

Dutch physical activity advice for children aged 0-4 years: background document

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Background document to: Beweegadvies voor kinderen tot en met vier jaar
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01 introduction



This background document forms part of an advisory report on *Dutch physical activity advice for children aged 0-4 years* (in Dutch: *Beweegadvies voor kinderen tot en met vier jaar*) which has been prepared by the Committee Dutch physical activity advice for children up to age 4 years of the Health Council of the Netherlands.

In 2017, the Health Council of the Netherlands published the *Dutch physical activity guidelines 2017* (in Dutch: *Beweegrichtlijnen 2017*) for children aged 4 years and older, adults, and older adults. In 2019, the Minister for Medical Care and Sport asked the Health Council to draw up an advisory report on the physical activity and sedentary behaviour of children aged 0-4 years old.

This background document describes the methodology and the results of a systematic literature search and an evaluation of the evidence of the (health) effects of physical activity and sedentary behaviour on children aged 0-4 years old.



02 methods



2.1 Literature search

The committee decided to base their evaluation on prospective studies in children aged 0-4 years, investigating the effects of physical activity and/or sedentary behaviour on the following outcomes: bone health, cardio-metabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, risks, and physical activity/sedentary behaviour at a later age. For this purpose, a systematic literature search was performed, the details of which are described below.

2.2 Search strategy

Initially, the committee's aim was to evaluate appropriate systematic literature reviews, meta-analyses, and pooled analyses (from now on: "reviews"). Therefore, systematic literature searches were performed in the PubMed, Scopus and PsycInfo databases to identify relevant reviews published from 01-01-2000 onwards. The searches were performed in July (for all outcomes except physical activity/sedentary behaviour at a later age) and November 2020 (for the outcome physical activity/sedentary behaviour at a later age). The search strings of these searches are available in Appendices A1 and A2.

Upon inspection, the committee noticed that, in terms of populations, the identified reviews generally used broader inclusion criteria (e.g. 0-12 or 0-18 years) and/or study designs (e.g. cross-sectional or retrospective studies) and consequently reported conclusions which were broader than

the scope of the current evaluation. Therefore, the committee decided to base their evaluation on individual studies only.

There was one exception; multiple reviews were identified that specifically reviewed the effects of physical activity in children 3-4 years on subsequent motor development. Therefore, in the evaluation of this subject, the reviews were also taken into account.

All relevant individual studies from the reviews that matched the selection criteria (see below) were included. Additionally, to ensure that recent studies that may not have been included in the reviews were identified, systematic literature searches for individual studies were performed separately for each outcome in the literature databases PubMed, Scopus and PsycInfo. For all outcomes, except physical activity/sedentary behaviour at a later age, these searches were performed in September-October 2020 and included studies published from 01-01-2015 onwards (to identify any additional studies that had been published in the last five years). For the outcome physical activity/sedentary behaviour at a later age, the search was performed in February 2021 and included studies published from 01-01-2012 onwards (as the reviews identified regarding this outcome generally included studies up to this period). The search strings of these searches are available in Appendices A3-A11.



2.3 Study selection

Appropriate reviews and individual studies that were identified through the systematic literature searches were selected, based on pre-specified selection criteria regarding article, study design, population, exposure and outcome. The selection criteria for both the reviews and the individual studies are available in Appendix B. The selection criteria for the individual studies are summarised below.

2.3.1 Article

Studies were included if they were published in an English or Dutch article in a peer-reviewed scientific journal with the full-text available.

2.3.2 Study design

Both experimental (e.g. randomised controlled trials) and observational (e.g. cohort studies) prospective studies were included.

2.3.3 Population

Studies were included if the mean age of the study population was under five years at the time the exposure was measured. Studies that focused specifically on children with chronic diseases, physical limitations, or developmental delays were excluded.

Studies were categorised into three age groups based on the mean age at the time the exposure was measured: <1 year (including children under

1 year old), 1-2 years (including children from 1 year old – under 3 years old), and 3-4 years old (including children from 3 years old – under 5 years old).

2.3.4 Exposure

Physical activity was defined as “any bodily movement produced by skeletal muscles that requires energy expenditure”¹ and sedentary behaviour was defined as “any waking behaviour characterised by a low energy expenditure ≤ 1.5 metabolic equivalents, while in a sitting, reclining or lying posture.”² All forms of physical activity and sedentary behaviour were included, including prone position, organised sports activities and (outdoor) play for physical activity, and supine position, being in a (car) seat and several forms of screen time for sedentary behaviour. In order for an experimental study to be included, the difference in physical activity or sedentary behaviour content between the intervention and the control condition must at least have been described. Experimental studies that focused on the acute effects of a singular intervention activity were excluded.

2.3.5 Outcome

Bone health, cardiometabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, risks, and physical activity/sedentary behaviour at a later age were included as relevant outcomes.



2.4 Data extraction

All relevant information regarding the study, study population, exposure(s), outcome(s), and results was extracted from the included studies and summarised in tables. This was done for each combination of exposure (physical activity and sedentary behaviour), age group (<1 year, 1-2 years, and 3-4 years), and outcome (bone health, cardiometabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, risks, and physical activity/sedentary behaviour at a later age).

2.5 Evaluation of the evidence

As the identified studies were highly heterogeneous, formal meta-analysis was not deemed appropriate. Instead, the committee used a decision tree, which is depicted in Figure 1, to evaluate the available scientific evidence. The evidence was evaluated for each combination of exposure (physical activity and sedentary behaviour), age group (<1 year, 1-2 years, and 3-4 years), and outcome (bone health, cardiometabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, risks, and physical activity/sedentary behaviour at a later age).

In the decision tree, a conclusion was drawn based on the number of available studies and the number of participants in those studies, the proportion of studies that reported statistically significant effects/

associations, the degree of heterogeneity in the direction of those effects/associations, and other considerations.

In the first step of the decision tree, the number of available studies and the number of participants in those studies was determined. A higher number of participants in observational studies were deemed needed when compared to experimental studies. As there were generally few studies available, in the remaining steps of the decision tree all the studies were taken together – without distinguishing between experimental and observational studies.

In the second step of the decision tree, whether there were statistically significant effects/associations in $\leq 10\%$ or $> 10\%$ of the studies was determined. This was determined at the level of the studies. If a study reported at least one statistically significant effect/association, it was scored as being statistically significant. The proportion of studies with at least one statistically significant effect/association relative to the total number of studies was calculated.

In the third step of the decision tree, it was determined whether $< 75\%$ or $\geq 75\%$ of the effects/associations were in the same direction. This was determined at the level of the effects/associations. For each study, the number of positive, null, and negative effects/associations were tallied. If a study reported more than 5 effects/associations, only the 5 largest effects/



associations were used to avoid over-representation of this study. The committee notes that this approach is liberal as it favours type I errors (false positives) over type II errors (false negatives). The proportion of positive and/or negative effects/associations relative to the total number of considered effects/associations was calculated across all studies.

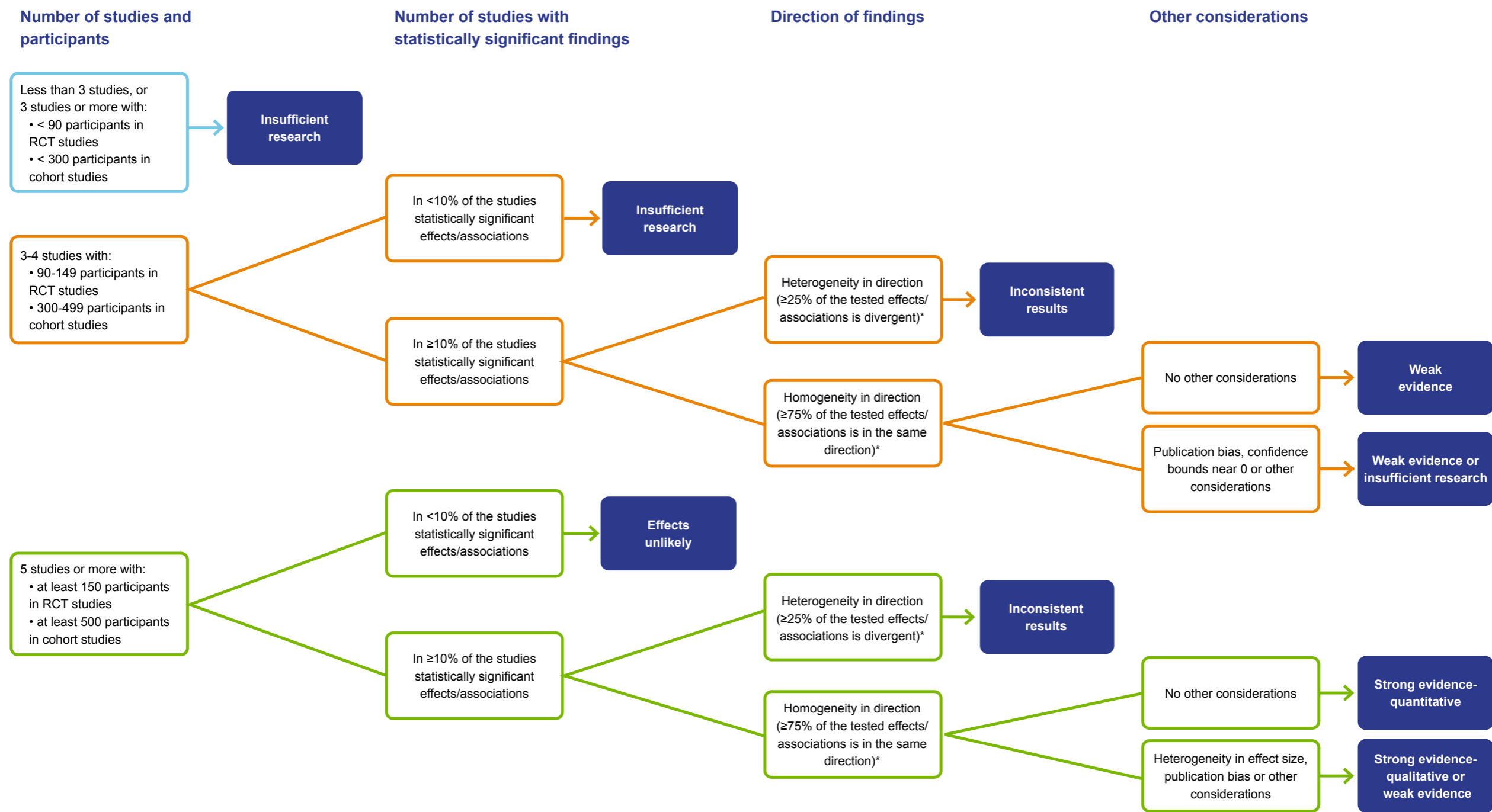
significant effects/associations in $\leq 10\%$ of the studies.

