

Systematic search strategy

We updated the searches of previous meta-analyses of school-based physical activity interventions. We then combined the search terms used by these systematic reviews to create a new search strategy, and repeated searches to identify studies published subsequent to these reviews and up until April 2019 when our search was completed. We searched five databases (MEDLINE, EMBASE, CINAHL, Web of Science (WOS) and SportDiscus) from January 2017 to April 2019.

The following search terms were used:

1. (child* or children or childhood or kids or adolescen* or "young person*" or "young people" or teen* or youth* or boy* or girl* or juvenile).ti,ab.
2. ("physical* activ*" or "physical activity" or sport* or cycling or bicycling or bicycle* or walk* or "physical education" or "physical training" or exercis* or "energy expenditure" or danc* or "physical inactivity" or "physical fitness" or lifestyle or "active travel" or commut* or "aerobic fitness").ti,ab.
3. ("clinical trial" or "control* trial" or controlled or randomi#ation or randomised or randomized or randomization or randomly or randomisation or rct or "randomi#ed controlled trial*" or "randomised or controlled trial" or "randomized controlled trial" or "cluster randomized controlled trial" or "group-randomized controlled trial" or "randomized controlled study" or "randomised controlled study" or "random* sample" or trial* or evaluation or effect* or control* or cluster or intervention).ti,ab.
4. (accelerometer or accelerometry or accelerometers or accelerometer-assessed or "counts per minute" or CPM or triaxial or Actigraph or Yamax or Actiheart or Omron, sensewear or caltrac or walk4life or idea or actireg* or lifecorder or tritrac or genea* or stepwatch or actical or actiwatch or rt3 or activpal or actimarker or dynaport or CSA or MTI or pedometer or "heart rate" or pedometry or pedometers or uniaxial or actigraphy or unidimensional or "objectively measur*" or "SenseWear Pro2 Armband" or "motion sensor data" or "activity monitor" or MVPA).ti,ab.
5. (CRF or "cardiorespiratory fitness" or "cardiovascular fitness" or fit* or shuttle or run or running or VO2 or aerobic or bicycle or "beep test" or "oxygen consumption").ti,ab.
6. Limit to English Language + Year limitation: 2017 – 2019

To identify unpublished trials, we sent emails or electronic posts to members of relevant societies; SBRN (Sedentary Behavior Research Network), ISBNPA (The International Society of Behavioral Nutrition and Physical Activity), and ISPAH (The International Society For Physical Activity And Health). We also searched trial registries; ANZCTR (Australian New Zealand Clinical Trials Registry), ISRCTN (International Standard Randomised Controlled Trial Number), and ICTRP (International Clinical Trials Registry Platform).

Appendix Table 1. Overview of Studies that Provided Raw Data for Individual Participant Data Analyses.

