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Madsen et al. 2013

Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	4 schools in the intervention group and 3 schools in the control group
	Follow-up	Post-intervention
	Country	US
	Period	Study measures were collected in the fall (baseline), winter (midpoint), and spring (end point) of the 2009-2010 school year
Participants	Number of participants at baseline and follow-up (intervention/control)	82 individuals in the intervention group and 74 individuals in the control group at baseline; 79 individuals in the intervention group and 71 individuals in the control group
	Age	4th and 5th grade students
	Sex	Both boys and girls
	Other characteristics	42% Latino, 32% Asian and 12% African American
Intervention	Description	SCORES uses soccer as a "hook" to engage youth, with a primary goal of building competencies and skills that will support students' overall development, including teamwork, leadership, and academic commitment. The after-school program offers soccer, creative writing and service learning experiences to youth that would otherwise have limited access to extracurricular activities. spend 2–3 days per week in soccer drills or games. The 2 non-soccer days each week are dedicated to creative writing and performance in the 12-week fall session, and to community service projects in the 12-week spring session.
	Duration of intervention	2 x 12 weeks (fall and spring).
	Frequency of PA	3 times/week.
	Duration of PA	3 h/week.
	Intensity of PA	Not specified.
	Type of PA	Soccer drills and play.
	Parent involvement	Not specified.
	Setting	School.
	Who delivered the intervention	Trained after-school staff.
	Theoretical framework	Not specified.
	Control	Usual curriculum.
	Intervention fidelity	Participation was optional and overall attendance was 48% (range, 0%-100%), with overweight and obese students attending more than normal weight students (60% vs 39%); in the spring, only 7 weeks of SCORES were offered on average.

Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical activity (GT1M or GT3X accelerometer (Actigraph LLC), which yield equivalent activity counts when programmed in uniaxial mode); BMI; BMI z-score (2000 CDC); Cardiorespiratory fitness (20-m shuttle test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Manager et al. 2012
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	14 schools in the intervention group and 15 schools in the control group
	Follow-up	2 years post-intervention
	Country	USA
	Period	2005
Participants	Number of participants at baseline and follow-up (intervention/control)	396 individuals in the intervention group and 301 individuals in the control group at baseline; 125 of whom had two and 572 of whom had three assessments of BMI over the 2-year period
	Age	median (IQR)= 5.68 (5.40-5.98) yrs
	Sex	Both boys and girls
	Other characteristics	Prevalence of obesity -About 14% of the students in each group were obese based on an age- and sex-specific BMI percentile of 95 of greater
Intervention	Description	The VITAL curriculum consists of 8 different weekly lessons that teach young children healthy eating and appropriate physical activity. Each lesson last approximately 30 minutes (15 minutes devoted to teaching and 15 minutes to physical activity). Using plastic food models and games, children learn healthy nutrition and appropriate physical activity. VITAL provides simple exercise equipment, and children participate in games that increase physical activity. They receive pedometers to encourage physical activity.
	Duration of intervention	24-months
	Frequency of PA	1 times/week
	Duration of PA	15 min/week
	Intensity of PA	Not specified

	Type of PA	Hula hoops and skip ropes; classroom physical activities (eg, hopscotch, musical chairs, London Bridge is falling down, bunny hop, crab walk, etc.)
	Parent involvement	Yes through parent-teacher meetings
	Setting	School
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Regular school programme
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Manley et al. 2014
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 1 school in the control group
	Follow-up	1 week
	Country	USA
	Period	2007
Participants	Number of participants at baseline and follow-up (intervention/control)	55 individuals in the intervention group and 61 individuals in the control group at baseline; 29 in the intervention group and 9 in the control group at follow-up
	Age	11.6+-0.7 yrs
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-Discounted or free lunch eligibility rates 30 to 55%; Ethnicity-99% Caucasian; 13.8% of the student participants were overweight and 29.3% obese
Intervention	Description	Teachers provided encouragement to the students at the beginning of each day and education regarding the benefits of physical activity was provided in the health class. Students were provided with pedometers in the morning and encouraged to accumulate as many steps as possible, but specifically, girls were encouraged to achieve at least 12,000

		steps and boys 15,000 steps each day at school. At the end of the day, teachers provided praiseregarding the step counts that students received and continuedto encourage increasing the number of steps During the health class, students participated in 10 minutes of physical activity. This activity was in addition to physical education class or any other structured physical activity. The 10-minute physical activity was provided in a group setting and was led by the teacher.
	Duration of intervention	12-weeks
	Frequency of PA	5 times/week
	Duration of PA	50 min/week
	Intensity of PA	MVPA
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	Teacher
	Theoretical framework	Social Cognitive Theory
	Control	Regular school activities
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	BMI relative (BMI/50th centile CDC); Physical activity (Yamax Digiwalker 200 pedometer); aerobic fitness (1-mile walk test); Self-efficacy (Physical Activity Self-Efficacy scale)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Marcus et al. 2009
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 5 schools in the control group
	Follow-up	Only post-intervention
	Country	Sweden
	Period	Between August 2001 and June 2005 (4 years)
Participants	Number of participants at baseline and follow-up (intervention/control)	719 in the intervention group and 671 individuals in the control group at baseline; 591 individuals in the intervention group and 430 individuals in the control group at follow-up
	Age	6–10 yrs
	Sex	Both boys and girls

	Other characteristics	Socio-economic status - Participating schools had a mixed pupil population with children from middle and working class families living both in blocks of flats and in detached houses. The proportion of children with an immigrant background, defined as children requiring native-language teaching did not exceed 15%
Intervention	Description	The main focus of the intervention was to change the school environment rather than on healthy lifestyle education, although the school and after school care centre staff were encouraged to emphasize the importance of healthy eating and PA. An additional 30 min of daily PA was integrated into the regular school curriculum and facilitated by the class teachers. To reduce sedentary behaviour, children were not allowed to bring toys that might increase this behaviour, such as hand held computer games, to schools and after school care centres. The maximum time spent playing computer games at the after school care centres was restricted to 30 min per child per day. All intervention schools had agreed to offer a variety of vegetables, and the food was arranged so that the children first served themselves vegetables and thereafter the main course. White bread was substituted with whole-grain bread or similar products including a high amount of dietary fibres. The sugar content in the school lunches and in the afternoon snacks was reduced by strategies such as replacing fruit yogurt with plain yogurt and eliminating fruit juices, soft drinks, lemonades and desserts.
	Duration of intervention	12-48 months.
	Frequency of PA	5 days/week.
	Duration of PA	150 min/week.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	STOPP newsletter was distributed to parents and school staff of intervention schools twice annually aimed to increase the awareness of the intervention.
	Setting	School.
	Who delivered the intervention	Class teachers.
	Theoretical framework	Not specified.
	Control	All control schools continued their normal curriculum
	Intervention fidelity	Not specified.

Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Overweight and obesity (IOTF); Physical activity (accelerometer, Actiwatch (AW) (model 4, Cambridge Neurotechnology Ltd, Cambridge, UK)); eating habits (questionnaire consisted of 14 multiple choice questions); BMI sds
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		McKay et al. 2005
Methods and setting	Study design	Prospective cohort study
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	Canada
	Period	Participants were measured at baseline (start of the school year, September) and after 8 months (end of the school year, June)
Participants	Number of participants at baseline and follow-up (intervention/control)	51 individuals in the intervention group and 73 individuals in the control group at baseline and at follow-up
	Age	10.1 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - approximately 34% Hong Kong Chinese, 57% North American/Western European Caucasian, 5% Southeast Asian, and 4% other ethnic origin or mixed ethnicity
Intervention	Description	Teachers instructed the children to perform 10 counter movement jumps (two foot take off, clutch knees, two foot landing), three times each school day (once at morning bell, once at noon bell, and once at home time bell).
	Duration of intervention	8-months
	Frequency of PA	3 times/day (15 times/week).
	Duration of PA	15 min /week.
	Intensity of PA	Not specified.
	Type of PA	Counter movement jumps.
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	Clasroom teachers.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Compliance ranged from 10 jumps three times per day,2 days per week, to 10 jumps three times per day 5 days perweek with a mean

		uptake of 90±34 jumps per week. Average school attendance of the intervention children was 96.8% ranging from 0 to 25 days absent (excluding statutory andschool holidays)
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Dietary calcium (The calcium food frequency questionnaire (FFQ)); physical activity (Physical Activity Questionnaire for Children (PAQ-C)); Bone mineral content (BMC) and bone area at the lumbar spine, total body, and proximal femur (measured Hologic QDR 4500 W bone densitometer (DXA)); Proximal femur scans (analysed for bone geometry and structural strength using the hip structural analysis program); Lean and fat mass (calculated); anthropometry (measured)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Nyberg et al. 2015
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Classroom
	Number of clusters	7 classes in the intervention group and 7 classes in the control group
	Follow-up	Post-intervention and 6 months after intervention
	Country	Sweden
	Period	2010-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	243 at baseline; 129 individuals in the intervention group and 112 individuals in the control group at follow-up
	Age	6.2+-0.3 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-70% of the parents were born in Sweden, 7% in Europe and 23% were born outside of Europe; socio-economic status - 33% (n = 41) of the parents in the intervention group and 40% (n = 40) in the control group had a low level of education
Intervention	Description	The intervention included: 1)Teacher-led classroom activities with children. The activities were related to the different areas, for example discussing the importance of eating fruit and vegetables and thereafter trying a new fruit or vegetable. The children were exposed to ten 30-minute

		teacher-led sessions. After most sessions the children were given homework in their workbooks with the aim to discuss the session and perform related activities at home with their parents/guardians. 2) Health information for parents and 2 sessions of motivational interviewing
	Duration of intervention	6-months
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	Information on diet and PA provided by brochure; Motivational interviewing
	Setting	School
	Who delivered the intervention	Teachers (trained by research team), parents
	Theoretical framework	Social Cognitive Theory
	Control	Regular school activities. Control classes were offered the whole programme directly after the 6-months follow up measurements.
	Intervention fidelity	The implementation of the programme has been evaluated qualitatively. This evaluation showed that the programme was appreciated by teachers and parents and perceived as flexible and easy to implement.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (Swedish reference standard); prevalence of overweight and obesity (IOTF); physical activity (accelerometry (GT3 XP, Actigraph; LCC; Pensacola, USA)); Indicator foods, PA habits, sedentary behaviour and sleep (parent-proxy questionnaire, the Eating and Physical Activity Questionnaire (EPAQ), parental self-efficacy-questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Nyberg et al. 2016
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Class
	Number of clusters	16 classes in the intervention group and 15 classes in the control group
	Follow-up	Post-intervention and 5 months post-intervention
	Country	Sweden
	Period	2012-2013 for 6 months