Working through these steps, the decision tree allowed for four different conclusions to be drawn:

- The conclusion is “*weak/strong evidence*” if there are ≥ 3 studies with statistically significant effects/associations in $> 10\%$ of the studies and homogeneity in the directions of the considered effects/associations ($\geq 75\%$ is significant and in the same direction). The strength of the evidence depends on the number of studies and other considerations.
- The conclusion is “*inconsistent results*” if there are ≥ 3 studies with statistically significant effects/associations in $> 10\%$ of the studies but with heterogeneity in the direction of the considered effects/associations ($< 75\%$ is significant and in the same direction).
- The conclusion is “*insufficient research*” if there are < 3 studies, 3-4 studies but with < 90 (RCT studies) or < 300 (cohort studies) participants, or 3-4 studies with ≥ 90 (RCT studies) or ≥ 300 (cohort studies) participants but with statistically significant effects/associations in $\leq 10\%$ of the studies.
- The conclusion is “*effect unlikely*” if there are ≥ 5 studies with ≥ 150 (RCT studies) or ≥ 500 (cohort studies) participants with statistically



Figure 1 Decision tree for evaluating the available scientific evidence



* If a study reports more than 5 effects/associations, only the 5 largest effects/associations are used to prevent overrepresentation of this study.



03 results



3.1 Included studies

The systematic literature search for reviews for all outcomes, except physical activity/sedentary behaviour at a later age, resulted in 2575 unique records, of which 58 were included. Together with the additional 11 records that were identified (for example via reviews of reviews), the total number of included reviews was 69.³⁻⁷¹ The flow chart of this search is available in Appendix C1.

For the outcome physical activity/sedentary behaviour at a later age, the systematic literature search for reviews resulted in 830 unique records, of which 8 reviews were included.⁷²⁻⁷⁹ The flow chart of this search is available in Appendix C2.

The additional systematic literature searches for individual studies for all outcomes except physical activity/sedentary behaviour at a later age resulted in 522-1769 unique records per outcome, of which 2-18 were included. The flow charts of these searches are available in Appendices C3-C10.

The additional systematic literature search for individual studies for the outcome physical activity/sedentary behaviour at a later age resulted in 4763 unique records, of which 14 were included. The flow chart of this search is available in Appendix C11.

An overview of the total number of identified studies for each combination of exposure (physical activity and sedentary behaviour), age group (<1 year, 1-2 years, and 3-4 years), and outcome (bone health, cardio-metabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, risks, and physical activity/sedentary behaviour at a later age) is shown in Table 1.



Table 1 Overview of the total number of identified studies for each combination of exposure, age group, and outcome

Age	Bone health	Cardiometabolic health	Body composition: BMI	Body composition: Other	Fitness	Motor development	Cognitive development	Psychosocial development	Risks	Behaviour at a later age
Physical activity										
<1 year	1 study	0 studies	4 studies	8 studies	0 studies	11 studies	2 studies	2 studies	1 study	3 studies
1-2 years	1 study	0 studies	3 studies	3 studies	0 studies	1 study	1 study	1 study	1 study	5 studies
3-4 years	6 studies	7 studies	30 studies	18 studies	15 studies	5 reviews & 14 studies	11 studies	16 studies	3 studies	18 studies
Sedentary behaviour										
<1 year	0 studies	0 studies	0 studies	2 studies	0 studies	1 study	2 studies	1 study	2 studies	0 studies
1-2 years	1 study	2 studies	9 studies	4 studies	2 studies	2 studies	10 studies	12 studies	0 studies	9 studies
3-4 years	3 studies	2 studies	22 studies	12 studies	2 studies	2 studies	13 studies	19 studies	0 studies	8 studies



3.2 Bone health

The outcome “bone health” included outcome measures such as skeletal health, bone density, bone mineral content, bone mass, and vitamin D.

A total of 7 studies⁸⁰⁻⁸⁶ that matched the selection criteria were identified in the systematic literature search; 4 through the reviews and 3 through the additional search for individual studies.

3.2.1 Physical activity & <1 year & bone health

One study⁸⁴ investigated the effects/associations of physical activity on bone health in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children <1 year old and bone health.*

3.2.2 Physical activity & 1-2 years & bone health

One study⁸⁵ investigated the effects/associations of physical activity on bone health in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children 1-2 years old and bone health.*

3.2.3 Physical activity & 3-4 years & bone health

Six studies^{80-83,85,86} investigated the effects/associations of physical activity in children 3-4 years old on bone health. Details of these studies are shown in Table 2. There were 2 RCT studies with a total of 339 participants, and 4 cohort studies with a total of 3837 participants. Overall, 5 out of 6 studies (83%) reported statistically significant effects/associations, and 13 out of 26 (50%) of the tested effects/associations were positive (i.e. physical activity was associated with favourable bone health).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and bone health.*



3.2.4 Sedentary behaviour & <1 year & bone health

There were no studies that investigated the effects/associations of sedentary behaviour on bone health in children <1 year old.

*Based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and bone health.*

3.2.5 Sedentary behaviour & 1-2 years & bone health

One study⁸⁵ investigated the effects/associations of sedentary behaviour on bone health in children 1-2 years old.

*Based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 1-2 years old and bone health.*

3.2.6 Sedentary behaviour & 3-4 years & bone health

Three studies^{82,85,86} investigated the associations between sedentary behaviour and bone health in children 3-4 years old. Details of these studies are shown in Table 3. They were all cohort studies, with a total of 490 participants. Overall, 1 out of 3 studies (33%) reported statistically significant associations, and 2 out of 9 (22%) of the tested associations were negative (i.e., associated with unfavourable bone health).

As there were ≥ 3 cohort studies with ≥ 300 participants, the evidence was evaluated using the middle route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 3-4 years old and bone health.*



Table 2 Overview of the studies that investigated physical activity & 3-4 years & bone health**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Specker (2003) ^{*83}	3-5 years	178	1 year	Intervention: Gross motor activities (30 min/day, 5 days/week, 1 year) Control: Fine motor activities (30 min/day, 5 days/week, 1 year)	Total body bone mineral content (g; DXA): No significant effect Arm bone mineral content (g; DXA): No significant effect Leg bone mineral content (g; DXA): No significant effect Total body bone mineral area (cm ² ; DXA): No significant effect Arm bone mineral area (cm ² ; DXA): No significant effect Leg bone mineral area (cm ² ; DXA): No significant effect Periosteal circumference (mm; pQCT; Least square means ± SEM): Gross (49.9 ± 0.7) > fine (48.8 ± 0.7); p=0.03 ^a Endosteal circumference (mm; pQCT; Least square means ± SEM): Gross (41.7 ± 0.9) > fine (39.4 ± 0.9); p=0.05 ^a Cortical thickness (mm; pQCT): No significant effect Cortical area (mm ² ; pQCT): No significant effect
Binkley (2004) ^{*81}	3-5 years	161	2 years	Intervention: Gross motor activities (30 min/day, 5 days/week, 1 year) Control: Fine motor activities (30 min/day, 5 days/week, 1 year)	Changes between 12-24 months (<i>no changes between 0-24 months</i>): Total body bone mineral content (g; DXA; Least square means ± SEM): Gross (115 ± 2) > fine (108 ± 2); p≤0.05 ^a Arm bone mineral content (g; DXA; Least square means ± SEM); Gross (19 ± 1) > fine (16 ± 1); p≤0.01 ^a Leg bone mineral content (g; DXA): No significant effect Total body bone mineral area (cm ² ; DXA): No significant effect Arm bone mineral area (cm ² ; DXA; Least square means ± SEM): Gross (37 ± 1) > fine (32 ± 1); p≤0.01 ^a Leg bone mineral area (cm ² ; DXA): No significant effect Changes between 12-24 months (<i>differences at 24 months</i>): Periosteal circumference (mm; pQCT): No significant effect (gross > fine; p=0.03) ^a Endosteal circumference (mm; pQCT): No significant effect (<i>No significant effect</i>) Cortical thickness (mm; pQCT): No significant effect (<i>No significant effect</i>) Cortical area (mm ² ; pQCT): No significant effect (<i>No significant effect</i>)

* These articles are based on the same RCT study, with a different follow-up duration

^a These effects/associations were included as 'positive' in the calculations



Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Wosje (2009) ⁸⁶	3.5 years	214	3.5 years	Counts/minute physical activity (accelerometry; average counts/minute) Outdoor playtime (parental report)	Total body bone area (cm ² ; DXA): No significant association Total body bone mineral content (g; DXA): No significant association Total body bone area (cm ² ; DXA): No significant association Total body bone mineral content (g; DXA): No significant association
Bielemann (2018) ⁸⁰	4 years	3347	2 years	Above average, average, or below average physical activity (maternal report)	Reference = above average Total-body bone mineral density (g/cm ² ; DXA; B (95%CI)): Boys below average: -0.014 (-0.024 - -0.005) ^a ; Boys average: No significant association Girls below average: No significant association; Girls average: No significant association Lumbar-spine bone mineral density (g/cm ² ; DXA; B (95%CI)): Boys below average: -0.029 (-0.045 - -0.014) ^a ; Boys average: -0.010 (-0.018 - -0.003) ^a Girls below average: No significant association; Girls average: No significant association
Taylor (2018) ⁸⁵	3.5 years	178	1.5 years	Moderate-to-vigorous physical activity (accelerometry; ≥ 698 counts/15 sec epoch)	Total body bone mineral density (g/cm ² ; DXA; Regression coefficient (SE)): 0.014 (0.006); p=0.023 ^a Total body bone mineral content (g; DXA; Regression coefficient (SE)): 26.0 (11.1); p=0.021 ^a
Hinkley (2020) ⁸²	4.6 \pm 0.7 years	98	8 years	Meeting the physical activity guidelines (accelerometry; 3 hours/day PA (≥ 25 counts/15 sec epoch) and 1 hour/day MVPA (≥ 420 counts/15 sec epoch))	Total body bone mineral density z-score (DXA; B (95% CI)): 0.67 (0.23 - 1.11); p<0.05 ^a Lumbar spine bone mineral density z-score (DXA): No significant association Total body bone mineral content (g; DXA; B (95% CI)): 183.19 (69.92 - 296.46); p<0.05 ^a Lumbar spine bone mineral content (g; DXA): No significant association Child fracture history (parental report): No significant association

^a These effects/associations were included as 'positive' in the calculations



Table 3 Overview of the studies that investigated sedentary behaviour & 3-4 years & bone health**Cohort studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Wosje (2009) ⁸⁶	3.5 years	214	3.5 years	Hours/day TV viewing (parental questionnaire)	Total body bone area (DXA, cm ² ; Least-square means): <2 hours/day (981±5) > ≥2 hours/day (966±3); p<0.01 ^a Total body bone mineral content (DXA, g; Least-square means): <2 hours/day (628±5) > ≥2 hours/day (617±3); p<0.04 ^a
Taylor (2018) ⁸⁵	3.5 years	178	1.5 years	Sedentary behaviour (accelerometry; 0 – 25 counts/ 15 sec epoch)	Total body bone mineral content (DXA): No significant association Total body bone mineral density (DXA): No significant association
Hinkley (2020) ⁸²	4.6 ± 0.7 years	98	8 years	Meeting the screen-time guideline (parent report; ≤ 1 hour/day screen time)	Total body bone mineral density (DXA): No significant association Lumbar spine bone mineral density (DXA): No significant association Total body bone mineral content (DXA): No significant association Lumbar spine bone mineral content (DXA): No significant association Child fracture history (parental report): No significant association

^a These effects/associations were included as 'positive' in the calculations



3.3 Cardiometabolic health

The outcome “cardiometabolic health” included outcome measures such as blood pressure, cholesterol, blood glucose, diabetes, and metabolic syndrome.

A total of 10 studies⁸⁷⁻⁹⁶ were identified in the systematic literature search, 6 through the reviews and 4 through the additional search for individual studies.