Study ID	Country	N provided	N included	Age y (SD) provided	Age y (SD) included	Follow-up (Months)	CRF Fitness Test	Accelerometer Device	Accelerometer Wear Location
Andrade 2014 ¹	Ecuador	151	16	12.7 (0.7)	12.8 (0.7)	28	20-m shuttle run	Actigraph - GT-256/GT1M	Hip
Bartholomew 2017 ²	USA	1838	0	9.6 (0.5)	NA	9	20-m shuttle run	Actigraph - GT3X+	Hip
Chesham 2018 ³	UK	389	102	8.4 (2.0)	8.5 (1.7)	7	20-m shuttle run	Actigraph - wGT3X-BT/wGT3X+/GT3X+/GT3X/GT1M	Hip
Christiansen 2013 ⁴	Denmark	861	733	12.5 (0.6)	12.5 (0.6)	24	Andersen test	Actigraph - GT3X	Hip
Cohen 2015 ⁵	Australia	460	213	8.5 (0.6)	8.4 (0.5)	12	20-m shuttle run	Actigraph - GT3X/GT3X+	Hip
Gorely 2009 ⁶	UK	367	140	8.8 (0.9)	8.9 (0.9)	10	20-m shuttle run	Actigraph - GT1M	Hip
Kriemler 2010 ⁷	Switzerland	540	358	9.2 (2.1)	9.4 (2.1)	9	20-m shuttle run	Actigraph - MTI 7164	Hip
Lonsdale 2016 ⁸	Australia	1219	904	8.8 (0.8)	8.8 (0.7)	12	20-m shuttle run	GENEActiv	Wrist
Martínez-Vizcaíno 2012 ⁹	Spain	196	0	8.1 (2.1)	NA	8	20-m shuttle run	Actigraph - MT1/CSA7164	Hip
McGrane 2018 ¹⁰	UK	557	0	12.4 (0.5)	NA	9	Queens College 3-minute step test	Actigraph - GT1M/GT3X/GT3X+	Hip
Møller 2014 ¹¹	Denmark	1152	864	8.4 (1.4)	8.4 (1.4)	12	Andersen test	Actigraph - GT3X	Hip
Morris 2013 ¹²	UK	386	190	9.6 (0.9)	9.6 (0.9)	7	20-m shuttle run	Actigraph - GT1M	Hip
O'Leary 2019 ¹³	Ireland	180	111	8.1 (2.1)	8.1 (2.1)	24	Time to complete 550m	Actigraph - 7164/ GT3X/wGT3X+	Hip
Peralta 2009 ¹⁴	Australia	35	19	12.5 (0.4)	12.5 (0.3)	6	20-m shuttle run	Actigraph - MTI7164	Hip
Puder 2011 ¹⁵	Switzerland	655	284	5.1 (0.6)	5.2 (0.6)	9.5	20-m shuttle run	Actigraph - MTI7164	Hip
Robbins 2019 ¹⁶	USA	1519	1297	12.0 (1.0)	12.0 (1.0)	4	20-m shuttle run	Actigraph - GT1M	Hip
Sánchez-López 2015 ¹⁷	Spain	447	0	9.4 (0.7)	NA	24	20-m shuttle run	Actigraph - GT3X/GT1M	Hip
Seljebotn 2019 ¹⁸	Norway	446	291	10.0 (0.0)	10.0 (0.0)	10	Andersen test	Actigraph - GT1M/GT3X/GT3X+/LLC	Hip
Tarp 2016 ¹⁹	Denmark	627	263	12.9 (0.6)	12.9 (0.6)	5	Andersen test	Actigraph - GT3X/GT3X+	Hip
Taylor 2018 ²⁰	UK	230	141	9.6 (0.3)	9.6 (0.3)	4	20-m shuttle run	Actigraph - GT9X	Wrist
Tercedor 2017a ²¹	Spain	203	144	8.4 (0.3)	8.4 (0.4)	2	20-m shuttle run	Actigraph wGT3X-BT	Wrist
Tercedor 2017b ²¹	Spain	375	331	8.4 (0.3)	8.4 (0.3)	2	20-m shuttle run	Actigraph wGT3X-BT	Wrist
Weston 2016 ²²	UK	101	45	14.1 (0.3)	14.1 (0.3)	2.5	20-m shuttle run	Actigraph - GT1M	Hip
Zhou 2018 ²³	China	221	175	13.5 (0.5)	13.5 (0.5)	10	20-m shuttle run	Actigraph - GT3X+	Hip

NA = not applicable, CRF = Cardiorespiratory fitness (VO_{2Peak})

Appendix Table 2. Details of Study Design and Intervention Delivery and Content in Studies that Provided Raw Data for Individual Participant Data Analyses.