Participants	Number of participants at baseline and follow-up (intervention/control)	185 individuals in the intervention group and 193 individuals in the control group at baseline; 181 in the intervention group and 187 in the control at follow-up
	Age	6 yrs
	Sex	Both boys and girls
	Other characteristics	Swedish; socio-economic status - low to medium socioeconomic status; Families classified as having low parental education comprised 47.1 % of the total sample. Of all the parents, 80.4 % were born outside of the Nordic region with Iraq, Eritrea, Somalia, Iran and Turkey as the most common countries of birth."
Intervention	Description	The intervention components were: 1) A brochure with health information targeting parental knowledge; 2) Motivational interviewing targeting parental self-efficacy, willingness to change and care and control (two times for 45 minutes); and 3) Classroom activities targeting children's knowledge, attitudes and preferences and indirectly parental role modelling (ten 30-min teacher-led sessions. The brochure contains facts and advice for parents within seven areas: 1) parental feeding practices; 2) healthy food and family meal times; 3) physical activity; 4) sweets, snacks, ice-cream and soft drinks; 5) fruit and vegetables; 6) physical inactivity, screen time, and commercials; 7) sleep. The children were exposed to ten 30-min teacher-led sessions. The teachers were provided with a tool-box containing culturally appropriate images of common food, and used the teaching manual for each session. After most sessions, the children were given homework to discuss and complete together with their parents. Back in the classroom, the teachers and children summarised the homework, so that each theme was repeated
	Duration of intervention	7-months.
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Engaged in Motivational interviewing, and children's homeworks.
	Setting	School, home.
	Who delivered the intervention	Motivational interviewing counsellors, teachers, parents.
	Theoretical framework	social cognitive theory
	Control	Control classes were offered the entire programme after the follow-up measurements were completed.

	Intervention fidelity	The first MI session was performed with 146 parents (79 %). In the second session,86 of the initial 146 parents participated. In the 13 classes which reported their work with the classroom component, teachers spent on average 33 min on each lesson, ranging from 20 to 150 min. Eleven classes performed all 10 lessons, 4 classes performed 9 lessons, and 1 class performed 8 lessons. Regarding the home assignments in the work book, 12 of the 16 intervention classes completed all 9 of the assignments, 1 class completed 8 assignments and 3 classes completed 1to“a few”of the home assignments.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical activity (accelerometry (GT3X+, Actigraph, LCC, Pensacola, USA)); Dietary indicators (fruit, vegetables and energy-dense products), physical activity habits, sedentary behaviour and sleep (measured through a validated parentproxy questionnaire, the Eating and Physical Activity Questionnaire (EPAQ)); Height, weight and waist circumference measurements were performed in schools by two trained research assistants according to standardised procedures; BMI; overweight and obesity (IOTF); BMI standard deviation score (Swedish reference Standard)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Paradis et al. 2005
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 1 schools in the control group
	Follow-up	At the half time during intervention, post-intervention, 2, 3 and 6 years after intervention in the intervention group and at half time during intervention and post-intervention in the control group
	Country	Canada
	Period	1994-1996
Participants	Number of participants at baseline and follow-up (intervention/control)	394 individuals in the intervention group and 140 individuals in the control group at baseline; 330 in the intervention group and 119 in the control group at follow-up
	Age	6-11 years
	Sex	Both boys and girls

	Other characteristics	Ethnicity- Aboriginal (Mohawk)
Intervention	Description	The KSDPP intervention program components include a health education curriculum delivered in grades 1 through 6 in the community's 2 elementary schools (ten 45-minute lessons per year for each grade). The curriculum includes topics on type 2 diabetes, healthy nutrition (including traditional foods), physical activity and fitness, and other healthy lifestyles. Community activities include regular use of the local newspaper and radio for advertisement, press coverage of events and reporting of results back to the community, promotional events such as contests and family activities (treasure hunts, snow sculpture contests, harvest fair, food tasting, cyclothons, walking clubs, line-dancing clubs, figure skating, etc). Finally, the program supports the development of capacity (training of native staff and volunteers as well as community members) and promotes healthier environments and stronger social norms for healthy behaviors, especially nutritional choices and physical activity
	Duration of intervention	36-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Not specified
	Setting	School, Community
	Who delivered the intervention	Community health nurses and dietitian (1st and 2nd year), teachers (3rd year)
	Theoretical framework	Social Learning Theory, the Precede-Proceed model, the Ottawa Charter for Health Promotion, and traditional learning styles of native children
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat (triceps and subscapular skinfolds); lifestyle (questionnaire); physical activity (7-day recall adapted from an instrument developed by Sallis); sedentary behaviours (questions on the frequency of television watching and video playing); physical fitness (run/walk test); nutrition (7-day food-frequency questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Parsons et al. 2014
Methods and setting	Study design	Non-RCT
	Unit of allocation	School
	Number of clusters	All schools in Anchorage, Alaska; control 1999-2004, intervention 2004-2010
	Follow-up	1 year post-intervention
	Country	USA
	Period	2006-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	3716 individuals in the intervention group and 3506 individuals in the control group at follow-up, numbers at baseline not reported
	Age	1st grade
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-34% in title I schools (is given to schools that have around 40% or more students whose families qualify under the U.S. Census's definitions as 'low income'); ethnicity- 55% white, 45% minority (includes Alaska Native/American Indian, Asian, Hispanic, Black, Pacific Islander, and multirace)
Intervention	Description	The program included nutritional guidelines and provisions for eliminating the sales of high-carbohydrate snacks and beverages in all schools. Stricter standards were adopted for the nutritional value of foods offered in the breakfast and lunch menus, and more fruits and vegetables were offered. In addition, a curriculum (Great body shop) which included topics about healthy lifestyle choices, nutrition, and physical activity (2 modules out of 10; others are not related to obesity behaviours), had been taught by Health/Social and Emotional Learning Specialist (previously taught occasionally by classroom teachers). After 2 years, an additional 30 min of weekly physical education (PE) classes for elementary-aged students was added.
	Duration of intervention	60-months; 36-monthd for PE
	Frequency of PA	1xweek
	Duration of PA	30 min/week
	Intensity of PA	/
	Type of PA	/
	Parent involvement	No
	Setting	School

	Who delivered the intervention	Classroom teachers and Health/Social and Emotional Learning Specialist
	Theoretical framework	Social Cognitive Theory
	Control	/
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Odds of staying becoming overweight (85th centile CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Puma et al. 2013
Methods and setting	Study design	Non-RCT
	Unit of allocation	School-cohorts
	Number of clusters	1 school- intervention and comparison cohorts
	Follow-up	4 years
	Country	USA
	Period	2000-2002
Participants	Number of participants at baseline and follow-up (intervention/control)	173 individuals in the intervention group and 190 in the control group at baseline; 131 individuals in the intervention group and 177 individuals in the control group at follow-up
	Age	2nd grade
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 55.6% Hispanic; Socio-economic status- 55.4% of students in the federal free-or reduced-cost lunch program
Intervention	Description	The Integrated Nutrition and Physical Activity Program (INPAP) is aimed to increase fruit and vegetable consumption and intensify physical activity levels by targeting simple and consistent messages and reinforcing them in multiple ways. Students received 28 lessons (18 focused on nutrition and 10 focused on physical activity) in each grade. The lessons included: (1) hands-on food preparation and classroom cooking, (2) tasting activities, (3) cooperative learning, and (4) integration of science, math, and literacy core content standards into the lessons. In addition, a secondary targeted behavior related to physical activity was reducing the amount of time spent engaging in watching television (TV).
	Duration of intervention	20-months (2 school years)

	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	via take-home messages and parent night events
	Setting	School
	Who delivered the intervention	Resource teacher, classroom teacher
	Theoretical framework	Social Cognitive Theory and Piaget's Cognitive Development Theory
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Overweight and obesity prevalence (CDC); Nutrition and physical activity knowledge, self-efficacy, attitudes and behaviours and BMI
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Reed et al. 2013
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	1 school in the intervention group and 2 schools in the control groups
	Follow-up	Only post-intervention
	Country	USA
	Period	2009-2010
Participants	Number of participants at baseline and follow-up (intervention/control)	165 individuals in the intervention group and 308 individuals in the control group at baseline and follow-up
	Age	10.2+-2.3 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity-African american; Socio-economic status- low socio-economic status (title I school)
Intervention	Description	The experimental school implemented a comprehensive, multifaceted approach to education based on the premise that a 'sound body nurtures a sound mind.' Two certified physical education teachers were hired to provide 45 minutes of daily physical education, 5 days a week to all children in all grades.
	Duration of intervention	9-months
	Frequency of PA	5 times/week
	Duration of PA	225 min/week