3.3.1 Physical activity & <1 year & cardiometabolic health

There were no studies that investigated the effects/associations of physical activity on cardiometabolic health in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children <1 year old and cardiometabolic health.*

3.3.2 Physical activity & 1-2 years & cardiometabolic health

There were no studies that investigated the effects/associations on cardiometabolic health of physical activity in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children 1-2 years old and cardiometabolic health.*

3.3.3 Physical activity & 3-4 years & cardiometabolic health

Seven studies^{87-90,93,94,96} investigated the effects/associations of physical activity on cardiometabolic health in children 3-4 years old. Details of these studies are shown in Table 4. There were 4 RCT studies with a total of 1094 participants and 3 cohort studies with a total of 1112 participants. Overall, 5 out of 7 studies (71%) reported statistically significant effects/associations, 9 out of 29 (31%) of the tested effects/associations were positive (i.e., physical activity was associated with favourable cardiometabolic health), and 2 out of 29 (7%) of the tested effects/associations were negative (i.e. associated with unfavourable cardiometabolic health).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and cardiometabolic health.*



3.3.4 Sedentary behaviour & <1 year & cardiometabolic health

There were no studies that investigated the effects/associations of sedentary behaviour on cardiometabolic health in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and cardiometabolic health.*

3.3.5 Sedentary behaviour & 1-2 years & cardiometabolic health

Two studies^{91,95} investigated the effects/associations of sedentary behaviour on cardiometabolic health in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 1-2 years old and cardiometabolic health.*

3.3.6 Sedentary behaviour & 3-4 years & cardiometabolic health

Two studies^{87,92} investigated the effects/associations of sedentary behaviour on cardiometabolic health in children 3-4 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 3-4 years old and cardiometabolic health.*



Table 4 Overview of the studies that investigated physical activity & 3-4 years & cardiometabolic health**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Scheffler (2007) ^{*94}	3 years	177	2 years	Intervention: exercise training (60 min, 3 days/week, 2 years) Control: no exercise program	Diastolic blood pressure during exercise (mmHg): I (62.0 ± 11.2) < C (68.8 ± 11.1); p<0.001 ^a Diastolic blood pressure 1 min after exercise (mmHg): I (65.1 ± 9.4) < C (68.1 ± 9.2); p<0.001 ^a Diastolic blood pressure 3 min after exercise (mmHg): I (64.4 ± 9.4) < C (67.6 ± 8.3); p<0.001 ^a
Ketelhut (2018) ^{*90}	3.0 ± 0.4 years	172	2 years	Intervention: supervised physical activity program (45 min, 3 days/week, 2 years) Control: not reported	Systolic blood pressure at rest (mmHg): No significant effect Systolic blood pressure during exercise (mmHg): No significant effect Systolic blood pressure after exercise (mmHg): No significant effect Diastolic blood pressure at rest (mmHg): I (65.7) < C (68.1); p<0.05 ^a Diastolic blood pressure during exercise (mmHg): I (62.0) < C (68.8); p<0.001 ^a Diastolic blood pressure after exercise (mmHg): I < C; p<0.05 ^a
Roth (2015) ⁹³	4.7 ± 0.6 years	610	14-16 months	Intervention: physical activity lessons (30 min, daily, 11 months) + homework (1-2 times/week) + interactive parent lectures (3) Control: continued routine schedule	Systolic blood pressure (mmHg): No significant effect Diastolic blood pressure (mmHg): No significant effect
Hacke (2019) ⁸⁹	4.8 ± 0.8 years	135	6 months	Intervention: supervised exercise sessions (45 min, 2 days/week, 6 months) Control: no exercise sessions	Peripheral systolic blood pressure (mmHg): No significant effect Peripheral diastolic blood pressure (mmHg): No significant effect Central systolic blood pressure (mmHg): No significant effect Central diastolic blood pressure (mmHg): No significant effect Pulse wave velocity (m/s): No significant effect

* These studies presumably used the same dataset

^a These effects/associations were included as 'positive' in the calculations



Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Wilson (1992) ⁹⁶	B:4.5±0.5/ G:4.4±0.5 years	158	3 years	Structured activity level (parental questionnaire)	Systolic blood pressure (mmHg): Girls & Boys: No significant association Diastolic blood pressure (mmHg): Girls & Boys: No significant association
				Leisure activity level (parental questionnaire)	Systolic blood pressure (mmHg): Girls & Boys: No significant association Diastolic blood pressure (mmHg): Girls & Boys: No significant association
				Aerobic activity level (parental questionnaire)	Systolic blood pressure (mmHg): Girls & Boys: No significant association Diastolic blood pressure (mmHg; coefficient (SE)): Girls: No significant association; Boys: -2.72 (1.10); p<0.05 ^a
DuRant (1993) ⁸⁸	4.0 ± 0.6 years	123	1 year	Mean activity level (1-5) (researcher observation)	Total serum cholesterol (mg/dl): No significant association Triglyceride (mg/dl; correlation coefficient): -0.22; p=0.013 ^a High-density lipoprotein (mg/dl): No significant association High-density lipoprotein2 (mg/dl): No significant association Low-density lipoprotein (mg/dl): No significant association LDL/HDL ratio: No significant association TSC/HDL ratio: No significant association
				Percentage time at high (≥3) activity levels (researcher observation)	Total serum cholesterol (mg/dl): No significant association Triglyceride (mg/dl; correlation coefficient): -0.18; p=0.036 ^a High-density lipoprotein (mg/dl): No significant association High-density lipoprotein2 (mg/dl): No significant association Low-density lipoprotein (mg/dl): No significant association LDL/HDL ratio: No significant association TSC/HDL ratio: No significant association
Bawaked (2020) ⁸⁷	4.4 years	831-832	3 years	Hours/week extracurricular physical activity (parental questionnaire)	Ref = low activity; p trend = 0.004 Systolic blood pressure z-score (B (95% CI)): medium: 0.07 (-0.05 - 0.19) ^b ; high: 0.17 (0.06 - 0.28) ^b Diastolic blood pressure z-score: No significant association

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



3.4 Body composition

The outcome “body composition” included outcome measures such as body mass index (BMI), weight status, skinfold thickness, waist circumference, and percentage body fat.

In addition to the general selection criteria, experimental studies that investigated the effects of a multicomponent intervention which also included a dietary component were excluded for the outcome body composition if the singular effects of physical activity/sedentary behaviour on body composition could not be evaluated.

A total of 60 studies^{82,83,85,87,89,91-93,97-148} were identified in the systematic literature search, 46 through the reviews and 13 through the additional search for individual studies. Additionally, 1 study was identified during the data extraction for the other outcomes.

The committee evaluated the outcome measure BMI (including weight status based on BMI) and other body composition measures such as skinfold thickness, waist circumference, and percentage body fat, separately because they represent different concepts of body composition.

3.4.1 Physical activity & <1 year & BMI

Four studies^{104,109,121,144} investigated the effects/associations of physical activity on BMI in children <1 year old. There was 1 RCT study with 143 participants, and 3 cohort studies with a total of 125 participants. As the cohort studies had <300 participants, the evidence was evaluated using the upper route in the decision tree.

*Conclusion: as the cohort studies had <300 participants, the committee concluded that there was **insufficient research** on physical activity in children <1 year old and BMI.*

3.4.2 Physical activity & <1 year & other body composition measures

Eight studies^{104,109,123,127,138,141,143,144} investigated the effects/associations of physical activity on other body composition measures in children <1 year old. Details of these studies are shown in Table 5. There was 1 RCT study with 143 participants, and 7 cohort studies with a total of 1519 participants. Overall, 4 out of 8 studies (50%) reported statistically significant effects/associations, and 5 out of 22 (23%) of the tested effects/associations were positive (i.e., physical activity was associated with a favourable body composition).

As there were ≥ 5 studies, but with <150 participants in the RCT study, the evidence was evaluated using the middle route in the decision tree.



*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children <1 year old and other body composition measures.*

3.4.3 Physical activity & 1-2 years & BMI

Three studies^{85,139,148} investigated the effects/associations of physical activity on BMI in children 1-2 years old. Details of these studies are shown in Table 6. They were all cohort studies with a total of 5827 participants. Overall, 1 out of 3 studies (33%) reported statistically significant associations, and 2 out of 13 (15%) of the tested associations were positive (i.e., associated with a favourable BMI).

As there were ≥ 3 cohort studies with ≥ 300 participants, the evidence was evaluated using the middle route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 1-2 years old and BMI.*

3.4.4 Physical activity & 1-2 years & other body composition measures

Three studies^{85,123,139} investigated the effects/associations of physical activity on other body composition measures in children 1-2 years old. Details of these studies are shown in Table 7. They were all cohort studies with a total of 1775 participants. Overall, 2 out of 3 studies (67%) reported statistically significant associations, and 2 out of 11 (18%) of the tested associations were positive (i.e., associated with a favourable body composition).

As there were ≥ 3 cohort studies with ≥ 300 participants, the evidence was evaluated using the middle route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 1-2 years old and other body composition measures.*

3.4.5 Physical activity & 3-4 years & BMI

Thirty studies^{82,85,87,89,93,97,99-103,106-108,111,113,114,117-120,122,124,126,129-132,137,147} investigated the effects/associations of physical activity on BMI in children 3-4 years old. Details of these studies are shown in Table 8. There were 16 RCT studies with a total of 5142 participants, and 14 cohort studies



with a total of 25965 participants. Overall, 7 out of 30 studies (23%) reported statistically significant effects/associations, 6 out of 51 (12%) of the tested effects/associations were positive (i.e. associated with a favourable BMI), and 4 out of 51 (8%) of the tested effects/associations were negative (i.e. associated with an unfavourable BMI).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as $>10\%$ of the studies reported statistically significant effects/associations, and $<75\%$ of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and BMI.*

3.4.6 Physical activity & 3-4 years & other body composition measures

Eighteen studies^{82,83,85,87,89,93,97,107,108,114,117,122-124,126,129,131,135} investigated the effects/associations of physical activity on other body composition measures in children 3-4 years old. Details of these studies are shown in Table 9. There were 8 RCT studies with a total of 2050 participants, and 10 cohort studies with a total of 4275 participants. Overall, 6 out of 18 studies (33%) reported statistically significant effects/associations, 13 out

of 45 (29%) of the tested effects/associations were positive (i.e., associated with a favourable body composition), and 1 out of 45 (2%) of the tested effects/associations was negative (i.e. associated with an unfavourable body composition).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as $>10\%$ of the studies reported statistically significant effects/associations, and $<75\%$ of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and other body composition measures.*

3.4.7 Sedentary behaviour & <1 year & BMI

There were no studies that investigated the effects/associations of sedentary behaviour on BMI in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and BMI.*



3.4.8 Sedentary behaviour & <1 year & other body composition measures

Two studies^{141,143} investigated the effects/associations of sedentary behaviour on other body composition measures in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and other body composition measures.*

3.4.9 Sedentary behaviour & 1-2 years & BMI

Nine studies^{85,91,112,115,134,139,140,142,148} investigated the effects/associations of sedentary behaviour on BMI in children 1-2 years old. Details of these studies are shown in Table 10. They were all cohort studies with a total of 21664 participants. Overall, 6 out of 9 studies (67%) reported statistically significant associations, and 9 out of 19 (47%) of the tested associations were negative (i.e. sedentary behaviour was associated with an unfavourable BMI).