Study ID	Study design	Delivery Target	Has Physical Education Component	Has Recess Component	Has Classroom Component	Has PA Before/After School Component	Has Staff Involvement Component	Has Family and Community Engagement Component	Included in Main Analysis
Andrade 2014 ¹	RCT	School-level	No	No	Yes	No	Yes	Yes	Yes
Bartholomew 2017 ²	RCT	School-level	No	No	Yes	No	Yes	No	No
Chesham 2018 ³	CT	School-level	No	No	Yes	No	Yes	No	Yes
Christiansen 2013 ⁴	RCT	School-level	No	Yes	No	Yes	Yes	No	Yes
Cohen 2015 ⁵	RCT	School-level	Yes	Yes	No	No	Yes	Yes	Yes
Gorely 2009 ⁶	CT	School-level	Yes	No	Yes	Yes	Yes	No	Yes
Kriemler 2010 ⁷	RCT	School-level	Yes	No	Yes	Yes	No	No	Yes
Lonsdale 2016 ⁸	RCT	School-level	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Martínez-Vizcaíno 2012 ⁹	RCT	School-level	No	No	Yes	No	Yes	Yes	No
McGrane 2018 ¹⁰	RCT	School-level	Yes	No	No	No	Yes	Yes	No
Møller 2014 ¹¹	CT	School-level	Yes	No	No	No	Yes	No	Yes
Morris 2013 ¹²	CT	School-level	Yes	No	Yes	No	Yes	Yes	Yes
O'Leary 2019 ¹³	RCT	School-level	No	Yes	Yes	Yes	Yes	Yes	Yes
Peralta 2009 ¹⁴	RCT	Individual-level	No	Yes	Yes	No	Yes	Yes	Yes
Puder 2011 ¹⁵	RCT	Class-level	NA	No	No	No	Yes	Yes	Yes
Robbins 2019 ¹⁶	RCT	School-level	No	No	No	Yes	No	No	Yes
Sánchez-López 2015 ¹⁷	RCT	School-level	No	Yes	Yes	No	Yes	Yes	No
Seljebotn 2019 ¹⁸	RCT	School-level	No	Yes	Yes	Yes	Yes	No	Yes
Tarp 2016 ¹⁹	RCT	School-level	No	Yes	Yes	No	Yes	No	Yes
Taylor 2018 ²⁰	RCT	School-level	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tercedor 2017a ²¹	CT	School-level	Yes	Yes	No	Yes	Yes	Yes	Yes
Tercedor 2017b ²¹	CT	School-level	Yes	Yes	No	Yes	Yes	Yes	Yes
Weston 2016 ²²	CT	School-level	Yes	Yes	No	Yes	No	No	Yes
Zhou 2018 ²³	RCT	School-level	Yes	Yes	No	Yes	Yes	Yes	Yes

Description of study intervention content was obtained by evaluating studies using the Comprehensive School Physical Activity Program (CSPAP) framework.²⁴ RCT = randomised controlled trial, CT = quasi-randomised controlled trial

Appendix Table 3. Harmonising of Cardiorespiratory Fitness Measurements

CRF Fitness Test	Peak oxygen consumption prediction equation
20-m shuttle run ²⁵	$\text{VO}_{2\text{Peak}} = 41.76799 + (0.49261 \times \text{PACER}) - (0.0029 \times \text{PACER}^2) - (0.61613 \times \text{BMI}) + (0.34787 \times \text{Gender} \times \text{Age})$ <p><i>PACER = Laps, 1 = Boys, 0 = Girls, Age in years, BMI = Body mass index</i></p>
Andersen test ²⁶	$\text{BOYS} = 27.1689 + 0.0397 \times \text{Andersen} - 0.1698 \times \text{body mass}$ $\text{GIRLS} = 32.5793 + 0.0309 \times \text{Andersen} - 0.2351 \times \text{body mass}$ <p><i>Andersen = Distance covered in meters</i></p>
Time to complete 550m ²⁷	$\text{VO}_{2\text{Peak}} = - 8.41 (\text{MRW}) + 0.34 (\text{MRW})^2 + 0.21 (\text{Age} \times \text{Gender}) - 0.84 (\text{BMI}) + 108.94$ <p><i>MRW = Minutes running or walking, Age in years, 1 = Boys, 0 = Girls, BMI = Body mass index</i></p>
Queens College 3-minute step test ²⁸	$\text{BOYS VO}_{2\text{Peak}} = 111.33 - [0.42 \times \text{heart rate (bpm)}]$ $\text{GIRLS VO}_{2\text{Peak}} = 65.81 - [0.1847 \times \text{heart rate (bpm)}]$ <p><i>Heart rate is measured in recovery immediately post test</i></p>

CRF = Cardiorespiratory fitness ($\text{VO}_{2\text{Peak}}$)

Appendix Table 4. Overview of Socio-Economic Status (SES) Harmonisation for Studies Included in the Main Analysis that Provided Individual Level SES Data.