	Intensity of PA	Not specified
	Type of PA	Not specified
	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified
	Control	Regular school activities; Control middle school students in grades 6th–8th received 50 minutes of daily physical education daily for the fall semester only. Elementary control school students in grades 2nd–5th received only 45 minutes of PE 1 day per week for the entire school year
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC); Fluid Intelligence (The Standard Progressive Matrices (SPM) Test designed by Raven); Perceptual Speed (The Perceptual Speed Test developed by Salthouse); physical fitness (Fitnessgram)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Sahota et al. 2001
Methods and setting	Study design	Group RCT
	Unit of allocation	School
	Number of clusters	5 schools in the intervention group and 5 schools in the control group
	Follow-up	Only post-intervention
	Country	UK
	Period	September 1996 - July 1997
Participants	Number of participants at baseline and follow-up (intervention/control)	314 individuals in the intervention group and 322 individuals in the control group at baseline; 292 individuals in the intervention group and 303 individuals in the control group at follow-up
	Age	8.4 +- 0.63 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- Caucasian mostly (British); Socio-economic status-The schools had 1-42% children from ethnic minorities and 7-29% entitled to free school meals compared with 11% and 25% respectively for Leeds children as a whole.
Intervention	Description	The programme consisted of teacher training, modifications of school meals, and

		the development and implementation of school action plans designed to promote healthy eating and physical activity over one academic year. It was designed to take place over one academic year and was based on the concept of school action plans, which were to be developed by the individual schools on the basis of their perceived needs. The programme was intended to influence dietary and physical activity behaviour and not simply knowledge in the school children. All schools elected to incorporate nutrition education into the curriculum, with additional sessions supplied by the project manager. They also included a "fit is fun" programme in physical education lessons and undertook to improve their health resources.
	Duration of intervention	12-months
	Frequency of PA	Not specified.
	Duration of PA	Not specified.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	?
	Setting	School.
	Who delivered the intervention	The programme's team included a dietitian (project manager), a community paediatrician, a health promotion specialist, a psychologist, an obesity physician, and a nutritional epidemiologist.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	All 10 schools participated throughout the study. 76 (89%) of the action points determined by schools in their school action plans were achieved, along with positive changes in school meals.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; Dietary information (assessed by both 24 hour recall and three day food diaries); the frequency of physical activity and sedentary behaviour (questionnaire); Psychological measures (36-item questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Shamah et al. 2012

Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	30 schools in the intervention group and 30 in the control group
	Follow-up	Only post-intervention
	Country	Mexico
	Period	2010-2011
Participants	Number of participants at baseline and follow-up (intervention/control)	509 children in intervention group and 510 children in the control group at baseline evaluation; 498 in the intervention group and 499 in the control group at follow-up
	Age	5th grade children
	Sex	Both boys and girls
	Other characteristics	Socio-economic status- Low interv 34.9 (30.8,39.0) contr 34.1 (30.1, 38.3), Medium interv 33.7 (29.6, 37.8) contr 39.3 (35.0, 43.5), High interv 31.4 (27.3, 35.4) contr 26.5 (22.7, 30.4); Ethnicity- Mexican
Intervention	Description	The strategy consisted of 4 components: 1. A gradual decrease of the energy content of school breakfasts 2. The gradual regulation of food offered within theschool, through the technical council of the State of Mexico. 3. Gradual adherence to the physical activity program,according to the requirements of the Ministry of Public Education 4. Implementation of an educational campaign, called“Healthy Break,”for healthy eating and physical activity. The objectives of this program are to promote consum-ing one fruit and one vegetable, drinking pure water and performing physical activity (organized games and calisthenics) during break. The ongoing activities in schools in the IG were: a) Nutrition and physical activity workshops. b) Puppet Theatre, based on the theory of peer learning c) Two-day workshopswith teachers in each school to raise aware-ness about healthy eating and physical activity. d) Sale of fruits, vegetables and pure water in the school’s store cooperative e) To promote the consumption of pure water, spots were broadcast using the schools’PA systems, and waterbottles were delivered to children and teachers to encourage water consumption.

		f) Physical activation. Organized activities involving motion were conducted twice per week. Activities performed each day before the start of classes included warm-ups, activation and relaxation. Weekly activation sessions gradually increased from 2 to 5 days. g) Broadcasting of audio spots on the schools'PA systems. Spots were broadcast 3 times per week during the break. The central messages were aimed at promoting the consumption of fruits, vegetables and pure water during break and to promote physical activity in children,with an average length of 1 min and 15 seconds per spot. h) Organized games during break (once per week). To this end, the schools were provided with balls, ropes and hoops, i) Placement of banners at the entrance of the school.In order to highlight the campaign in the school com-munity, a banner was hung that read,"This school pro-motes healthy breaks.
	Duration of intervention	6-months
	Frequency of PA	2-5 times/week.
	Duration of PA	not specified; >30min week.
	Intensity of PA	Not specified.
	Type of PA	Active play.
	Parent involvement	Yes, via educational material
	Setting	School.
	Who delivered the intervention	Standardized and trained promoters, nutrition and health professionals.
	Theoretical framework	Not specified.
	Control	Regular school curriculum
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI, overweight or obese, considering the distribution and cut off points (IOTF); food intake (A Food Frequency Questionnaire (FFQ)); physical activity (semi-quantitative questionnaire was used to record the physical activity of students, based on the Youth Activity Questionnaire developed and validated by Hernández et al. 1999); knowledge about diet and physical activity (questionnaire); Self-efficacy (dichotomous scale with 12 items)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Slusser et al. 2013

Methods and setting	Study design	CBA
	Unit of allocation	Study site
	Number of clusters	4 study sites in the intervention group and 4 study sites in the control group
	Follow-up	Only post-intervention
	Country	US
	Period	2008-2009
Participants	Number of participants at baseline and follow-up (intervention/control)	73 individuals in the intervention group and 48 individuals in the control group at baseline and at follow-up
	Age	3rd -5th graders, 73% 8 to 9 years old
	Sex	Both boys and girls
	Other characteristics	Ethnicity – 60% Asian
Intervention	Description	Catch Kids Club is an evidence- based program that is designed to teach students nutrition and the skills to make healthy dietary and physical activity choices at school, in the community and at home. It is a 32- lesson after school enrichment program designed for the early prevention of cardiovascular disease. It includes a nutrition education manual, an activity box, and hands- on snack preparation activities. After school Youth Specialists were coached to increase the students' opportunities to participate in moderate to vigorous physical activity. The curriculum consisted of physical activity cards that gave the after school Youth Specialists and Program Leaders creative ideas to get the students active. The physical activity cards provided the staff with ideas of activities that they could implement that required minimal or no equipment and were inclusive of children regardless of their physical activity talents, or abilities. The cards included instructions and illustrations, and identified the skills learned from each physical activity. The physical activity component had four main objectives: 1. involvement of students in at least 30 min of daily physical activity; 2. involvement of students in MVPA for at least 40% of daily physical activity time; 3. providing students with many opportunities to participate and practise skills in physical activities that could be carried over into other times of the day and maintained later in life; and 4. providing students with a variety of enjoyable physical activities
	Duration of intervention	10-months
	Frequency of PA	5 x /week

	Duration of PA	150 min/week
	Intensity of PA	/
	Type of PA	physical activities underscored simple generalisable skills such as gross motor movement (throwing, catching and kicking) and large muscle movement
	Parent involvement	No
	Setting	School.
	Who delivered the intervention	Youth Specialists.
	Theoretical framework	Social Cognitive Theory
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI – z score (CDC); Physical activity knowledge, perception and behaviors (The Catch Kids Club questionnaire); The Day in the Life Questionnaire was used to measure fruit, vegetable, and snack foods intake and the Previous Day Physical Activity Recall (PDPAR) was used to measure physical activity behaviour
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Speroni et al. 2007
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	Four public elementary schools in the community served by the hospital were selected based on the school principals' willingness to accommodate an after-school program offering the KLF intervention
	Follow-up	Post-intervention and 12 weeks after intervention
	Country	USA
	Period	2006
Participants	Number of participants at baseline and follow-up (intervention/control)	86 individuals in the intervention group and 108 individuals in the control group at baseline; 80 individuals in the intervention group and 105 individuals in the control group at follow-up
	Age	2^{nd} to 5^{th} grade
	Sex	Both boys and girls

	Other characteristics	Ethnicity-80%white, 20%hispanic
Intervention	Description	Intervention included a weekly fitness program and monthly dietitian presentations. A physical fitness trainer led the participants in performing various types of physical fitness activities, such as aerobic dance, light strength training, stretching, balancing techniques, heart rate monitoring, yoga, and relaxation techniques. Best lifestyle choices were reinforced, encouraging participants to make best choices in selecting active behaviors such as running or cycling compared with being sedentary by viewing television or playing video games. The objective of the four 30-minute dietary education presentations given by registered dietitians was to encourage children to select foods best for them when making meal and snack selections.
	Duration of intervention	12-weeks
	Frequency of PA	1 time/week
	Duration of PA	30 min – 60 min/week
	Intensity of PA	Not specified
	Type of PA	Various types of physical fitness activities, such as aerobic dance, light strength training, stretching, balancing techniques, heart rate monitoring, yoga, and relaxation techniques.
	Parent involvement	Parents were encouraged to attend each of the four dietary presentations.
	Setting	School
	Who delivered the intervention	Physical fitness trainer, registered dietitians
	Theoretical framework	Social Learning Theory
	Control	Not specified
	Intervention fidelity	The average attendance rate of participants was 82%.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC); WC (measured); food, activity and satisfaction (questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Spiegel et al. 2006
Methods and setting	Study design	Cluster RCT
	Unit of allocation	Class
	Number of clusters	35 classes in the intervention group and 34 classes in the control group