As there were ≥ 5 cohort studies with ≥ 500 participants, the evidence was evaluated using the lower route in the decision tree.

Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that

*there were **inconsistent results** for sedentary behaviour in children 1-2 years old and BMI.*

3.4.10 Sedentary behaviour & 1-2 years & other body composition measures

Four studies^{85,91,110,139} investigated the effects/associations of sedentary behaviour on other body composition measures in children 1-2 years old. Details of these studies are shown in Table 11. They were all cohort studies with a total of 3942 participants. Overall, 3 out of 4 studies (75%) reported statistically significant associations, and 5 out of 11 (45%) of the tested associations were negative (i.e. associated with an unfavourable body composition).

As there were ≥ 3 cohort studies with ≥ 300 participants, the evidence was evaluated using the middle route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 1-2 years old and other body composition measures.*



3.4.11 Sedentary behaviour & 3-4 years & BMI

Twenty-two studies^{82,85,87,92,98,103,105,107,108,111,112,117,118,125,126,128,129,133,136,145-147}

investigated the effects/associations of sedentary behaviour on BMI in children 3-4 years old. Details of these studies are shown in Table 12. There were 2 RCT studies with a total of 495 participants and 20 cohort studies with a total of 54137 participants. Overall, 7 out of 22 studies (32%) reported statistically significant effects/associations, and 11 out of 46 (24%) of the tested effects/associations were negative (i.e., associated with an unfavourable BMI).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as $>10\%$ of the studies reported statistically significant effects/associations, and $<75\%$ of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 3-4 years old and BMI.*

3.4.12 Sedentary behaviour & 3-4 years & other body composition measures

Twelve studies^{82,85,87,107,108,116,117,125,126,129,133,135} investigated the effects/associations of sedentary behaviour on other body composition measures in children 3-4 years old. Details of these studies are shown in Table 13. They were all cohort studies with a total of 20083 participants. Overall, 4 out of 12 studies (33%) reported statistically significant associations, and 5 out of 27 (19%) of the tested associations were negative (i.e., associated with an unfavourable body composition).

As there were ≥ 5 cohort studies with ≥ 500 participants, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as $>10\%$ of the studies reported statistically significant effects/associations, and $<75\%$ of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 3-4 years old and other body composition measures.*



Table 5 Overview of the studies that investigated physical activity & <1 years & other body composition measures**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
De Vries (2015) ¹⁰⁹	2 weeks - 11 months	143	1.5 years	Intervention: nurses advised parents on stimulating motor development and physical activity (during visits at 2 weeks and 2/4/8/11 months old) Control: standard care	Waist circumference (measured): No significant effect Hip circumference (measured): No significant effect Sum of (four) skinfolds (measured, mm, mean±SD): I (29.6±4.7) < C (32.4±6.0); p=0.003 ^a Body fat percentage (BIA): No significant effect

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Ku (1981) ¹²³	6 months	90	8.5 years	Activity score (parental report using a 24-hour diary)	Percentage body fat (underwater weighing): No significant association
Berkowitz (1985) ¹⁰⁴	Second day of life	52	4-8 years	Activity (electronic activity monitor in foam rubber mattress)	Triceps skinfold (measured): No significant association
Roberts (1988) ¹³⁸	3 months	18	9 months	Total energy expenditure (kJ/kg/day; doubly labelled water method)	Overweight (measured; weight-for-length>90th percentile, mean (SE)): Normal weight (323±14-324±22) > Overweight (256±27); p<0.05 ^a
Li (1995) ¹²⁷	6 months	31	6 months	Physical activity score (researcher observation at day care centres)	Percentage body fat (DXA): No significant association
Wells (1996) ¹⁴⁴	12.1 ± 0.5 weeks	23-27	2-3.5 years	Total energy expenditure (doubly labelled water method)	Percentage body fat (doubly labelled water): No significant association Triceps skinfold (measured): No significant association Subscapular skinfold (measured): No significant association
				Energy expended on physical activity	Percentage body fat (doubly labelled water): No significant association Triceps skinfold (measured): No significant association Subscapular skinfold (measured): No significant association
Wells (2001) ¹⁴³	0.9 ± 0.1 years	22-26	1 year	Total energy expenditure (doubly labelled water method)	Sum of (two) skinfolds (measured, mm): No significant association Fat mass index (measured): No significant association
				Time spent being awake and active (maternal report in 2-day diary)	Sum of (two) skinfolds (measured, mm, B (SE)): -0.59 (0.25); p=0.028 ^a Fat mass index (measured): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Sijtsma (2013) ¹⁴¹	41.0 ± 2.4 weeks	1283	15 months	Time spent moving unrestrictedly (parental questionnaire)	Difference at 24 months: Weight-for-height z-score (measured): No significant association Weight-for-age z-score (measured): No significant association Waist circumference-for-age z-score (measured): No significant association Difference from 9 to 24 months: Weight-for-height z-score (measured, mean±SD): <5 hrs/d (0.04±0.80) > ≥5 hrs d (-0.11±0.70); p<0.01 ^a Weight-for-age z-score (measured, mean±SD): <5 hrs/d (0.02±0.79) > ≥5hrs/d (-0.08±0.76); p<0.05 ^a Waist circumference-for-age z-score (measured): No significant association

^a These effects/associations were included as 'positive' in the calculations

Table 6 Overview of the studies that investigated physical activity & 1-2 years & BMI

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Saldanha-Gomes (2017) ¹³⁹	2.0 ± 0.1 years	883	3.5 years	Min/day spent playing outdoors (parental report; in tertiles)	BMI (measured): Boys & Girls: No significant association
Taylor (2018) ⁹⁵	1 year/ 2 years	802	4 years/ 3 years	Min/day spent in LPA (accelerometry, 26–697 counts/15 sec epoch)	BMI z-score (measured): 1 year: No significant association; 2 years: No significant association
				Min/day spent in MVPA (accelerometry, ≥698 counts/15 sec epoch)	BMI z-score (measured): 1 year: No significant association; 2 years: No significant association
Zulfiqar (2019) ¹⁴⁸	2.3 years	4142	9 years	No participation in organised sports activities (parental report)	BMI (measured) trajectories 2-11 yrs (RRR 95% CI); ref = low risk trajectory: Declining risk: No significant association Delayed risk: 1.6 (1.1-2.1); p=0.007 ^a Gradual risk: No significant association Moderate risk: 1.5 (1.1-2.0); p=0.02 ^a High risk: No significant association

^a These effects/associations were included as 'positive' in the calculations



Table 7 Overview of the studies that investigated physical activity & 1-2 years & other body composition measures**Cohort studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Ku (1981) ¹²³	1 year/ 2 years	90	8 years / 7 years	Activity score (parental report using a 24-hour diary)	Percentage body fat (underwater weighing): 1 year: No significant association; 2 years: No significant association
Saldanha-Gomes (2017) ¹³⁹	2.0 ± 0.1 years	883	3.5 years	Min/day spent playing outdoors (parental report; in tertiles)	Percentage body fat (BIA; Regression coefficient (95% CI); ref = lowest tertile): Boys: No significant association Girls: Intermediate: 0.21 (-0.38 - 0.80); High: -0.96 (-1.60 - -0.32); overall p=0.001 ^a
Taylor (2018) ⁹⁵	1 year/ 2 years	802	4 years/ 3 years	Min/day spent in LPA (accelerometry, 26–697 counts/15 sec epoch)	Fat free mass index (DXA): 1 year: No significant association; 2 years: No significant association Percentage body fat (DXA, B(SE)): 1 year: -1.88 (0.91); p=0.041 ^a ; 2 years: No significant association
				Min/day spent in MVPA (accelerometry, ≥698 counts/15 sec epoch)	Fat free mass index (DXA): 1 year: No significant association; 2 years: No significant association Percentage body fat (DXA): 1 year: No significant association; 2 years: No significant association

^a These effects/associations were included as 'positive' in the calculations

Table 8 Overview of the studies that investigated physical activity & 3-4 years & BMI**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Mo-Suwan (1998) ¹³¹	4.5 ± 0.4 years	292	30 weeks	Intervention: 15 min walk and 20 min aerobic dance session at preschool (3 days/week, 30 weeks) Control: routine activities	BMI (measured): No significant effect BMI increased slope (measured, OR (95% CI)): Boys: No significant effect; Girls: 0.32 (0.18-0.56); p<0.05 ^a
Reilly (2006) ¹³⁷	4.2 ± 0.2 years	504	6 and 12 months	Intervention: enhanced physical activity program in nursery (30 min, 3 days/week, 24 weeks) + family health education Control: usual curriculum	BMI (measured, standard deviation score): 6 months: No significant effect; 12 months: No significant effect
Jones (2011) ¹¹⁹	4.1 years	97	20 weeks	Intervention: movement skill development physical activity structured lessons in childcare (20 min, 3 days/week, 20 weeks) Control: usual program	BMI (measured): No significant effect



Study	Age at exposure	N	Follow-up	Condition	Results
Krombholz (2012) ¹²²	I: 55.1 ± 7.3 C: 54.4 ± 7.8 months	428	11 and 20 months	Intervention: physical activity lesson (45 min, at least 1 day/week) and sessions (20 min, other days) for 20 months Control: usual curriculum, including one physical activity lesson of 45 min	BMI (measured): No significant effect
Annesi (2013) a ^{*99}	4.4 ± 0.5 years	1152	9 months	Intervention: structured physical activity (30 min, 5 days/week, 9 months) using daily lesson plans based on social cognitive and self-efficacy theory Control: usual structured physical activity (30 min, 5 days/week, 9 months)	BMI (method not reported): Intervention < Control; p=0.023 ^a
Annesi (2013) b ^{*100}	4.4 ± 0.5 years	271	9 months	Intervention: structured physical activity (30 min, 5 days/week, 9 months) using daily lesson plans based on social cognitive and self-efficacy theory Control: usual structured physical activity (30 min, 5 days/week, 9 months)	BMI (method not reported): Intervention < Control; p=0.035 ^a
Bellows (2013) 102	I: 53.0 ± 6.8 C: 51.5 ± 6.6 months	201	18 weeks	Intervention: 'Mighty moves' gross motor skills lessons (15-20 min, 4 days/week, 18 weeks) and 'Food Friends' program Control: 'Food Friends' program	BMI z-score (measured): No significant effect
Bonvin (2013) ¹⁰⁶	3.3 ± 0.6 years	648	10 months	Intervention: training/support of educators, rearrangement of child care environment, encouragement of parental involvement, recommendation of physical activity (but no demands regarding daily PA time) Control: regular program	BMI (measured): No significant effect Weight status (measured, IOTF criteria): No significant effect
Nicklas (2013) ¹³²	4.3 ± 0.6 years	295	5 months	Intervention: SPARK-EC lessons (15-20 min/day, 3 days/week, 5 months) Control: only supervised recess	BMI-for-age z-score (measured): No significant effect
Monsalves-Álvarez (2015) ¹³⁰	B: 3.2 ± 0.4 G: 3.3 ± 0.7 years	70	6 months	Intervention: physical activity classes (3 x 15 min, 3 days/week, 6 months) Control: N/A	BMI (measured): No significant effect
Roth (2015) ⁹³	4.7 ± 0.6 years	610	14-16 months	Intervention: physical activity lessons (30 min, daily, 11 months) + homework (1-2 times/week) + interactive parent lectures (3) Control: routine schedule	BMI (measured, centile): No significant effect
Goldfield (2016) ¹¹⁴	3.3 ± 0.6 years	83	6 months	Intervention: train-the trainer training workshops (3 hours, 2 times) + manual for child care providers + 12 booster sessions Control: standard curriculum	BMI (measured): No significant effect BMI z-score (measured): No significant effect
Adamo (2017) ⁹⁷	3.5 ± 0.4 – 3.8 ± 0.6 years	215	6 months	Intervention1: childcare intervention (workshops, recommended activity program, booster sessions; 6 months) Intervention 2: childcare intervention + parental involvement (webinars, documents) Control: regular curriculum	BMI (measured): No significant effect