Study ID	SES Measurement	SES Scale	Details of SES Scales	Harmonization
Andrade 2014 ¹	Family wealth	2-level scale	‘Better off’ or ‘poor’ based on basic needs being met (e.g. water, electricity).	Dichotomous split
Chesham 2018 ³	SIMD rank decile	10 groups	Deprivation measure comprising income, employment, health, education, housing, environment, and crime. IMD ranks generated from home post codes (child/school-reported).	Dichotomous split
Christiansen 2013 ⁴	Parent employment	6-level scale	1=High SES employment ranging to 5=low SES employment, 6=unemployed.	Dichotomous split
Møller 2014 ¹¹	Mother education	6-level scale	1=10th grade or less, 2=vocational education, 3=high school education, 4=short tertiary education, 5=bachelor’s degree or equivalent, 6=master’s degree or higher.	Dichotomous split
Kriemler 2010 ⁷	Parent education	6-level scale	1=no formal education; 2=partial apprenticeship; 3=2-3 yr apprenticeship; 4=4-year apprenticeship; 5=technical college or university of applied sciences; 6= university degree.	Dichotomous split
Lonsdale 2016 ⁸	Books in home	5-level scale	Self-reported number of books 1=0-10, 2=11-25, 3=26-100, 4=101-200, 5= >200.	1-3=‘low’, 4-5=‘high’
Puder 2011 ¹⁵	Parent education	4-level scale	1=university, 2=maturity/college degree, professional cadre position without university degree, 3=apprenticeship, 4=no formal professional education.	Dichotomous split
Seljebotn 2019 ¹⁸	Parent education	4-level scale	1=university, 2=maturity/college degree, professional cadre position without university degree, 3=apprenticeship, 4=no formal professional education.	Dichotomous split
Tarp 2016 ¹⁹	Mother education	3-level scales	0=high school or less, 1=vocational training or <3.5yrs of adult education, 2=bachelor level or higher.	1-2=‘low’, 3=‘high’
Taylor 2018 ²⁰	IMD rank decile	10 groups	Deprivation measure comprising income, employment, health, education, housing, environment, and crime. IMD ranks generated from home post codes (child/school-reported).	Dichotomous split
Zhou 2018 ²³	Parent education	5-level scale	1=junior high, 2=high school, 3=junior colleges, 4=university, 5=graduate.	1-3=‘low’, 4-5=‘high’

To harmonise these data to allow for SES to be assessed across studies with differences in scales, we converted all measures to a dichotomous outcome of ‘low’ or ‘high’ SES. IMD = Indices of Multiple Deprivation. SIMD = Scottish Indices of Multiple Deprivation.

Appendix Table 5. Overview of Studies Unable or Unwilling to Provide Raw Data for Individual Participant Data Analyses.

Study ID	Country	N study	N with accelerometry	Age y (SD)	Follow-up (Months)	Intervention design	Delivery target
Donnelly 2019 ²⁹	USA	1527	167	7.7-8.8	36	RCT	School-level
*Fredriksen 2017 ³⁰	Norway	2297	Unavailable	6-11	84	CT	School-level
Have 2018 ³¹	Denmark	505	314	7.2 (0.3)	9	RCT	School-level
Herrick 2012 ³²	USA	100	100	10.4 (0.6)	5	CT	School-level
Madsen 2015 ³³	USA	879	450	4-5 th grade	24	RCT	School-level
Resaland 2015 ³⁴	Norway	1145	700	8.8 (0.9)	7	RCT	School-level
Van den Berg 2019 ³⁵	Netherlands	512	330	10.9 (0.7)	2	RCT	Class-level
*Verjans-Janssen 2018 ³⁶	Netherlands	523	Unavailable	7-10	24	CT	School-level
Verstraete 2007 ³⁷	Belgium	764	111	11.2 (0.7)	24	RCT	School-level

*Complete study information unavailable as the study had not completed data collection at time of invitation to contribute data. RCT = randomised controlled trial, CT = quasi-randomised controlled trial.