	Follow-up	Only post-intervention
	Country	USA
	Period	2003-2004
Participants	Number of participants at baseline and follow-up (intervention/control)	534 individuals in the intervention group and 479 individuals in the control group at baseline
	Age	4 and 5 grade
	Sex	Both boys and girls
	Other characteristics	Socio-economic status-0.1% to 58% free or reduced lunch (depending on school); 39.4% controls and 36.4% interventions were OW or OB at baseline
Intervention	Description	The WAY program engages students in multidisciplinary activities in language arts, mathematics, science, and health content, building their academic skills while developing their health attitudes, behavioral intent, and, ultimately, behavior. Among other, students learn about the F.I.T.T. (Frequency, Intensity, Time, and Technique) principles, how to design a basic workout routine, and how to incorporate physical activity into their daily routine. Students apply this knowledge in social contexts, examining their attitudes and beliefs and projecting these on intended behavior through role-play, journaling, and other techniques. Another module addresses nutrition and provides information about nutrients, eating balanced meals, balancing energy input with energy output, the food pyramid, nutrient density, and serving size Intervention classes followed a 10-minute aerobic exercise routine each day during class time. The video provided a common baseline exercise routine for all intervention classes. The routine (designed and choreographed by a PE specialist) builds up in intensity to moderate to vigorous physical activity and provides a cool down period.
	Duration of intervention	10 months (1 academic year)
	Frequency of PA	5 time/week
	Duration of PA	50 min/week
	Intensity of PA	MVPA
	Type of PA	Aerobic exercise
	Parent involvement	Yes. students were required to interview family members to learn about their family health history, discuss meal and activity planning with their parents or guardians,
	Setting	School
	Who delivered the intervention	PE Teachers

	Theoretical framework	Theory of Reasoned Action
	Control	Usual school programme
	Intervention fidelity	Not reported
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; overweight or obesity prevalence (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Stephens et al. 1998
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	1 schools in the intervention group and 1 schools in the control group
	Follow-up	Only post-intervention
	Country	US
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	45 individuals in the intervention group and 44 individuals in the control group at baseline and at follow-up
	Age	8-10 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - The student body of each school was predominantly black; Socio-economic status - from low-income families.
Intervention	Description	Students in experimental group received a 15-week fitness intervention program in addition to their usual schedule of PE (45 minutes weekly). Each class received three activity sessions in the classroom per week. The fitness intervention consisted of 5 minutes of warm-up activities and stretching, followed by 20 minutes of continuous aerobic activity. These activities were selected from a standard roster, defined by the Centers for Disease Control and Prevention to include repetitive movements of large muscle groups, designed to elevate the pulse rate 40–60 beats over the resting level. The sessions concluded with a 5–10 minute cool-down period, during which the medical student teams presented educational material about nutrition, exercise, and disease prevention.
	Duration of intervention	15-weeks.
	Frequency of PA	3 times/week
	Duration of PA	90 – 115 min/week.

	Intensity of PA	Moderate; Pulse rate 40–60 beats over the resting level.
	Type of PA	Aerobic activity
	Parent involvement	No.
	Setting	School
	Who delivered the intervention	Medical students volunteers.
	Theoretical framework	Not specified.
	Control	Regular school activities
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Low-back and hamstring flexibility (-Weber sit and reach test); % body fat (the sum of skinfolds for triceps and calf); Heart rate response to submaximal exercise (modified step test)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Toledo-Domínguez et. al. 2017
Methods and setting	Study design	CBA
	Unit of allocation	School
	Number of clusters	4 primary schools
	Follow-up	Only post-intervention
	Country	Mexico
	Period	NR
Participants	Number of participants at baseline and follow-up	545 individuals at baseline; 287 individuals in the intervention group and 215 individuals in the control group at follow-up (total 502)
	Age	8-13 yrs: mean age=10.2 controls and 10.5 intervention
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The National School Physical Activation Program (PNAFE) consisted of daily 30 min sessions of physical activity. The first physical activity session consisted of three phases (warm-up, middle phase and relaxation) at the beginning of the school day. The second session was applied after recess.
	Duration of intervention	6-months
	Frequency of PA	5 x/week
	Duration of PA	30 min/day (15 min + 15 min)
	Intensity of PA	Moderate intensity
	Type of PA	Different activities
	Parent involvement	No

	Setting	School
	Who delivered the intervention	Researchers
	Theoretical framework	Not specified
	Control	Regular school physical activity
	Intervention fidelity	Not reported
Outcomes		BMI; BMI – z-score; overweight and obesity prevalence (CDC 2000); aerobic endurance (600 m run); strength of the legs (long jump without run-up)
Adverse outcomes		NR

Authors and year		Trevinoet al. 2004
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	13 schools in the intervention group and 14 schools in the control group
	Follow-up	Only post-intervention
	Country	US
	Period	October 1, 2001, to April 26, 2002
Participants	Number of participants at baseline and follow-up (intervention/control)	969 children in the intervention group and 1024 children in the control group. 713 (74%) children in the intervention group measured at baseline and 619 (87% of baseline) were included in analysis; 706 (69%) control children measured at baseline and 602 (85% of baseline) were included in analysis.
	Age	Intervention 9.79±0.53 yrs; Control students 9.77±0.49 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- Intervention- Asian 5.5%, African American 7.0%, Mexican American 82.5%, Other 5.0%; Control Asian 6.2%, African American 13.1%, Mexican American 76.7%, Other 4.0%; Socio-economic status- The annual household income averaged $11 000 for intervention schools and $12 000 for control schools. The average number of persons living in a household was 5 for intervention and control schools. Twenty-one percent of intervention schools and 18% of control schools had households with single parents. Mother's level of education was similar for both groups. For each group, 82% of mothers had a high school education or less and 18% had some college education or more.

		Fifty-five percent of questionnaire respondents from intervention schools and 60% from control schools reported having a fair to poor health status. Family members responding to the questionnaire reported that 55% of children from intervention schools and 60% from control schools had a first- or second-degree relative with diabetes mellitus.
Intervention	Description	The objective of the Bienestar Health Program is to provide children with 50 sessions of health programming distributed throughout 7 months. The health sessions were used to transmit to children 3 health behavior messages shown to be associated with diabetes mellitus control (decrease dietary saturated fat intake, increase dietary fiber intake, and increase physical activity in children). These behaviors were taught and reinforced through classroom, home, school cafeteria, and after-school care educational activities. Bienestar health and physical education class was held 45 min/d, 5 d/wk; 1d is health education and 4 d are physical activities
	Duration of intervention	7-months
	Frequency of PA	4x/week
	Duration of PA	180 min/week.
	Intensity of PA	Not specified.
	Type of PA	Not specified.
	Parent involvement	Yes, via bimonthly school parent meetings
	Setting	School, home.
	Who delivered the intervention	Physical education teachers, parents, school cafeteria staff, and after-school caretakers.
	Theoretical framework	Social Cognitive Theory and Social Ecological Theory and Cultural Appropriateness.
	Control	Not specified.
	Intervention fidelity	Bienestar and school staff delivered 652 sessions of Bienestar programming to the 13 elementary schools (average of 50 sessions per school): 87 school cafeteria sessions, 26 parent activities, 222 health club sessions, 118 lunch visits, and 199health and physical education classes). On average, during the 7-month intervention period, a student attended 32 Bienestar sessions
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	Physical fitness (modified Harvard step test); body fat (BIA); dietary fiber and intake and energy intake from saturated fat (24-hour dietary recall protocol)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Tucker et al. 2011
Methods and setting	Study design	CBA
	Unit of allocation	Classroom
	Number of clusters	Ninety-nine children of varying heights and weights were recruited from two elementary schools – classrooms
	Follow-up	3 months post-intervention
	Country	US
	Period	October 2008 – May 2009
Participants	Number of participants at baseline and follow-up (intervention/control)	99 individuals at baseline - 66 individuals in the intervention group and 33 in the control group at baseline; 97 individuals at follow-up
	Age	9-10 yrs
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	All children received classroom Let's Go 5-2-1-0 Program curriculum by the public health nurse. Intervention children also received 1:1 student nurse coaching, parent evening offerings, and reinforcement incentives. In one school coaching sessions were held after school hours at the location preferred by parent, or by telephone. The total number of sessions ranged from 1-12.5 sessions (15–75 min). In another school weekly sessions (range 10-14) were held at the school during the lunch hour; 2 parent evening offerings were held during this project period.
	Duration of intervention	7-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	Yes via parent evenings
	Setting	School and location preferred by parent, or by telephone.
	Who delivered the intervention	Nursing students
	Theoretical framework	Not specified
	Control	Received classroom delivery of the Let's Go 5-2-1-0 Program curriculum by the public health nurse.
	Intervention fidelity	
Outcomes		BMI; BMI percentile (CDC); Health habits (Healthy Habits Survey, developed by the Maine Youth Overweight Collaborative); Physical activity (StepWatchActivity Monitor)