Study	Age at exposure	N	Follow-up	Condition	Results
Latorre-Román (2018) ¹²⁴	B: 4.3 ± 0.6 G: 4.6 ± 0.5 years	111	10 weeks	Intervention: aerobic games program (30 min; 3 days/week, 10 weeks) Control: not reported	BMI (measured): No significant effect
Gao (2019) ¹¹³	4.7 ± 0.7 years	32	12 weeks	Intervention: home-based exergaming (30 min, 5 times/week, 12 weeks) beyond usual physical activity patterns Control: maintain regular PA patterns	BMI (measured): No significant effect
Hacke (2019) ⁸⁹	4.8 ± 0.8 years	133-135	6 months	Intervention: supervised exercise sessions (45 min, 2 days/week, 6 months) Control: no exercise sessions	BMI (measured): No significant effect

* These articles reported information from the same study, 2013b is presumably a subsample of 2013a

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Klesges (1995) ¹²⁰	B: 4.4 ± 0.5 G: 4.3 ± 0.5 years	146	2 years	Structured activity (parental report; relative to other children)	BMI change (measured): No significant association
				Leisure activity (parental report; relative to other children)	BMI change (measured): No significant association
				Aerobic activity (parental report; relative to other children)	BMI change (measured, coefficient): Baseline activity: -0.316; p=0.0333 ^a ; Change in activity: No significant association
Zimmerman (2010) ¹⁴⁷	0-6 years	1114-1118	5 years	Min/day physical activity (time use diary)	BMI z-score (measured): No significant association
Carter (2011) ¹⁰⁸	3/4/5 years	202	2 years	Physical activity (accelerometry, counts/min) averaged over ages 3/4/5	BMI (measured): No significant association
Huynh (2011) ¹¹⁷	4-5 years	526	1 year	Hours/day vigorous physical activity (parent and teacher questionnaire)	BMI (measured): No significant association
Flores (2013) ¹¹¹	3-4 years	6800	To kindergarten entry	Frequency of taking child outside to walk or play (method not reported)	Overweight (measured, BMI ≥85th percentile): No significant association
Ansari (2015) ¹⁰¹	45.5 ± 6.6 months	2810	10 months	Min/day outdoor play time (teacher reported)	BMI (measured, B (95% CI)): -0.05 (-0.09 - -0.01); p<0.05 ^a Obesity (measured; BMI≥95th percentile, OR (95% CI)): 0.99 (0.98-0.99); p<0.05 ^a



Study	Age at exposure	N	Follow-up	Exposure	Results
Butte (2016) ¹⁰⁷	4.6 ± 0.9 years	111	1 year	Min/day MVPA (accelerometry + heart rate, ≥ 3908 counts/min)	BMI (measured): No significant association
				Total energy expenditure (TEE, doubly labelled water method)	BMI (measured, B ± SE): 0.002 ± 0.0004; p<0.0001 ^a
				Activity energy expenditure (difference between TEE and basal metabolic rate + thermic effect of food)	BMI (measured, B ± SE): 0.002 ± 0.001; p=0.001 ^a
				Physical activity level (ratio of TEE over basal metabolic rate)	BMI (measured, B ± SE): 1.287 ± 0.459; p=0.006 ^a
Leppänen (2017) ¹²⁶	4.5 ± 0.2 years	138	1 year	Moderate intensity physical activity (accelerometry; 818–1968 vector magnitudes in 10 sec epochs)	BMI (measured): No significant association
				Vigorous intensity physical activity (accelerometry; ≥1969 vector magnitudes in 10 sec epochs)	BMI (measured, B (95% CI)): 0.39 (0.12 - 0.65); p=0.005 ^b
				Moderate-to-vigorous intensity physical activity (accelerometry; ≥818 vector magnitudes in 10 sec epochs)	BMI (measured): No significant association
Berglind (2018) ¹⁰³	4 years	830	1 year	Meeting the MVPA guideline (accelerometry, MVPA = 3908–6111 cpm, ≥60 min MVPA/day)	Weight status (measured; Cole definitions): No significant association BMI (measured): No significant association BMI z-score (measured): No significant association
Isong (2018) ¹¹⁸	4 years	10700	1-2 years	Physical activity (child went outside to walk or play at least once per day versus less than once per day)	BMI z-score (measured): No significant association
Meredith-Jones (2018) ^{*129}	1-5 years	398	Until 5 years of age	Physical activity tracking patterns (accelerometry, counts/min)	BMI (measured): No significant association
Taylor (2018) ^{*85}	3.5 years	802	1.5 years	Min/day spent in LPA (accelerometry, 26–697 counts/15 sec epoch)	BMI z-score (measured): No significant association
				Min/day spent in MVPA (accelerometry, ≥698 counts/15 sec epoch)	BMI z-score (measured): No significant association
Bawaked (2020) ⁸⁷	4.4 years	830-1179	3 years	Hours/week extracurricular physical activity (parental questionnaire)	BMI z-score (measured): No significant association
Hinkley (2020) ⁸²	4.6 ± 0.7 years	558-559	3 years and 6 years	Meeting the physical activity guideline (accelerometry; PA ≥ 25 counts/15 sec epoch; MVPA ≥ 420 counts/15 sec epoch; guidelines = 3 hours/day PA and 1 hour/day MVPA)	BMI z-score (measured): 3-years follow up: No significant association; 6-years follow-up: No significant association

* These studies used the same dataset, but with a different population, exposure, and outcome measures

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



Table 9 Overview of the studies that investigated physical activity & 3-4 years & other body composition measures**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Mo-Suwan (1998) ¹³¹	4.5 ± 0.4 years	292	30 weeks	Intervention: 15 min walk and 20 min aerobic dance session at preschool (3 days/week, 30 weeks) Control: routine activities	Weight/height ³ (measured): No significant effect Weight/height ³ increased slope: No significant effect Triceps skinfold thickness (measured): No significant effect Triceps skinfold thickness increased slope: No significant effect
Specker (2003) ⁸³	3.8 ± 0.5 - 4.0 ± 0.6 years	178	1 year	Intervention: Gross motor activities (30 min/day, 5 days/week, 1 year) Control: Fine motor activities (30 min/day, 5 days/week, 1 year)	Total body lean mass (DXA): No significant effect Total body fat mass (DXA): No significant effect
Krombholz (2012) ¹²²	I: 55.1 ± 7.3 C: 54.4 ± 7.8 months	428	11 and 20 months	Intervention: physical activity lesson (45 min, at least 1 day/week) and sessions (20 min, other days) for 20 months Control: usual curriculum, including one physical activity lesson of 45 min	Skinfold thickness (measured): No significant effect
Roth (2015) ⁹³	4.7 ± 0.6 years	610	14-16 months	Intervention: physical activity lessons (30 min, daily, 11 months) + homework (1-2 times/week) + interactive parent lectures (3) Control: routine schedule	Sum of (four) skinfolds (measured): No significant effect
Goldfield (2016) ¹¹⁴	3.3 ± 0.6 years	83	6 months	Intervention: train-the-trainer training workshops (3 hours, 2 times) + manual for child care providers + 12 booster sessions Control: standard curriculum	Percentage body fat (BIA, mean (95%CI)): -1.9 (-3.5 - -0.3); p=0.023 ^a Fat mass (BIA, kg, mean (95%CI)): -0.3 (-0.7 - -0.1); p=0.018 ^a Fat free mass (BIA, kg): No significant effect
Adamo (2017) ⁹⁷	3.5 ± 0.4 - 3.8 ± 0.6 years	215	6 months	Intervention1: childcare intervention (workshops, recommended activity program, booster sessions; 6 months) Intervention 2: childcare intervention + parental involvement (webinars, documents) Control: regular curriculum	Fat mass (BIA): No significant effect Fat free mass (BIA): No significant effect Body fat percentage (BIA): No significant effect
Latorre-Román (2018) ¹²⁴	B: 4.3 ± 0.6 G: 4.6 ± 0.5 years	111	10 weeks	Intervention: aerobic games program (30 min; 3 days/week, 10 weeks) Control: not reported	Waist circumference (measured): No significant effect
Hacke (2019) ⁸⁹	4.8 ± 0.8 years	133-135	6 months	Intervention: supervised exercise sessions (45 min, 2 days/week, 6 months) Control: no exercise sessions	Waist circumference (measured): No significant effect



Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Ku (1981) ¹²³	3 years and 4 years	90	6 years and 5 years	Activity score (parental report using a 24-hour diary)	Percentage body fat (underwater weighing, correlation coefficient) 3 years - boys: -0.35; p<0.05 ^a ; girls: No significant association 4 years - boys: -0.36; p<0.05 ^a ; girls: No significant association
Carter (2011) ¹⁰⁸	3/4/5 years	202	2 years	Physical activity (accelerometry, counts/min) averaged over ages 3/4/5	Fat mass index (BIA; kg/m ²): No significant association Fat free mass index (BIA; kg/m ²): No significant association
Huynh (2011) ¹¹⁷	4-5 years	526	1 year	Hours/day vigorous physical activity (parent and teacher questionnaire)	Sum of (three) skinfolds (measured): No significant association
Butte (2016) ¹⁰⁷	4.6 ± 0.9 years	111	1 year	Min/day MVPA (accelerometry + heart rate, ≥ 3908 counts/min)	Fat free mass (DXA, kg, B ± SE): 0.008 ± 0.004; p=0.037 ^a Fat mass (DXA, kg): No significant association % fat mass (DXA): No significant association
				Total energy expenditure (TEE, doubly labelled water method)	Fat free mass (DXA, kg, B ± SE): 0.002 ± 0.001; p<0.0001 ^a Fat mass (DXA, kg, B ± SE): 0.001 ± 0.001; p=0.002 ^b % fat mass (DXA): No significant association
				Activity energy expenditure (difference between TEE and basal metabolic rate + thermic effect of food)	Fat free mass (DXA, kg, B ± SE): 0.002 ± 0.001; p=0.001 ^a Fat mass (DXA, kg, B ± SE): 0.001 ± 0.001; p=0.049 % fat mass (DXA): No significant association
				Physical activity level (ratio of TEE over basal metabolic rate)	Fat free mass (DXA, kg, B ± SE): 1.270 ± 0.519; p=0.016 ^a Fat mass (DXA, kg): No significant association % fat mass (DXA): No significant association
Leppänen (2017) ¹²⁶	4.5 ± 0.2 years	138	1 year	Moderate intensity physical activity (accelerometry; 818–1968 vector magnitudes in 10 sec epochs)	Fat free mass index (BodPod, kg/m ²): No significant association Percentage fat mass (BodPod): No significant association Fat mass index (BodPod, kg/m ²): No significant association
				Vigorous intensity physical activity (accelerometry; ≥1969 vector magnitudes in 10 sec epochs)	Fat free mass index (BodPod, kg/m ² , B (95% CI)): 0.36 (0.18 - 0.55); p<0.001 ^a Percentage fat mass (BodPod): No significant association Fat mass index (BodPod, kg/m ²): No significant association
				Moderate-to-vigorous intensity physical activity (accelerometry; ≥818 vector magnitudes in 10 sec epochs)	Fat free mass index (BodPod, kg/m ² , B (95% CI)): 0.07 (0.00 - 0.13); p=0.044 ^a Percentage fat mass (BodPod): No significant association Fat mass index (BodPod, kg/m ²): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Meredith-Jones (2018) ^{*129}	1-5 years	398	Until 5 years of age	Physical activity tracking patterns (accelerometry, counts/min)	Waist circumference (measured): No significant association Percentage body fat (DXA, mean (SD)): Ref = consistently high 14.3 (13.5 - 15.2) Consistently low: 16.8 (15.6 - 18.2); p<0.05 ^a Increasing: 15.7 (14.7 - 16.7); p<0.05 ^a Decreasing: No significant association
Taylor (2018) ^{*85}	3.5 years	802	1.5 years	Min/day spent in LPA (accelerometry, 26–697 counts/15 sec epoch) Min/day spent in MVPA (accelerometry, ≥698 counts/15 sec epoch)	Fat free mass index (DXA, B (SE)): 1.26 (0.31); p<0.001 ^a Percentage body fat (DXA): No significant association Fat free mass index (DXA): No significant association Percentage body fat (DXA): No significant association
Potter (2018) ¹³⁵	4.5 ± 0.5 years	620	3 years	Hours/week physical activity (parent reported)	Waist circumference (measured): At baseline: No significant association; Change follow-up - baseline: No significant association
Bawaked (2020) ⁸⁷	4.4 years	830-1179	3 years	Hours/week extracurricular physical activity (parental questionnaire)	Waist circumference z-score (measured): No significant association
Hinkley (2020) ⁸²	4.6 ± 0.7 years	558-559	3 years and 6 years	Meeting the physical activity guideline (accelerometry; PA ≥ 25 counts/15 sec epoch; MVPA ≥ 420 counts/15 sec epoch; guidelines = 3 hours/day PA and 1 hour/day MVPA)	Waist circumference (measured): 3-years follow-up: No significant association; 6-years follow-up: No significant association

* These studies used the same dataset, but with a different population, exposure, and outcome measures

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



Table 10 Overview of the studies that investigated sedentary behaviour & 1-2 years & BMI**Cohort studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Schmidt (2009) ¹⁴⁰	6 months -2 years	872	1 year	Hours/day television viewing (maternal report, weighted average 6 mo - 1 yr - 2 yrs, in categories)	BMI z-score (method not reported, mean (SD), overall p=0.0001) ^a 0 - <0.5 hrs/d: 0.20 (1.04) 0.5 - <1.0hrs/d: 0.40 (0.89) 1 - <2hrs/d: 0.58 (0.97) ≥2hrs/d: 0.58 (1.14)
Pagani (2010) ^{*134}	29-53 months	1314	5.5-7.5 years	Hours/week television exposure (parental report)	BMI (measured, B(SE)): At 29 months: 0.05 (0.02); p<0.01 ^a ; Change 29-53 months: 0.03 (0.01); p<0.01 ^a
Simonato (2018) ^{*142}	29 months	1234	11 years	Hours/day television exposure (parental report)	BMI (measured, B (95% CI)): 0.38 (0.26 - 0.50); p<0.001 ^a
Gooze (2011) ¹¹⁵	24 months	6750	3.5 years	Hours/day screentime (parental report, in categories)	Obesity (measured; BMI ≥ 95th percentile, % (95% CI)): ≤2 hrs/d (15.5 (14.1-16.9)) < >2hrs/d (20.8 (18.3-23.2)); p<0.001 ^a
Fuller-Tyszkiewicz (2012) ¹¹²	2.3 ± 0.5 years	4724	2-4 years	Minutes/week television viewing (parental report)	BMI (measured, correlation): 2 yrs follow-up: 0.03; significant ^a ; 4 yrs follow-up: 0.04; significant ^a
Saldanha-Gomes (2017) ¹³⁹	2.0 ± 0.1 years	883	3.5 years	Min/day spent watching TV/DVDs (parental report; in categories)	BMI (measured): Boys: No significant association; Girls: No significant association
Taylor (2018) ⁸⁵	1 year/ 2 years	802	4 years/ 3 years	Min/day spent sedentary (accelerometry, 0-25 counts/15 sec epoch)	BMI z-score (measured): 1 year: No significant association; 2 years: No significant association
Padmapriya (2019) ⁹¹	2 and 3 years	943-955	1.5 years	Hours/day total screen-viewing time (parental report)	BMI (measured): No significant association
				Hours/day television viewing time (parental report)	BMI (measured): No significant association
				Hours/day handheld devices viewing time (parental report)	BMI (measured): No significant association
Zulfiqar (2019) ¹⁴⁸	2.3 years	4142	9 years	≥3 hours/day screen time (parental report)	BMI (measured) trajectories 2-11 yrs, RRR (95% CI): Ref = Low risk trajectory Declining risk: No significant association Delayed risk: 1.5 (1.1-2.0); p=0.01 ^a Gradual risk: 1.5 (1.2-2.0); p=0.002 ^a Moderate risk: No significant association High risk: No significant association

* These articles reported information from the same study but with a different follow-up duration

^a These effects/associations were included as 'negative' in the calculations



Table 11 Overview of the studies that investigated sedentary behaviour & 1-2 years & other body composition measures**Cohort studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Fitzpatrick (2012) ¹¹⁰	29-53 months	1314	5.5-7.5 years	Hours/week television exposure (parental report)	Waist circumference (measured, cm, B (95% CI)): At 29 months: No significant association Change 29-53 months: 0.047 (0.001-0.094); p<0.05 ^a
Saldanha-Gomes (2017) ¹³⁹	2.0 ± 0.1 years	883	3.5 years	Min/day spent watching TV/DVDs (parental report; in categories)	Percentage body fat (BIA, regression coefficient (95% CI), ref = ≤ 15 min/day): Boys, overall p=0.05 ^a >15-<60 min/day: 0.25 (-0.25 - 0.75) ≥60 min/day: 0.50 (0.001 - 1.00) Girls: No significant association
Taylor (2018) ⁸⁵	1 year/ 2 years	802	4 years/ 3 years	Min/day spent sedentary (accelerometry, 0-25 counts/15 sec epoch)	Fat free mass index (DXA): 1 year: No significant association 2 years: No significant association Percentage body fat (DXA): 1 year: No significant association 2 years: No significant association
Padmapriya (2019) ⁹¹	2 and 3 years	943-955	1.5 years	Hours/day total screen-viewing time (parental report)	Sum of (three) skinfolds (measured, mm, mean difference (95% CI)): 0.41 (0.13 - 0.68); p<0.05 ^a
				Hours/day television viewing time (parental report)	Sum of (three) skinfolds (measured, mm, mean difference (95% CI)): 0.49 (0.11 - 0.87); p<0.05 ^a
				Hours/day handheld devices viewing time (parental report)	Sum of (three) skinfolds (measured, mm, mean difference (95% CI)): 0.65 (0.09 - 1.22); p<0.05 ^a

^a These effects/associations were included as 'negative' in the calculations



Table 12 Overview of the studies that investigated sedentary behaviour & 3-4 years & BMI**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Birken (2012) ¹⁰⁵	I: 3.1 ± 0.2 C: 3.1 ± 0.1 years	132	1 year	Intervention: behavioural counselling for parents with strategies to decrease screen time (10 min) Control: no counselling	BMI (measured): No significant effect
Yilmaz (2015) ¹⁴⁶	I: 3.5 ± 1.2 C: 3.5 ± 1.3 years	363	9 months	Intervention: printed materials and interactive CDs, one counselling call (over a period of 8 weeks) Control: usual care	BMI z-score (measured): No significant effect

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Reilly (2005) ¹³⁶	38 months	5493	4 years	Hours/week spent watching television (questionnaire, in categories)	Obesity (measured; BMI ≥ 95th percentile, OR (95% CI)): Ref: ≤ 4 hours/week; p<0.010 ^a 4.1-8 hours/week: 1.37 (1.02 - 1.83) >8 hours/week: 1.55 (1.13 - 2.12)
				Time/day in car on weekdays (questionnaire)	Obesity (measured; BMI ≥ 95th percentile, OR (95% CI)): No significant association
				Time/day in car on weekend days (questionnaire)	Obesity (measured; BMI ≥ 95th percentile, OR (95% CI)): No significant association
Lumeng (2006) ¹²⁸	36 months	893-946	1.5 years	≥ 2 hours/day being awake in room with television on (maternal report)	Overweight status (measured, BMI≥95th percentile): No significant association New overweight (measured, BMI≥95th percentile): No significant association Change in BMI (measured): No significant association
Zimmerman (2010) ¹⁴⁷	0-6 years	1114-1118	5 years	Hours/day commercial television viewing (time use diary)	BMI z-score (measured, B (95% CI)): Adjusted for PA: 0.11 (0.00 - 0.21); p<0.05 ^a Adjusted for eating during TV: 0.10 (0.00 - 0.21); p<0.05 ^a
				Hours/day non-commercial television viewing (time use diary)	BMI z-score (measured): No significant association
Carter (2011) ¹⁰⁸	3/4/5 years	202	2 years	Hours/day television viewing (maternal report)	BMI (measured): No significant association
Huynh (2011) ¹¹⁷	4-5 years	526	1 year	Hours/day sedentary activity (parent and teacher questionnaire)	BMI (measured): No significant association
				Hours/day TV viewing (parent and teacher questionnaire)	BMI (measured): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Fuller-Tyszkiewicz (2012) ^{*112}	4.3 ± 0.4 years	4724	2 years	Minutes/week television viewing (parental report)	BMI (measured, correlation): 0.04; significant ^a
Wheaton (2015) ^{*145}	4.8 ± 0.2 years	4169	2/4/6 years	Hours/weekday television watching (parental report)	Change in weight status category (measured; BMI): No significant association
				Hours/weekend day television watching (parental report)	Change in weight status category (measured; BMI, RRR (SE)): 2 yrs follow-up: No significant association 4 yrs: normal->overweight/obese: 1.39 (0.23); p<0.05 ^a 6 yrs follow-up: No significant association
				Hours/weekday computer use (parental report)	Change in weight status category (measured; BMI): No significant association
				Hours/weekend day computer use (parental report)	Change in weight status category (measured; BMI): No significant association
Flores (2013) ¹¹¹	3-4 years	6800	To kindergarten entry	Hours/weekday watching television (method not reported)	Overweight (measured, BMI ≥85th percentile, mean (SD)): Normal weight (2.2±0.1) < Overweight (2.5±0.1); p=0.03 ^a
				Frequency of using home computer (method not reported)	Overweight (measured, BMI ≥85th percentile, mean (SD)) Normal weight vs. overweight; overall p<0.01 ^a Never: 8.7 vs 5.3% 1-2 times/week: 57.3 vs 55.3% 3-6 times/week: 22.3 vs 23.2% Every day: 11.7 vs 16.2%
				Hours/weekday watching DVDs (method not reported)	Overweight (measured, BMI ≥85th percentile, OR (95% CI)): 1.1 (1.01 - 1.14) ^a
Olafsdottir (2014) ¹³³	2-<6 years	Not reported	2 years	Hours/day TV viewing (parental report; including video and DVD)	% increase BMI (measured, OR (95% CI)): 1.23 (1.08-1.40); p<0.01 ^a
				Hours/day total screen time (parental report; above + computer)	% increase BMI (measured, OR (95% CI)): 1.15 (1.04-1.28); p<0.01 ^a
Leary (2015) ¹²⁵	38 months	4329	12 years	Hours/week spent in car (maternal report)	BMI (measured): No significant association
	38 months	4325	12 years	Hours/week spent watching television (maternal report)	BMI (measured): No significant association
	57 months	4226	10 years	Frequency playing computer games (maternal report)	BMI (measured): No significant association
Butte (2016) ¹⁰⁷	4.6 ± 0.9 years	111	1 year	Min/day sedentary (accelerometry + heart rate, <820 counts/min)	BMI (measured): No significant association
Anderson (2017) ⁹⁸	36.8 months	10995	8 years	Hours/day television/video watching (parental report, in categories)	Obesity (measured; BMI z-score; IOTF): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Leppänen (2017) ¹²⁶	4.5 ± 0.2 years	138	1 year	Sedentary behaviour (accelerometry; ≤305 vector magnitudes in 10 sec epochs)	BMI (measured): No significant association
Berglind (2018) ¹⁰³	4 years	830	1 year	Meeting the screen time guideline (parental questionnaire, ≤120 min screen time/day)	Weight status (measured; BMI - Cole definitions): No significant association BMI (measured): No significant association BMI z-score (measured): No significant association
Isong (2018) ¹¹⁸	4 years	10700	1-2 years	Hours/day television/DVD viewing (≥2 hours versus less)	BMI z-score (measured, B (SE)): Girls: No significant association African American boys: No significant association Hispanic boys: No significant association Asian boys: No significant association American Indian boys: 0.64 (0.25); p<0.05 ^a White boys: No significant association
Meredith-Jones (2018) ^{**129}	1-5 years	398	Until 5 years of age	Sedentary behaviour tracking patterns (accelerometry, percentage of valid wear time spent sedentary based on Adolph's equation)	BMI (measured): No significant association
Taylor (2018) ^{**85}	3.5 years	802	1.5 years	Min/day spent sedentary (accelerometry, 0-25 counts/15 sec epoch)	BMI z-score (measured): No significant association
Bawaked (2020) ⁸⁷	4.4 years	830-1179	3 years	Hours/week TV viewing (parental questionnaire)	BMI z-score (measured): No significant association
Hinkley (2020) ⁸²	4.6 years	558-559	3 years and 6 years	Meeting the screen-time guideline (parent report; ≤1hour/day)	BMI z-score (measured): 3 years follow-up: No significant association 6 years follow-up: No significant association
Pedersen (2020) ⁹²	3 years	628	2 years	Total screen time/day (parental report)	BMI z-score (measured): No significant association