Appendix Table 6. Characteristics of Students Included and Students Excluded from Main Analysis

Outcome	Included		Excluded	
	Boys	Girls	Boys	Girls
Baseline CRF	48.0 (7.9)	41.2 (6.3)	52.1 (8.5)	43.1 (7.4)
Baseline MPA	5.2 (1.9)	4.4 (2.7)	5.6 (2.4)	3.8 (2.3)
Baseline VPA	1.6 (1.6)	1.5 (2.1)	2.0 (2.3)	1.2 (1.7)
Baseline BMI	18.3 (3.4)	18.8 (4.1)	17.6 (3.0)	19.3 (4.9)
Baseline age	9.8 (3.4)	9.8 (4.1)	9.3 (3.0)	10.1 (4.9)

CRF = Cardiorespiratory fitness (VO_{2peak}), MPA = Moderate physical activity (per day percentage units), VPA = Vigorous physical activity (per day percentage units), BMI = Body mass index.

Appendix Table 7. Risk of Bias Assessment in Studies that Provided Raw Data for Individual Participant Data Analyses.

Study ID	Sequence Generation Rating	Allocation Concealment Rating	Blinding of Participants for All Outcomes Rating	Blinding of Personnel for All Outcomes Rating	Blinded Outcome Assessor for All Outcomes Rating	Incomplete Outcome rating	Selective Reporting Rating	Other Biases Rating	Included in Main Analysis
Andrade 2014 ¹	Low	Low	Low	Unclear	Unclear	Low	Low	Low	Yes
Bartholomew 2017 ²	Unclear	Unclear	Unclear	High	High	Low	Low	Unclear	No
Chesham 2018 ³	High	High	High	High	Unclear	Low	Low	High	Yes
Christiansen 2013 ⁴	Low	Low	Unclear	Unclear	Unclear	Low	Low	Low	Yes
Cohen 2015 ⁵	Low	Low	Unclear	High	High	Unclear	Low	Low	Yes
Gorely 2009 ⁶	High	High	High	High	High	Low	Low	High	Yes
Kriemler 2010 ⁷	Low	Low	Unclear	Unclear	Low	Low	Low	Low	Yes
Lonsdale 2016 ⁸	Low	Low	Unclear	Unclear	Unclear	Unclear	Low	Low	Yes
Martínez-Vizcaíno 2012 ⁹	Unclear	Unclear	High	High	High	Unclear	Low	Low	No
McGrane 2018 ¹⁰	Unclear	Unclear	Unclear	High	Unclear	Low	Low	Low	No
Møller 2014 ¹¹	High	High	Unclear	Unclear	Unclear	Unclear	Low	High	Yes
Morris 2013 ¹²	High	High	Unclear	Unclear	High	High	Low	High	Yes
O'Leary 2019 ¹³	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	High	Yes
Peralta 2009 ¹⁴	Low	Low	High	High	Low	Low	Low	High	Yes
Puder 2011 ¹⁵	Low	Low	Low	High	Low	Low	Low	Low	Yes
Robbins 2019 ¹⁶	Unclear	Unclear	High	High	High	Low	Low	High	Yes
Sánchez-López 2015 ¹⁷	Unclear	Unclear	Unclear	Unclear	High	Unclear	Low	Low	No
Seljebotn 2019 ¹⁸	Low	Low	Unclear	High	Unclear	Low	Low	Low	Yes
Tarp 2016 ¹⁹	Low	Low	High	High	High	Low	Low	Low	Yes
Taylor 2018 ²⁰	Unclear	Low	High	High	Unclear	Low	Low	High	Yes
Tercedor 2017a ²¹	Unclear	Unclear	Unclear	High	Unclear	Unclear	Low	High	Yes
Tercedor 2017b ²¹	Unclear	Unclear	Unclear	High	Unclear	Unclear	Low	High	Yes
Weston 2016 ²²	High	High	High	Unclear	Unclear	Low	Low	High	Yes
Zhou 2018 ²³	Unclear	Unclear	Unclear	High	Low	Unclear	Low	High	Yes

Risk of bias assessed using the Cochrane Collaboration tool. Two authors (TS, MN) independently assessed studies and resolved disagreements by consensus. Percent of studies included in the main IPD pooled analysis (n = 20) rated as low risk for domain; sequence generation (45%), allocation concealment (50%), blinding of participants for all outcomes (10%), blinding of personnel for all outcomes (0%), blinded outcome assessor for all outcomes rating (20%), incomplete outcome (65%), selective reporting (100%), other biases (40%).