Adverse outcomes		NR

Authors and year		Warren et al. 2003
Methods and setting	Study design	RCT
	Unit of allocation	Child
	Number of clusters	/
	Follow-up	Post-intervention
	Country	UK
	Period	2000 start of a 14-16 months intervention
Participants	Number of participants at baseline and follow-up (intervention/control)	51 individuals in the control group (Be smart) at baseline and 42 at follow-up; 56 in the intervention group (Eat smart) at baseline and 40 at follow-up; 53 individuals in the intervention (Play smart) at baseline and 45 at follow-up; 53 individuals in the intervention (Eat/Play smart) at baseline and 42 at follow-up
	Age	5-7 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity - Most of the children were of Caucasian origin (89%); Thirty-nine per cent of their parents had obtained either a degree or a postgraduate qualification
Intervention	Description	Children were randomly allocated to one of four groups: three intervention (nutrition, physical activity, combined nutrition and physical activity group) or control group. Intervention group lesson was designed to last for a 25-min. The intervention program incorporated: 1. Raising the value of the desired behaviour, including the short-term benefits, which are most likely to appeal to children competitive physical activity. 2. Providing incentives to reinforce messages, for example verbal praise and small prizes. 3. Developing practical skills and thus self-confidence in the desired behaviour. The physical activity programme was designed to promote activity in daily life rather than the promotion of specific leisure pursuits, which would not be accessible to everyone. Using insects as a theme, the concepts of energy and activity were explored in the first term. The promotion of activity in the playground and a reduction in television viewing were specifically addressed in the second and third terms, using

		team games, fun physical activities and quizzes. The US recommendations for physical activity in children have been translated into an 'activity pyramid' which formed the basis of the fourth term's lessons.
	Duration of intervention	20 weeks over 14 months
	Frequency of PA	1 times/week
	Duration of PA	25 min/week
	Intensity of PA	Not specified
	Type of PA	Team games, fun physical activities.
	Parent involvement	Yes, through newsletters and homeworks
	Setting	School and home
	Who delivered the intervention	Investigators
	Theoretical framework	Social Learning Theory
	Control	Educational programme (not specified about PA)
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI; body fat - Skinfold measurements were taken at five sites (biceps, triceps, subscapular, supra-iliac and calf); Circumferences were taken at four sites (waist, hip, mid-upper arm and head) using a standard tape measure (0.1 mm intervals); nutrition knowledge (questionnaire); physical activity (parent questionnaire); Children's diets were assessed using a combination of two questionnaires completed by parents on their behalf, a 24-h recall questionnaire and a food frequency questionnaire (FFQ)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Wendel et al. 2016
Methods and setting	Study design	RCT
	Unit of allocation	24 teachers in 3 Texas schools (8 in each school) approached
	Number of clusters	/
	Follow-up	Only post-intervention
	Country	US
	Period	At the beginning of school year 2011/2012 - at the end of school year 2012/2013
Participants	Number of participants at baseline and follow-up (intervention/control)	62 students at T-T group 49 students at C-C group, 23 students at C-T group and 59

		students at T-C group; the final sample size for analyses was 193
	Age	Mean 8.8 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- The majority of participating students were White (75%); approximately 8% were Hispanic, 7% were African American, and roughly 10% were of Asian or Native American descent; 12% were overweight, and 9% were obese at baseline
Intervention	Description	Altering classroom environments from traditional to stand-biased environments. Students' regular desks were replaced with standing-desks.
	Duration of intervention (	24-months
	Frequency of PA	/
	Duration of PA	/
	Intensity of PA	/
	Type of PA	/
	Parent involvement	No.
	Setting	School.
	Who delivered the intervention	/
	Theoretical framework	Not specified.
	Control	Regular school activities.
	Intervention fidelity	Not specified.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI percentile (CDC)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Widhalm et al. 2018
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	6 months post-intervention
	Country	Austria
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	82 individuals in the intervention group and 59 individuals in the control group at baseline; Due to illness or absence at the times of measurements, not all data from the subjects were collected at all points of time. This led to

		small variations in the sample between the different test parameters.
	Age	11.7+-0.7 yrs (11-14)
	Sex	Both boys and girls
	Other characteristics	/
Intervention	Description	The intervention group received 20 h of nutritional training, five lessons about physiology and the impact of a healthy lifestyle, and 20-hour sports and exercise intervention. The pupils received a 10-hour sports and movement intervention per semester during their normal physical education lessons. The sports interventions served to stimulate the subjects to integrate movement into their everyday life through movement and coordination games. In addition, the exercises were constructed to improve the endurance and physical strength of the adolescents.
	Duration of intervention	12-months
	Frequency of PA	Not specified
	Duration of PA	20 hours/year
	Intensity of PA	Not specified
	Type of PA	Movement and coordination games (to improve the endurance and physical strength)
	Parent involvement	No
	Setting	School
	Who delivered the intervention	All interventions were conducted by experts from the EDDY study team. The lifestyle intervention was held by physicians
	Theoretical framework	Not specified
	Control	Not specified
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	% body fat (BIA); BMI (standard deviation score were calculated according to Must and Anderson); nutritional knowledge (specially designed quiz); Food preferences (Food Frequency Questionnaire for children and adolescents); Physical fitness (‘Deutsche Motorik Test 6–18’); Psychological Measurements (The interdisciplinary test system ‘AD-EVA’)
Adverse outcomes	State the outcome and the method of assessment	NR

Authors and year		Williamson et al. 2007
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	2 schools in the intervention group and 2 schools in the control group
	Follow-up	18 months after the start of the intervention
	Country	USA
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	670 individuals at baseline; 586 individuals at follow-up
	Age	9.2+-4.1 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 627 white (94.9%), 16 were black (2.4%) and 18 were classified as other ethnic group (2.7%) at baseline
Intervention	Description	Changes to school environment were made in health promotion program (add more fruits, vegetables, milk products, and grains.), physical activity promotion (posters were positioned to promote decreased sedentary behavior and increased physical activity during the school day and after school), classroom health promotion (equipment to promote physical activity, pedometers for each child, jump ropes, and balls). Teachers were instructed to allow children 10 to 15 minutes of play-time for every hour of instruction
	Duration of intervention	20-months (2 academic years)
	Frequency of PA	Not specified
	Duration of PA	Not specified
	Intensity of PA	Not specified
	Type of PA	Active play (with balls, jump ropes)
	Parent involvement	Yes via newsletters and assembly meetings.
	Setting	School and home
	Who delivered the intervention	Teachers
	Theoretical framework	Not specified
	Control	Regular school activities
	Intervention fidelity	Not reported.
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time	BMI z-score (from the 2003 National Health and Nutrition Education Survey database); body fat (BIA); food selections (Digital photography); Physical Activity (The Self-Administered Physical Activity Checklist (SAPAC), a 29-item self-report, Godin-Shephard Leisure Time Physical Activity

		Questionnaire); Psychosocial Variables (questionnaire)
Adverse outcomes	State the outcome and the method of assessment	NR

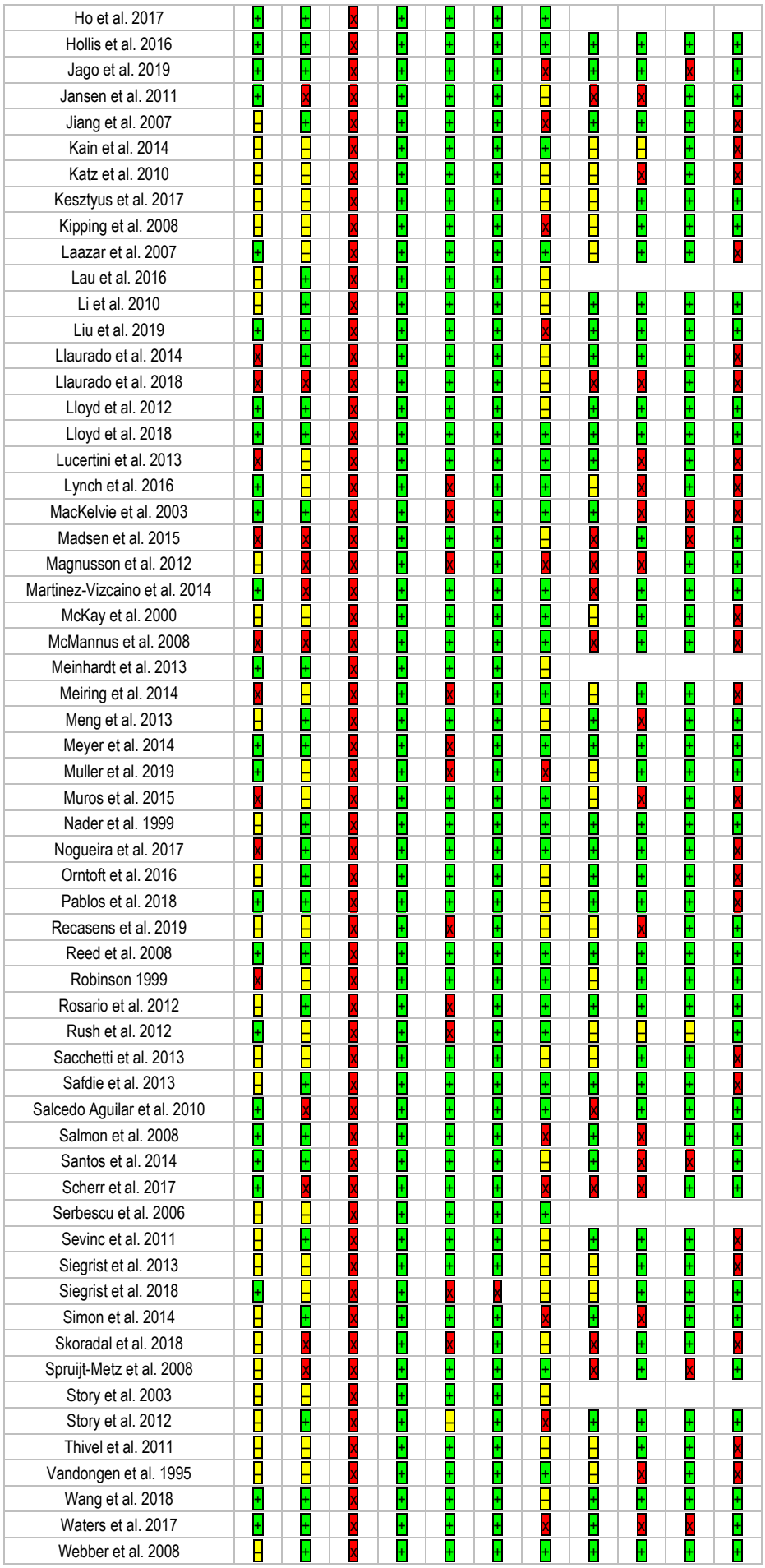
Authors and year		Zonderland et al. 1994
Methods and setting	Study design	Cluster RCT
	Unit of allocation	School
	Number of clusters	6 schools in the intervention group and 6 schools in the control group
	Follow-up	Only post-intervention
	Country	Netherlands
	Period	NR
Participants	Number of participants at baseline and follow-up (intervention/control)	156 individuals in the intervention group and 111 individuals in the control group at baseline; 115 individuals in the intervention group and 68 individuals in the control group at follow-up
	Age	10 yrs
	Sex	Both boys and girls
	Other characteristics	Ethnicity- 40% girls in the intervention group were non-Caucasian and other groups about 18% non-Caucasian
Intervention	Description	The intervention consisted of 1.5 additional classes of physical education (PE) per week (one PE class = 45 minutes) and one afternoon of out-of-school sport activities every 6 weeks, all led by qualified PE teachers.
	Duration of intervention	36-months
	Frequency of PA	1,5 times/week
	Duration of PA	67,5 min/week
	Intensity of PA	Not specified
	Type of PA	Different sports (swimming, skating, korfball, basketball, little league baseball, hockey, soccer, tag games, modem dancing, exercises on mats and use of climbing apparatus, track and field (high jump, relay race, endurance, and interval training), and circuit training with aerobic, strength, and flexibility exercises)
	Parent involvement	No
	Setting	School
	Who delivered the intervention	PE teachers
	Theoretical framework	Not specified