* These articles are based on the same study but use different analyses

** These studies used the same dataset, but with a different population, exposure, and outcome measures

^a These effects/associations were included as 'negative' in the calculations



Table 13 Overview of the studies that investigated sedentary behaviour & 3-4 years & other body composition measures**Cohort studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Griffiths (2010) ¹¹⁶	3 years	11653	2 years	Hours/day television viewing (reported)	Rapid weight gain (measured; top quarter of weight gain z scores): No significant association
Carter (2011) ¹⁰⁸	3/4/5 years	202	2 years	Hours/day television viewing (maternal report)	Fat mass index (BIA, kg/m ²): No significant association Fat free mass index (BIA, kg/m ²): No significant association
Huynh (2011) ¹¹⁷	4-5 years	526	1 year	Hours/day sedentary activity (parent and teacher questionnaire)	Sum of skinfold thickness (measured): No significant association
Olafsdottir (2014) ¹³³	2-<6 years	Not reported	2 years	Hours/day TV viewing (parental report; including video and DVD)	% increase waist to height ratio (measured, cm, OR (95% CI)): 1.32 (1.14-1.52); p<0.001 ^a
				Hours/day total screen time (parental report; above + computer)	% increase waist to height ratio (measured, cm, OR (95% CI)): 1.22 (1.09-1.36); p<0.01 ^a
Leary (2015) ¹²⁵	38 months	4329	12 years	Hours/week spent in car (maternal report)	Fat mass (DXA): No significant association Lean mass (DXA): No significant association
	38 months	4325	12 years	Hours/week spent watching television (maternal report)	Fat mass (DXA, B (95 % CI)): Ref = ≤ 4 hrs/wk; overall p=0.01 ^a 4.1-8 hrs/wk: 0.04 (-0.04 - 0.11) >8 hrs/wk: 0.11 (0.02 - 0.21) Lean mass (DXA): No significant association
	57 months	4226	10 years	Frequency playing computer games (maternal report)	Fat mass (DXA): No significant association Lean mass (DXA): No significant association
Butte (2016) ¹⁰⁷	4.6 ± 0.9 years	111	1 year	Min/day sedentary (accelerometry + heart rate, <820 counts/min)	Fat free mass (measured): No significant association Fat mass (measured): No significant association % fat mass (measured): No significant association
Leppänen (2017) ¹²⁶	4.5 ± 0.2 years	138	1 year	Sedentary behaviour (accelerometry; ≤305 vector magnitudes in 10 sec epochs)	Fat free mass index (BodPod): No significant association Percentage fat mass (BodPod): No significant association Fat mass index (BodPod): No significant association
Meredith-Jones (2018) ^{*129}	1-5 years	398	Until 5 years of age	Sedentary behaviour tracking patterns (accelerometry, percentage of valid wear time spent sedentary based on Adolph's equation)	Waist circumference (measured): No significant association Percentage body fat (DXA): No significant association
Taylor (2018) ^{*85}	3.5 years	802	1.5 years	Min/day spent sedentary (accelerometry, 0-25 counts/15 sec epoch)	Fat free mass index (DXA, B (SE)): 0.87 (0.43); p=0.046 ^a Percentage body fat (DXA): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Potter (2018) ¹³⁵	4.5 ± 0.5 years	639	3 years	Hours/week screen time (parent reported)	Waist circumference (measured): At baseline: No significant association Change follow-up - baseline: No significant association
Bawaked (2020) ⁸⁷	4.4 years	830-1179	3 years	Hours/week TV viewing (parental questionnaire)	Waist circumference z-score (measured, B (95% CI)): Ref = high TV viewing; overall p<0.001 ^a Medium: -0.20 (-0.32 - -0.08) Low: -0.28 (-0.40 - -0.17)
Hinkley (2020) ⁸²	4.6 years	558-559	3 years and 6 years	Meeting the screen-time guideline (parent report; ≤1 hour/day)	Waist circumference (measured): 3 years follow-up: No significant association 6-years follow-up: No significant association

* These studies used the same dataset, but with a different population, exposure and outcome measures

^a These effects/associations were included as 'negative' in the calculations



3.5 Fitness

The outcome “fitness” included outcome measures such as physical fitness, endurance, aerobic capacity, muscle strength, and explosive power.

As the literature search for fitness identified studies with motor development outcome measures, and vice versa, the search results of both literature searches were evaluated to identify appropriate studies for the outcome fitness.

A total of 18 studies^{89,90,93,110,113,124,126,130,134,135,149-156} were identified in the systematic literature search, 11 through the reviews and 7 through the additional search for individual studies.

3.5.1 Physical activity & <1 year & fitness

There were no studies that investigated the effects/associations of physical activity on fitness in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children <1 year old and fitness.*

3.5.2 Physical activity & 1-2 years & fitness

There were no studies that investigated the effects/associations of physical activity on fitness in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children 1-2 years old and fitness.*

3.5.3 Physical activity & 3-4 years & fitness

Sixteen studies^{89,90,93,113,124,126,130,135,149-156} investigated the effects/associations of physical activity on fitness in children 3-4 years old, but as two studies^{153,154} reported information from the same RCT, the study¹⁵³ that reported a smaller amount of fitness-related outcomes was excluded, and fifteen studies were evaluated. Details of these studies are shown in Table 14. There were 13 RCT studies with a total of 5624 participants, and 2 cohort studies with a total of 408 participants. Overall, 10 out of 15 studies (67%) reported statistically significant effects/associations, and 25 out of 47 (53%) of the tested effects/associations were positive (i.e. physical activity was associated with favourable fitness).

As there were ≥ 5 studies, but with <500 participants in the cohort studies, the evidence was evaluated using the middle route in the decision tree.



*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and fitness.*

Sedentary behaviour & <1 year & fitness

There were no studies that investigated the effects/associations of sedentary behaviour on fitness in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and fitness.*

3.5.5 Sedentary behaviour & 1-2 years & fitness

Two studies^{110,134} investigated the effects/associations of sedentary behaviour on fitness in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 1-2 years old and fitness.*

3.5.6 Sedentary behaviour & 3-4 years & fitness

Two studies^{126,135} investigated the effects/associations of sedentary behaviour on fitness in children 3-4 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 3-4 years old and fitness.*



Table 14 Overview of the studies that investigated physical activity & 3-4 years & fitness**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Alpert (1990) ¹⁴⁹	44 months	24	8 weeks	Intervention: aerobic exercises (30 min, 5 days/week, 8 weeks) Control: freeplay on the playground (as part of their regular schedule)	Intervention vs. Control: Resting heart rate (bpm): No significant effect Heart rate during cycling exercise test (bpm, Mean (SD)): 150 (20.8) vs. 178 (23.4); p=0.005 ^a Agility test (score 1-10, Mean (SD)): 9.6 (2.7) vs. 6.1 (1.9); p=0.05 ^a
Zhou (2014) ¹⁵⁶	4.5 years	357	1 year	Intervention: multifaceted intervention aimed at the childcare centre, family and community, including 60/90 min outdoor play/day + daily 10 min exercise routine Control: conditions as usual, including 30/60 min outdoor play/day.	20m agility run (sec, Mean (95% CI) change): -0.74 (-0.89, -0.58); p=0.0001 ^a Broad jump (m, Mean (95% CI) change): 8.09 (6.24, 9.93); p=0.0001 ^a Sit and reach (cm, Mean (95% CI) change): 0.88 (0.10, 1.66); p=0.03 ^a 20m crawl (sec, Mean (95% CI) change): -3.36 (-4.02, -2.69); p=0.0001 ^a 30m sprint (sec, Mean (95% CI) change): -0.45 (-0.82, -0.08); p=0.02 ^a
Klein (2015) ¹⁵²	4.7 ± 0.9 years	1510	6 months	Intervention 1: information session for parents/educators, fitness pass for children Intervention 2: physical education classes Intervention 3: information session for parents/educators, fitness pass for children, physical education classes Intervention 4: information session for parents/educators, fitness pass for children Control: usual curriculum	KiMo-test: Shuttle run (sec): No significant effect Standing long jump (cm): No significant effect Sit and reach (cm): Intervention 1 ^a ,3 ^a > control; p<0.001-0.035
Monsalves-Álvarez (2015) ¹³⁰	B: 3.2 ± 0.4 G: 3.3 ± 0.7 years	70	6 months	Intervention: physical activity classes (3 x 15 min, 3 days/week, 6 months) Control: N/A	Standing long jump (cm): Boys: post > pre; p<0.0001 ^a ; Girls: post > pre; p<0.0001 ^a Twelve-meter run (sec): Boys: No significant effect; Girls: No significant effect
Roth (2015) ⁹³	4.7 ± 0.6 years	610	14-16 months	Intervention: physical activity lessons (30 min, daily, 11 months) + homework (1-2 times/week) + interactive parent lectures (3) Control: continued routine schedule	Agility (sec, Effect estimate (95 % CI)): -0.689 (-1.324 - -0.055); p=0.034 ^a Explosive leg strength (cm, Effect estimate (95 % CI)): 4.041 (1.217 - 6.865); p=0.007 ^a
Bellows (2017) ¹⁵⁰	56 months	250	2 years	Intervention: physical activity program (15-20 min/day, 4 days/week, 18 weeks) Control: not reported	Bruininks-Oseretsky Test of Motor Proficiency-2: Running speed and agility: No significant effect Strength: No significant effect
Birnbaum (2017) ¹⁵¹	4.6 ± 0.7 years	1293	1 year	Intervention: rearranged kindergarten, structured physical activity sessions (45 min/ 2 days/week), additional activities (1 day/week), information for parents Control: continued usual routine	Standing long jump (cm): No significant effect
Ketelhut (2018) ⁹⁰	3.0 ± 0.4 years	172	2 years	Intervention: supervised structured physical activity program (45 min, 3 days/week, 2 years) Control: not reported	Intervention vs. Control Parallel long jump (cm, Mean (SD)): 103.5 (15.3) vs. 85.6 (19.6); p<0.001 ^a 6 m sprint running (sec, Mean (SD)): 2.3 (0.1) vs. 2.6 (0.3); p<0.001 ^a