Appendix Table 8. Accelerometer Wear Location Summary Statistics

Outcome	Hip				Wrist			
	Control Group		Treatment Group		Control Group		Treatment Group	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MPA Proportion T1	3.98	2.04	4.1	2.0	5.97	3.24	6.44	3.14
MPA Proportion T2	3.91	2.17	4.12	2.15	5.68	2.98	6.79	3.04
VPA Proportion T1	1.43	1.4	1.4	1.28	1.8	3.04	1.84	3.42
VPA Proportion T2	1.3	1.23	1.47	1.35	1.45	2.28	1.69	2.83

Note. T1 = baseline, T2 = follow-up, VPA = Vigorous physical activity, MPA = Moderate physical activity, Proportion = proportion of daily wear time.

Appendix Table 9. Accelerometer Wear Location Multigroup Sensitivity Analysis

Outcome	Hip				Wrist			
	Effect	95% CI Lower	95% CI Upper	<i>P</i>	Effect	95% CI Lower	95% CI Upper	<i>P</i>
MPA	0.075	-0.032	0.182	0.169	0.085	-0.086	0.140	0.329
VPA	0.109	0.035	0.183	0.004	0.091	-0.014	0.195	0.088

VPA = Vigorous physical activity, MPA = Moderate physical activity.

References for Supplementary File

1. Andrade S, Lachat C, Ochoa-Aviles A, et al. A school-based intervention improves physical fitness in Ecuadorian adolescents: a cluster-randomized controlled trial. *Int J Behav Nutr Phys Act*. 2014;11:153. doi:10.1186/s12966-014-0153-5.
2. Bartholomew JB, Jowers EM, Errisuriz VL, Vaughn S, Roberts G. A cluster randomized control trial to assess the impact of active learning on child activity, attention control, and academic outcomes: The Texas I-CAN trial. *Contemp Clin Trials*. 2017;61:81-86. doi:cccc
3. Chesham RA, Booth JN, Sweeney EL, et al. The Daily Mile makes primary school children more active, less sedentary and improves their fitness and body composition: a quasi-experimental pilot study. *BMC Med*. 2018;16(1):64. doi:10.1186/s12916-018-1049-z.
4. Christiansen LB, Toftager M, Boyle E, Kristensen PL, Troelsen J. Effect of a school environment intervention on adolescent adiposity and physical fitness. *Scand J Med Sci Sports*. 2013;23(6):e381-e389. doi:10.1111/sms.12088.
5. Cohen KE, Morgan PJ, Plotnikoff RC, Callister R, Lubans DR. Physical activity and skills intervention: SCORES cluster randomized controlled trial. *Med Sci Sports Exerc*. 2015;47(4):765-774. doi:10.1249/MSS.0000000000000452.
6. Gorely T, Nevill ME, Morris JG, Stensel DJ, Nevill A. Effect of a school-based intervention to promote healthy lifestyles in 7-11 year old children. *Int J Behav Nutr Phys Act*. 2009;6:5. doi:10.1186/1479-5868-6-5.
7. Kriemler S, Zahner L, Schindler C, et al. Effect of school based physical activity programme (KISS) on fitness and adiposity in primary schoolchildren: cluster randomised controlled trial. *BMJ*. 2010;340:c785. doi:10.1136/bmj.c785.
8. Lonsdale C, Sanders T, Cohen KE. Scaling-up an efficacious school-based physical activity intervention: study protocol for the 'Internet-based Professional Learning to help teachers support' *BMC Public Health*. 2016. doi:10.1186/s12889-016-3243-2.
9. Martínez-Vizcaíno V, Sánchez-López M, Salcedo-Aguilar F, et al. Protocol of a Randomized Cluster Trial to Assess the Effectiveness of the MOVI-2 Program on Overweight Prevention in Schoolchildren. *Revista Española de Cardiología (English Edition)*. 2012;65(5):427-433. doi:10.1016/j.rec.2011.12.009.
10. McGrane B, Belton S, Fairclough SJ, Powell D, Issartel J. Outcomes of the Y-PATH Randomized Controlled Trial: Can a School-Based Intervention Improve Fundamental Movement Skill Proficiency in Adolescent Youth? *J Phys Act Health*. 2018;15(2):89-98. doi:10.1123/jpah.2016-0474.
11. Møller NC, Tarp J, Kamelarczyk EF, Brønd JC, Klakk H, Wedderkopp N. Do extra compulsory physical education lessons mean more physically active children--findings from the childhood health, activity, and motor performance school study Denmark (The CHAMPS-study DK). *Int J Behav Nutr Phys Act*. 2014;11:121. doi:10.1186/s12966-014-0121-0.
12. Morris JG, Gorely T, Sedgwick MJ, Nevill A, Nevill ME. Effect of the Great Activity Programme on healthy lifestyle behaviours in 7-11 year olds. *J Sports Sci*. 2013;31(12):1280-1293. doi:10.1080/02640414.2013.781665.
13. O'Leary M, Rush E, Lacey S, Burns C, Coppinger T. Project Spraoi: two year outcomes of a whole school physical activity and nutrition intervention using the RE-AIM framework. *Irish Educational Studies*. 2019;38(2):219-243. doi:10.1080/03323315.2019.1567368.
14. Peralta LR, Jones RA, Okely AD. Promoting healthy lifestyles among adolescent boys: the Fitness Improvement and Lifestyle Awareness Program RCT. *Prev Med*. 2009;48(6):537-542. doi:10.1016/j.ypmed.2009.04.007.