	Control	Regular school activities (3 PE classes per week in the sixth grade and 2 in the seventh and eighth grade)
	Intervention fidelity	Not specified
Outcomes	State the outcome and the method of assessment weight related outcomes, PA, fitness, sedentary time,	% body fat (sum of 4 skinfolds)
Adverse outcomes	State the outcome and the method of assessment	NR

Appendix 4: Risk of bias

Table A1. Risk of bias summary across individual randomised controlled studies (Cochrane "Risk of bias" assessment tool for randomised studies, Higgins et al., 2011)

Authors	random sequence generation	allocation concealment	blinding of participants and personnel	blinding of outcome assessment	incomplete outcome data	selective outcome reporting	other sources of bias	recruitment bias	baseline imbalance between groups	loss to follow-up of clusters	adequate analysis methods for C-RCT
Adab et al. 2018	+	+	-	+	+	+	-	+	-	+	+
Alvirde-García et al. 2013	-	-	-	+	-	+	?	-	-	-	-
Anderson et al. 2016	+	+	-	+	+	+	-	+	+	+	+
Angelopoulos et al. 2009	+	+	-	+	+	+	?	+	+	+	+
Annesi et al. 2015	?	?	-	+	+	+	+	?	+	+	-
Annesi et al. 2016	+	?	-	+	+	+	?	?	+	+	+
Bacardi-Gascon et al. 2012	+	?	-	+	+	+	?	?	+	+	+
Barbeau et al. 2007	?	+	-	+	-	+	-				
Borrestad et al. 2012	+	+	-	+	+	+	-				
Brandstetter et al. 2012	?	+	-	+	+	+	-	+	+	+	+
Caballero et al. 2003	+	+	-	+	+	+	-	+	+	+	+
Cao et al. 2015	?	?	-	+	-	+	?	?	+	?	-
da Cruz et al. 2017	?	+	-	+	+	+	-	+	+	+	-
Donnelly et al. 2009	?	?	-	+	+	+	+	?	+	+	+
Drummy et al. 2016	?	?	-	+	+	+	?	?	+	+	-
Dzewaltowski et al. 2010	+	+	-	+	+	+	?	+	+	+	+
Eather et al. 2013	+	+	-	+	+	+	?	+	+	+	+
Fairclough et al. 2013	+	-	-	+	-	+	?	-	+	-	+
Farmer et al. 2017	+	-	-	+	+	+	+	-	+	+	+
Ford et al. 2013	+	+	-	+	+	+	+				
Foster et al. 2008	?	?	-	+	-	+	+	?	+	+	+
Foster et al. 2010	+	+	-	+	+	+	+	+	+	+	+
Gallota et al. 2016	-	+	-	+	+	+	+	+	+	+	-
Grydeland et al. 2014	+	+	-	+	+	+	-	+	+	+	+
Habib Mourad 2013	+	+	-	+	+	+	+	+	+	+	+
Have et al. 2018	+	+	-	+	+	+	?	+	+	+	+
Herazo-Beltran et al. 2018	?	+	-	+	+	+	?				
Herscovici et al. 2013	?	?	-	+	+	+	+	?	-	+	-


Ho et al. 2017
Hollis et al. 2016
Jago et al. 2019
Jansen et al. 2011
Jiang et al. 2007
Kain et al. 2014
Katz et al. 2010
Kesztyus et al. 2017
Kipping et al. 2008
Laazar et al. 2007
Lau et al. 2016
Li et al. 2010
Liu et al. 2019
Llaurado et al. 2014
Llaurado et al. 2018
Lloyd et al. 2012
Lloyd et al. 2018
Lucertini et al. 2013
Lynch et al. 2016
MacKelvie et al. 2003
Madsen et al. 2015
Magnusson et al. 2012
Martinez-Vizcaino et al. 2014
McKay et al. 2000
McMannus et al. 2008
Meinhardt et al. 2013
Meiring et al. 2014
Meng et al. 2013
Meyer et al. 2014
Muller et al. 2019
Muros et al. 2015
Nader et al. 1999
Nogueira et al. 2017
Orntoft et al. 2016
Pablos et al. 2018
Recasens et al. 2019
Reed et al. 2008
Robinson 1999
Rosario et al. 2012
Rush et al. 2012
Sacchetti et al. 2013
Safdie et al. 2013
Salcedo Aguilar et al. 2010
Salmon et al. 2008
Santos et al. 2014
Scherr et al. 2017
Serbescu et al. 2006
Sevinc et al. 2011
Siegrist et al. 2013
Siegrist et al. 2018
Simon et al. 2014
Skoradal et al. 2018
Spruijt-Metz et al. 2008
Story et al. 2003
Story et al. 2012
Thivel et al. 2011
Vandongen et al. 1995
Wang et al. 2018
Waters et al. 2017
Webber et al. 2008

Williamson et al. 2012	+	+	-	+	+	+	+	+	+	+	+	
Xu et al. 2015	+	+	-	+	+	+	+	+	+	+	+	
Yin et al. 2012	+	-	-	+	+	+	-	-	+	+	+	

Table A2. Risk of bias summary across individual non-randomised studies (modified Newcastle-Ottawa scale, Wells et al., 2008)

Authors	representativeness of the exposed cohort	selection of the non-exposed cohort	ascertainment of exposure (fidelity)	demonstration that outcome of interest was not present at start of study	comparability of cohorts	assessment of outcome	was follow-up long enough for outcomes to occur (>6m)	adequacy of follow-up of cohorts	total stars
Adab et al. 2014	★	★	★	/	★★	★	★	★	★★★★★★★★
Agurto et al. 2018		★	★	/		★		★	★★★★
Aparco et al. 2017		★		/	★	★	★	★	★★★★★
Ayala et al. 2016		★		/	★	★	★	★	★★★★★
Azevedo et al. 2014				/	★★	★	★		★★★★
Balas-Nakash et al. 2010		★		/		★			★★
Benjamin Neelon et al. 2015	★			/	★★	★	★		★★★★★
Bhave et al. 2016				/	★	★	★	★	★★★★
Breslin et al. 2012	★	★		/		★			★★★
Centis et al. 2012		★		/		★	★	★	★★★★
da Silva et al. 2013				/		★	★	★	★★★
de Henauw et al. 2015		★		/	★	★	★		★★★★
de Meij et al. 2011				/	★★	★	★		★★★★
Donnelly et al. 1996		★		/		★	★		★★★
Erfle et al. 2015		★		/		★	★		★★★
Ermetici et al. 2016		★		/	★★	★	★	★	★★★★★★
Eyre et al. 2016		★		/		★			★★
Farias et al. 2009		★		/	★	★	★		★★★★
Fritz et al. 2016		★		/	★★	★	★	★	★★★★★★
Gorely et al. 2011			★	/	★	★	★		★★★★
Graf et al. 2008	★	★		/	★★	★	★		★★★★★★
Hamelink-Baksteen et al. 2008				/		★		★	★★
Harrison et al. 2006		★	★	/	★★	★		★	★★★★★★
Hatzis et al. 2010	★			/	★★	★	★		★★★★★
Heelan et al. 2009		★		/		★	★		★★★
Herrick et al. 2012		★		/	★	★		★	★★★★
Hollar et al. 2010		★		/		★	★		★★★
Jordan et al. 2008		★	★	/		★	★		★★★★
Kain et al. 2004			★	/	★★	★	★	★	★★★★★★
Kain et al. 2009				/	★★	★	★		★★★★
Klakk et al. 2013		★	★	/	★	★	★	★	★★★★★★
Knox et al. 2012		★		/		★		★	★★★
Li et al. 2014		★	★	/	★	★		★	★★★★★
Liu et al. 2008		★	★	/		★	★		★★★★

Mandigout et al. 2001		★		/		★		★	★★★
Meszaros et al. 2009		★		/		★	★		★★★
Morris et al. 2013				/	★	★	★		★★★
Nayer 2015		★		/	★	★		★	★★★★
Neumark-Sztainer et al. 2009		★		/	★★	★	★	★	★★★★★★
Perez Solis et al. 2015				/		★	★	★	★★★
Plachta-Danielz et al. 2011	★	★		/	★★	★	★		★★★★★★
Resaland et al. 2011		★	★	/		★	★	★	★★★★★
Robbins et al. 2012		★		/	★★	★	★	★	★★★★★★
Ronsley et al. 2013		★		/		★		★	★★★
Sallis et al. 1997		★		/	★★	★	★		★★★★★
Shofan et al. 2011		★		/		★	★	★	★★★★
Sollerhed & Ejlertsson 2008		★		/	★	★	★	★	★★★★★
Stock et al. 2007		★		/	★	★	★	★	★★★★★
Taylor et al. 2008	★		★	/	★★	★	★		★★★★★★
Treu et al. 2017				/	★★	★	★		★★★★
Vilchis-Gil et al. 2016		★		/	★★	★	★	★	★★★★★★
Wadalovska et al. 2019		★		/	★	★	★		★★★★
Weber et al. 2017		★		/	★	★	★		★★★★
Whooten et al. 2018		★		/	★	★			★★★
Yang et al. 2017		★		/	★	★	★	★	★★★★★