15. Puder JJ, Marques-Vidal P, Schindler C, et al. Effect of multidimensional lifestyle intervention on fitness and adiposity in predominantly migrant preschool children (Ballabeina): cluster randomised controlled trial. *BMJ*. 2011;343:d6195. doi:10.1136/bmj.d6195.
16. Robbins LB, Ling J, Sharma DB, et al. Intervention Effects of “Girls on the Move” on Increasing Physical Activity: A Group Randomized Trial. *Ann Behav Med*. 2019;53(5):493-500. doi:10.1093/abm/kay054.
17. Sánchez-López M, Pardo-Guijarro MJ, Del Campo DG-D, et al. Physical activity intervention (Movi-Kids) on improving academic achievement and adiposity in preschoolers with or without attention deficit hyperactivity disorder: study protocol for a randomized controlled trial. *Trials*. 2015;16:456. doi:10.1186/s13063-015-0992-7.
18. Seljebotn PH, Skage I, Riskedal A, Olsen M, Kvalø SE, Dyrstad SM. Physically active academic lessons and effect on physical activity and aerobic fitness. The Active School study: A cluster randomized controlled trial. *Prev Med Rep*. 2019;13:183-188. doi:10.1016/j.pmedr.2018.12.009.
19. Tarp J, Domazet SL, Froberg K, Hillman CH, Andersen LB, Bugge A. Effectiveness of a School-Based Physical Activity Intervention on Cognitive Performance in Danish Adolescents: LCoMotion-Learning, Cognition and Motion - A Cluster Randomized Controlled Trial. *PLoS One*. 2016;11(6):e0158087. doi:10.1371/journal.pone.0158087.
20. Taylor SL, Noonan RJ, Knowles ZR, et al. Evaluation of a Pilot School-Based Physical Activity Clustered Randomised Controlled Trial-Active Schools: Skelmersdale. *Int J Environ Res Public Health*. 2018;15(5). doi:10.3390/ijerph15051011.
21. Tercedor P, Villa-González E, Ávila-García M, et al. A school-based physical activity promotion intervention in children: rationale and study protocol for the PREVIENE Project. *BMC Public Health*. 2017;17(1):748. doi:10.1186/s12889-017-4788-4.
22. Weston KL, Azevedo LB, Bock S, Weston M, George KP, Batterham AM. Effect of Novel, School-Based High-Intensity Interval Training (HIT) on Cardiometabolic Health in Adolescents: Project FFAB (Fun Fast Activity Blasts) - An Exploratory Controlled Before-And-After Trial. *PLoS One*. 2016;11(8):e0159116. doi:10.1371/journal.pone.0159116.
23. Zhou Z, Dong S, Yin J, Fu Q, Ren H, Yin Z. Improving Physical Fitness and Cognitive Functions in Middle School Students: Study Protocol for the Chinese Childhood Health, Activity and Motor Performance Study (Chinese CHAMPS). *Int J Environ Res Public Health*. 2018;15(5). doi:10.3390/ijerph15050976.
24. Special Issue: Comprehensive School Physical Activity Programs. *J Teach Phys Educ*. 2014;33(4):435-439. doi:10.1123/jtpe.2014-0193.
25. Mahar MT, Guerieri AM, Hanna MS, Kemble CD. Estimation of aerobic fitness from 20-m multistage shuttle run test performance. *Am J Prev Med*. 2011;41(4 Suppl 2):S117-S123. doi:10.1016/j.amepre.2011.07.008.
26. Aadland E, Andersen LB, Lerum Ø, Resaland GK. The Andersen aerobic fitness test: New peak oxygen consumption prediction equations in 10 and 16-year olds. *Scand J Med Sci Sports*. 2018;28(3):862-872. doi:10.1111/sms.12985.
27. Cureton KJ, Sloniger MA, O’Bannon JP, Black DM, McCormack WP. A generalized equation for prediction of VO₂peak from 1-mile run/walk performance. *Med Sci Sports Exerc*. 1995;27(3):445-451. <https://www.ncbi.nlm.nih.gov/pubmed/7752874>.
28. McArdle WD, Katch FI, Pechar GS, Jacobson L, Ruck S. Reliability and interrelationships between maximal oxygen intake, physical work capacity and step-test scores in college women. *Med Sci Sports*. 1972;4(4):182-186. <https://www.ncbi.nlm.nih.gov/pubmed/4648576>.
29. Donnelly JE, Greene JL, Gibson CA, et al. Physical Activity Across the Curriculum (PAAC): a randomized controlled trial to promote physical activity and diminish overweight and obesity in elementary school children. *Prev Med*. 2009;49(4):336-341. doi:10.1016/j.ypped.2009.07.022.