Appendix 5: Results by intervention characteristics

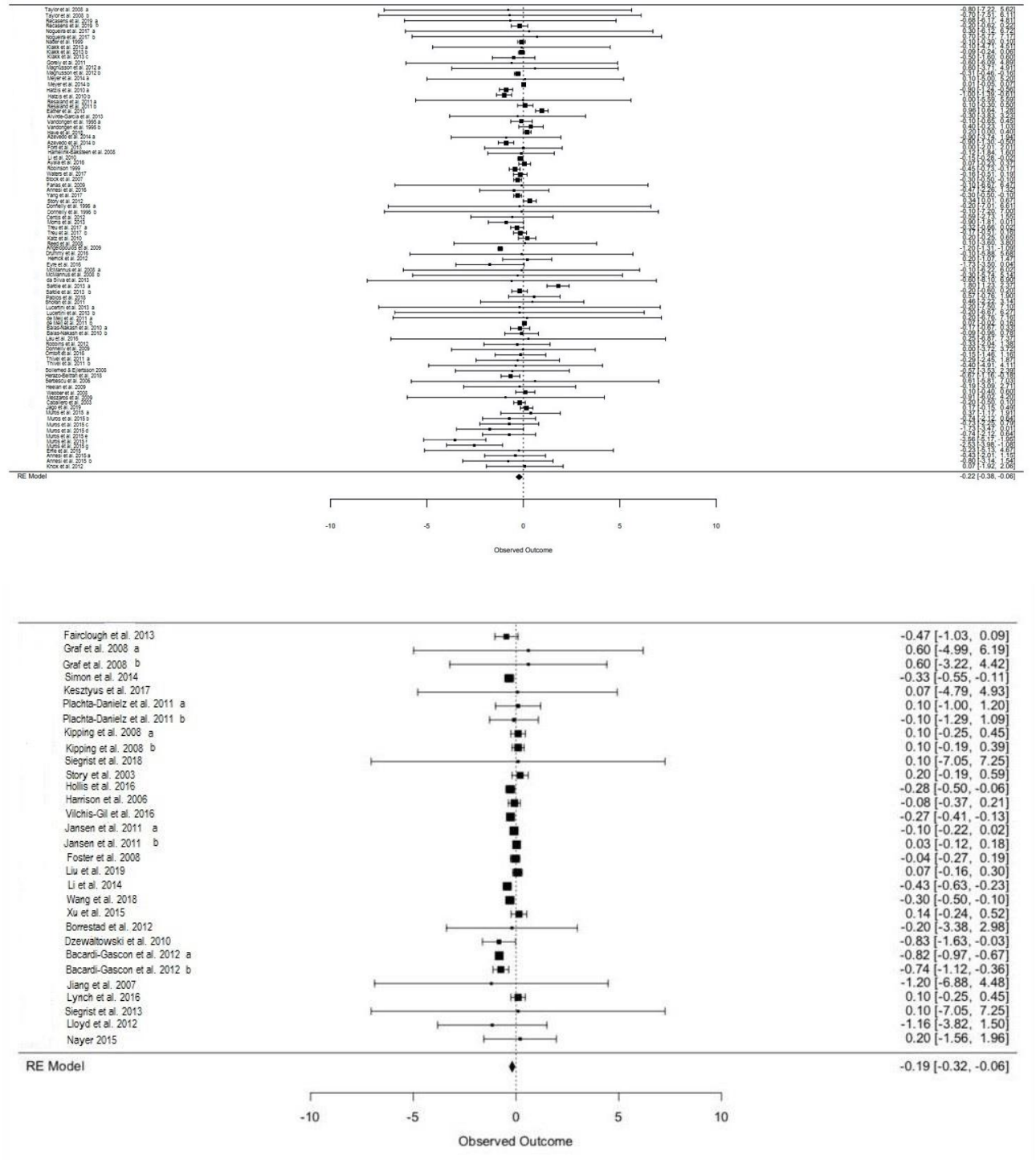
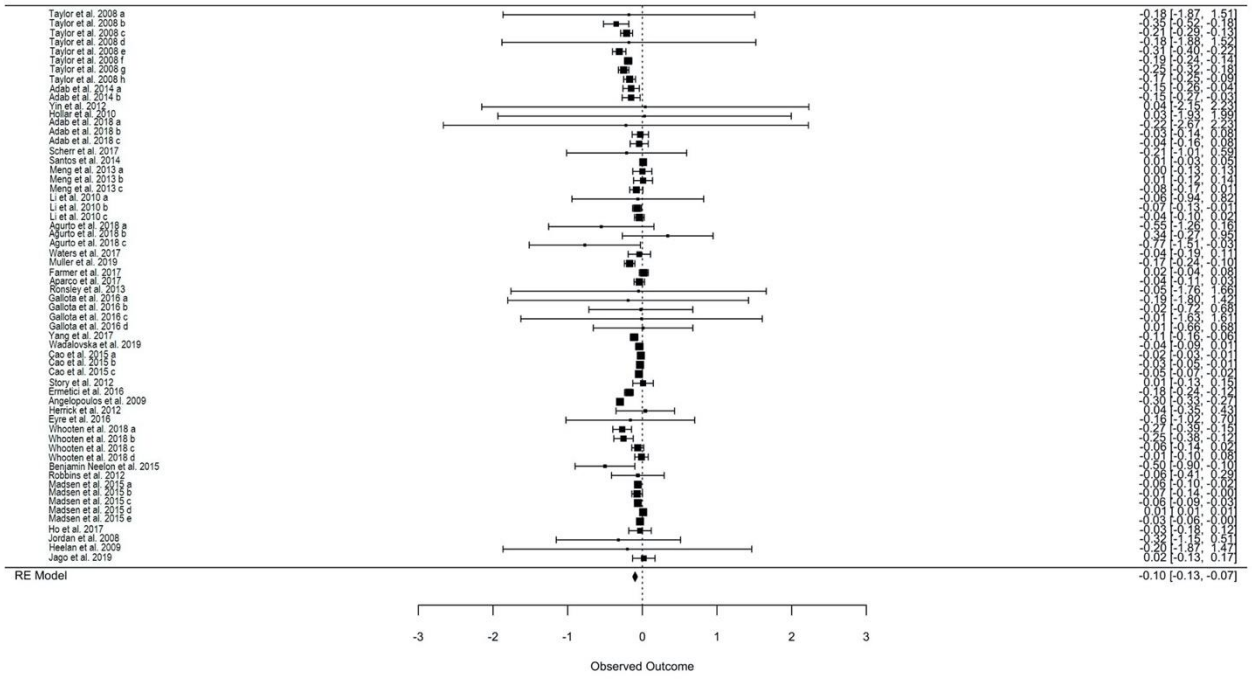


Figure A1. Forest plot of mean differences in change in body mass index between the intervention group and the control group for single component and multiple component interventions.



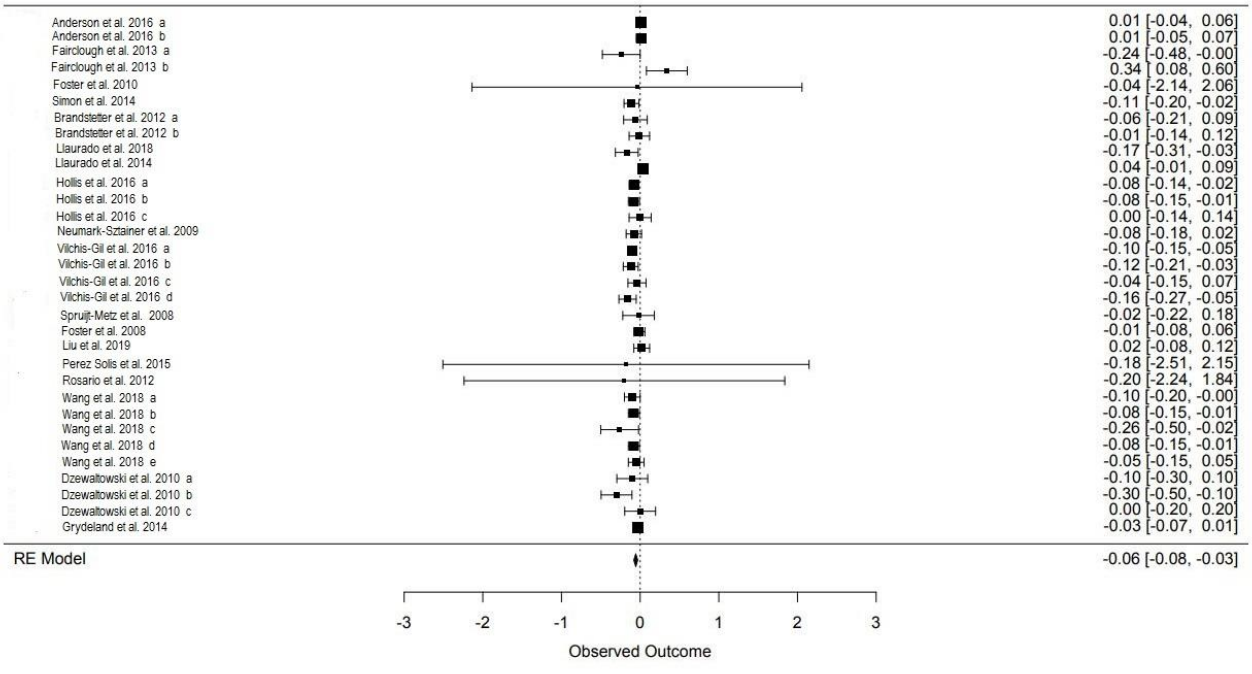


Figure A2. Forest plot of mean differences in change in body mass index z-score between the intervention group and the control group for single component and multiple component interventions

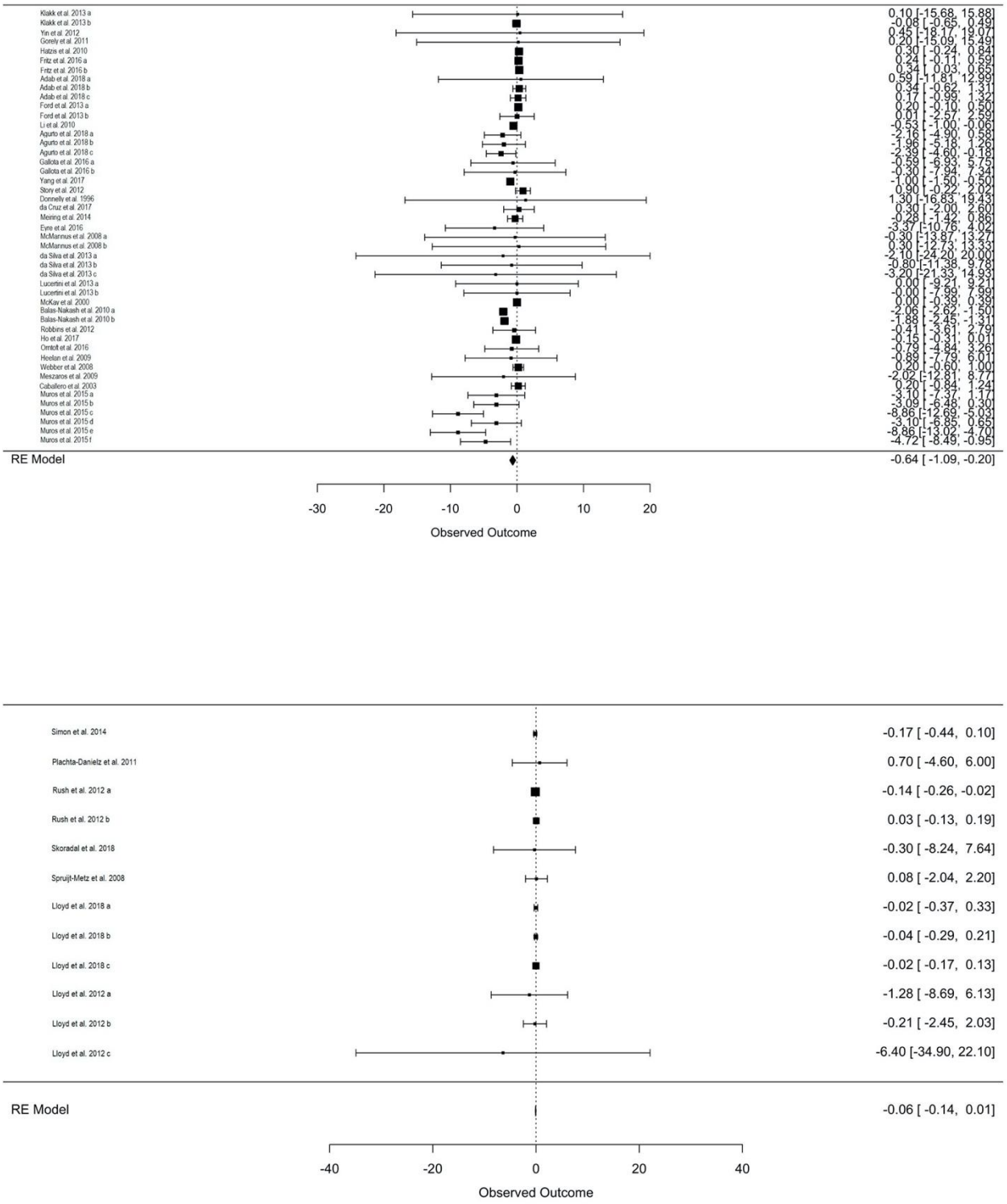


Figure A3. Forest plot of mean differences in change in percentage body fat between the intervention group and the control group for single component and multiple component interventions

Appendix 6. Analyses by gender

Table A3. Mean differences in change in BMI, BMI z-score and percentage body fat (%BF) between the intervention group and the control group in boys and girls

Outcome	BMI		BMI z-score		%BF	
	Girls	Boys	Girls	Boys	Girls	Boys
SC interventions	-0.20 (-0.27 to -0.13)	-0.03 (-0.09 to 0.04)	-0.04 (-0.12 to 0.04)	-0.02 (-0.08 to 0.04)	-0.65 (-1.20 to -0.11)	-0.27 (-0.89 to 0.35)
MC interventions	-0.38 (-0.79 to -0.02)	0.43 (0.02 to 0.85)	-0.18 (-0.41 to 0.05)	0.02 (-0.06 to 0.09)	-0.65 (-1.48 to 0.17)	-0.85 (-2.27 to 0.58)
PA	-0.19 (-0.31 to -0.06)	-0.13(-0.29 to 0.02)	-0.04 (-0.12 to 0.04)	-0.02 (-0.08 to 0.04)	-0.64 (-1.01 to -0.27)	0.05 (-0.73 to 0.84)
Fitness	-0.21 (-0.30 to -0.13)	0.004 (-0.07 to 0.08)	0.20 (-1.23 to 1.63)	-0.11 (-1.60 to 1.40)	-0.19 (-1.76 to 1.38)	-0.87 (-1.88 to 0.13)
PA + SB	-0.38 (-0.78 to 0.03)	0.45 (0.03 to 0.86)	-0.18 (-0.41 to 0.05)	0.02 (-0.06 to 0.09)	-0.64 (-1.01 to -0.27)	0.05 (-0.74 to 0.84)
Fitness+SB	-1.05 (-5.13 to 3.04)	-1.22 (-5.59 to 3.15)	/	/	/	/

SC=single-component; MC=multiple-component; PA=physical activity; SB=sedentary behavior;

Appendix 7: Sensitivity analyses

Table A4. Comparison of mean differences in change in BMI, BMI z-score and percentage body fat (%BF) between the intervention group and the control group according to study design, study period (beforevs. after 2009), risk of bias and mean age of the participants (6-9 yrs vs. 10-12 yrs)

Outcome	BMI		BMI z-score		%BF	
	SC interventions	MC interventions	SC interventions	MC interventions	SC interventions	MC interventions
Study design (RCT)	-0.16 (-0.41, 0.08)	-0.18 (-0.34,-0.02)	-0.05 (-0.08, -0.02)	-0.05 (-0-07,-0.02)	-0.10 (-0.32, 0.11)	-0.06 (-0.14,0.01)
Study period						
Before 2009	-0.16 (-0.38, 0.05)	-0.25 (-0.48, -0.02)	-0.16 (-0.22,-0.11)	-0.08 (-0.12, -0.03)	-0.28 (-0.86,0.30)	-0.09 (-0.21, 0.04)
After 2009	-0.44 (-0.82,-0.07)	-0.17 (-0.35,0.00)	-0.06 (-0.08,-0.03)	-0.05 (-0.09,-0.01)	-1.92 (-3.33,-0.52)	-0.03 (-0.15,0.10)

Risk of bias (Low risk)	-0.09 (-0.44,0.27)	-0.17 (-0.31,-0.04)	-0.21 (-0.25,-0.17)	-0.06 (-0.09,-0.04)	0.11 (-0.09,0.30)	-0.03 (-0.15,0.10)
Age						
6-9 yrs	-0.20 (-0.35,-0.04)	-0.19 (-0.40, 0.01)	-0.10 (-0.13,-0.07)	-0.07 (-0.11,- 0.03)	0.10 (-0.09,0.28)	/
10-12 yrs	-0.29 (-0.63,0.04)	-0.18 (-0.33,-0.03)	-0.10 (-0.18,-0.01)	-0.04 (-0.07,-0.01)	-2.05 (-3.30,-0.80)	-0.05 (-0.16,0.06)

Outcome	**BMI**			**BMI z-score**			**%BF**		
Single component interventions									
	SB	**PA**	**Fitness**	**SB**	**PA**	**Fitness**	**SB**	**PA**	**Fitness**
Study design (RCT)	/	0.02 (-0.24, 0.27)	-0.47 (-0.90,-0.04)	/	-0.03 (-0.05, -0.01)	-0.08 (-0.16, 0.00)	/	-0.03 (-0.24, 0.16)	-2.82 (-4.88, -0.87)
Study period	/			/			/		
Before 2009		-0.10 (-0.45,0.25)	-0.27 (-0.54, 0.00)		-0.16 (-0.22,-0.10)	-0.15 (-0.44,0.14)		-0.16 (-0.57,0.25)	-0.34 (-1.18,0.49)
After 2009		-0.25 (-0.53,0.04)	-0.29 (-0.51,-0.06)		-0.05 (-0.07,-0.02)	-0.08 (-0.14,-0.02)		-0.27 (-0,79,0.26)	-4.30 (-6.80,-1.80)
Risk of bias (Low risk)	/			/			/		
Age	/			/			/		
6-9 yrs		-0.07 (-0.20,0.06)	-0.30 (-0.59, 0.02)		-0.11 (-0.15,-0.07)	-0.08 (-0.13,-0.02)		-0.00 (-0.57,0.25)	0.22 (0.03,0.42)
10-12 yrs		-0.23 (-0.69,0.23)	-0.48 (-1.00,-0.00)		-0.07 (-0.13,-0.01)	-0.19 (-0.48,0.10)		-0.14 (-0,29,0.02)	-3.27 (-5.00,-1.54)

/ = too few observations; SC=single-component; MC=multiple-component; PA=physical activity; SB=sedentary behavior