30. Fredriksen PM, Hjelle OP, Mamen A. et al. The health Oriented pedagogical project (HOPP) - a controlled longitudinal school-based physical activity intervention program. *BMC Public Health*. 2017;17(370). <https://doi.org/10.1186/s12889-017-4282-z>.
31. Have M, Nielsen JH, Ernst MT, Gejl AK, Fredens K, Grøntved A, et al. Classroom based physical activity improves children's math achievement – A randomized controlled trial. *PLoS ONE*. 2018;13(12): e0208787.
32. Herrick H, Thompson H, Kinder J, Madsen KA. Use of SPARK to promote after-school physical activity. *J Sch Health*. 2012;82(10):457-461. doi:10.1111/j.1746-1561.2012.00722.x.
33. Madsen K, Linchey J, Gerstein D, et al. Energy Balance 4 Kids with Play: Results from a Two-Year Cluster-Randomized Trial. *Child Obes*. 2015;11(4):375-383. doi:10.1089/chi.2015.0002.
34. Resaland GK, Moe VF, Aadland E, et al. Active Smarter Kids (ASK): Rationale and design of a cluster-randomized controlled trial investigating the effects of daily physical activity on children's academic performance and risk factors for non-communicable diseases. *BMC Public Health*. 2015;15:709. doi:10.1186/s12889-015-2049-y.
35. van den Berg V, Saliassi E, de Groot RHM, Chinapaw MJM, Singh AS. Improving Cognitive Performance of 9-12 Years Old Children: Just Dance? A Randomized Controlled Trial. *Front Psychol*. 2019;10:174. doi:10.3389/fpsyg.2019.00174.
36. Verjans-Janssen SRB, Van Kann DHH, Gerards SMPL, et al. Study protocol of the quasi-experimental evaluation of “KEIGAAF”: a context-based physical activity and nutrition intervention for primary school children. *BMC Public Health*. 2018;18(842). <https://doi.org/10.1186/s12889-018-5764-3>.
37. Verstraete SJ, Cardon GM, De Clercq DL, De Bourdeaudhuij IM. A comprehensive physical activity promotion programme at elementary school: the effects on physical activity, physical fitness and psychosocial correlates of physical activity. *Public Health Nutr*. 2007;10(5):477-484. doi:10.1017/S1368980007223900.