Study	Age at exposure	N	Follow-up	Condition	Results
Latorre-Román (2018) ¹²⁴	B: 4.3 ± 0.6 G: 4.6 ± 0.5 years	111	10 weeks	Intervention: aerobic games program (30 min; 3 days/week, 10 weeks) Control: not reported	Intervention vs. Control Horizontal jump (cm, Mean (SD) change): 15.25 (14.07) vs. 6.98 (14.33); p=0.003 ^a 20 m sprint (sec, Mean (SD) change): -0.43 (0.64) vs. 0.12 (0.72); p<0.001 ^a 10 x 20 m endurance (sec, Mean (SD) change): -8.56 (7.35) vs. -3.58 (12.01); p=0.010 ^a
Hacke (2019) ⁸⁹	4.8 ± 0.8 years	135	6 months	Intervention: supervised exercise sessions (60 min, 2 days/week, 6 months) Control: daily routine	Standing long jump (cm): No significant effect Forward bends, (cm): No significant effect 20 m sprint (sec): No significant effect
Gao (2019) ¹¹³	4.7 ± 0.7 years	32	12 weeks	Intervention: home-based exergaming (30 min, 5 times/week, 12 weeks) beyond usual physical activity patterns Control: maintain regular PA patterns	Cardiovascular fitness (3-min step test): No significant effect
Steenbock (2019) ¹⁵⁵	4.3 ± 0.8 years	641	1 year	Intervention: promotion of PA, healthy eating, mental wellbeing in daycare facilities (which were free to choose which modules they would like) Control: usual routine	KindergartenMobil-Test: Shuttle run (sec): No significant effect Standing long jump (cm, B (95% CI)): 3.08 (0.09 - 6.07) ^a Sit-and-reach (cm): No significant effect
Kobel (2020) ¹⁵⁴	3.7 ± 0.6 years	419	1 year	Intervention: focus on PA, screen time & diet, including weekly exercises and games lessons, and short activity games (5-7 min, 2 times/day, 1 year) Control: normal kindergarten routine	Intervention vs. control Sit-and-reach: No significant effect Standing long jump: No significant effect 3-min endurance run (m, Mean difference (SD)): 55.3 (47.9) vs. 31.6 (52.7); p<0.001 ^a

^a These effects/associations were included as 'positive' in the calculations



Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Leppänen (2017) ¹²⁶	4.5 ± 0.2 years	138	1 year	Moderate intensity physical activity (accelerometry; 818–1968 vector magnitudes in 10 sec epochs)	20-m shuttle run test (laps): No significant association Handgrip strength test (kg): No significant association Standing long jump test (cm): No significant association 4 x 10-m shuttle run test (sec): No significant association
				Vigorous intensity physical activity (accelerometry; ≥1969 vector magnitudes in 10 sec epochs)	20-m shuttle run test (laps, B (95% CI)): 1.05 (0.20 – 1.89); p=0.016 ^a Handgrip strength test (kg): No significant association Standing long jump test (cm, B (95% CI)): 5.86 (2.45 – 9.26); p=0.001 ^a 4 x 10-m shuttle run test (sec, B (95% CI)): -0.32 (-0.61 – -0.03); p=0.031 ^a
				Moderate-to-vigorous intensity physical activity (accelerometry; ≥818 vector magnitudes in 10 sec epochs)	20-m shuttle run test (laps, B (95% CI)): 0.36 (0.08 – 0.64); p=0.014 ^a Handgrip strength test (kg): No significant association Standing long jump test (cm, B (95% CI)): 1.37 (0.19 – 2.54); p=0.023 ^a 4 x 10-m shuttle run test (sec, B (95% CI)): -0.11 (-0.21 – -0.01); p=0.026
Potter (2018) ¹³⁵	4.5 ± 0.5 years	270-635	3 years	Hours/week physical activity (parental report; at baseline)	Canadian Physical Activity, Fitness and Lifestyle Approach testing protocol: Vertical jump: No significant association Sit and reach: No significant association Grip strength: No significant association Predicted VO2max: No significant association Push-ups: No significant association Partial curl-ups: No significant association
				Hours/week physical activity (parental report; change follow-up - baseline)	Canadian Physical Activity, Fitness and Lifestyle Approach testing protocol: Vertical jump: No significant association Sit and reach: No significant association Grip strength: No significant association Predicted VO2max: No significant association Push-ups: No significant association Partial curl-ups: No significant association

^a These effects/associations were included as 'positive' in the calculations



3.6 Motor development

The outcome “motor development” included outcome measures such as gross motor skills, fine motor skills, balance, locomotor skills, and object control skills.

As the literature search for motor development identified studies with fitness outcome measures, and vice versa, the search results of both literature searches were evaluated to identify appropriate studies for the outcome motor development.

During the systematic literature review of reviews, multiple reviews were identified that specifically reviewed the effects/associations of physical activity on motor development in children aged 3-4 years. As these reviews matched the scope of the current evaluation, the committee decided to include them. Additionally, to ensure that recent studies which may not have been included in these reviews would be evaluated as well, they were supplemented with individual studies that were published from 01-01-2018 (since the identified reviews generally included studies up to this period).

A total of 31 studies were identified in the systematic literature searches, among which 5 reviews^{17,19,58,60,70} and 26 individual studies.^{89,90,109,124,140,154,155,157-175} Of these individual studies, 11 were identified through the reviews, 14 through the additional search for

individual studies, and 1 was identified by one of the members of the committee.

3.6.1 Physical activity & <1 year & motor development

Eleven studies^{109,157,159,160,162-164,167,168,170,173} investigated the effects/associations of physical activity on motor development in children <1 year old. Details of these studies are shown in Table 15. There were 5 RCT studies with a total of 304 participants, and 6 cohort studies with a total of 1164 participants. Overall, 9 out of 11 studies (82%) reported statistically significant effects/associations, 25 out of 39 (64%) of the tested effects/associations were positive (i.e., physical activity was associated with favourable motor development), and 1 out of 39 (3%) of the tested effects/associations was negative (i.e., associated with unfavourable motor development). The committee observed that 4 out of 5 RCT studies reported positive effects of physical activity interventions on motor development, while the cohort studies only reported 10 out of 22 positive associations between physical activity and motor development.

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations



were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children <1 year old and motor development. With the remark that the identified RCT studies generally reported 'positive effects' of physical activity interventions on motor development, while the cohort studies only reported 'some positive associations' between physical activity and motor development.

3.6.2 Physical activity & 1-2 years & motor development

One study¹⁵⁷ investigated the effects/associations of physical activity on motor development in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children 1-2 years old and motor development.*

3.6.3 Physical activity & 3-4 years & motor development

Five reviews^{17,19,58,60,70} and fourteen additional individual studies^{89,90,124,154,155,157,158,161,165,166,169,171,174,175} investigated the effects/associations of physical activity on motor development in children 3-4 years old. Details of these studies are shown in Table 16 (reviews) and 17 (individual studies). The 5 reviews all generally reported that there were positive effects of physical activity on motor development, either because the majority of

included studies reported positive effects, or because that was the conclusion of conducted meta-analyses.

Concerning the individual studies, there were 10 RCT studies with a total of 2377 participants, and 4 cohort studies with a total of 1011 participants. Overall, 8 out of 14 studies (57%) reported statistically significant effects/associations, 12 out of 28 (43%) of the tested effects/associations were positive (i.e., associated with favourable motor development), and 2 out of 28 (7%) of the tested effects/associations were negative (i.e., associated with unfavourable motor development).

As there were ≥ 5 studies, with ≥ 150 participants in RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: although all identified reviews reported positive effects, and >10% of the individual studies reported statistically significant effects/associations, <75% of the considered effects/associations in the individual studies were significant and in the same direction. Therefore, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and motor development. With the remark that the reviews generally pointed in the direction of a positive effect of physical activity on motor development in children 3-4 years old.*



3.6.4 Sedentary behaviour & <1 year & motor development

One study¹⁶³ investigated the effects/associations of sedentary behaviour on motor development in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and motor development.*

3.6.5 Sedentary behaviour & 1-2 years & motor development

Two studies^{140,172} investigated the effects/associations of sedentary behaviour on motor development in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 1-2 years old and motor development.*

3.6.6 Sedentary behaviour & 3-4 years & motor development

Two studies^{166,171} investigated the effects/associations of sedentary behaviour on motor development in children 3-4 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 3-4 years old and motor development.*



Table 15 Overview of the studies that investigated physical activity & <1 year & motor development**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Porter (1972) ¹⁷³	18.3 weeks	94	2 months	Intervention: passive cycling exercises by mothers (4 x 5 min, 6 days/week, 2 months) Control: usual child care	Motor developmental quotient (Gesell Development Schedules, mean gain): Intervention (29.0) > Control (12.0); p<0.0001 ^a
Hadders-Algra (1996) ¹⁶²	5-6 months	20	4 months	Intervention: training of sitting balance (3 x 5 min, daily, 3/3.5 months) Control: no training	Selection of complete muscle activation patterns: Forwards-slow: Intervention > Control; p<0.01 ^a Forwards-fast: Intervention > Control; p<0.05 ^a Backwards-slow: No significant effect Backwards-fast: Intervention > Control; p<0.05 ^a Ability to modulate EMG amplitude to platform velocity: Forwards-Neck Flexor: No significant effect Forwards-Rectus Abdominis: Intervention sooner than control Forwards-Rectus Femoris: Intervention sooner than control Backwards: No significant effect Antagonist activity: Forwards-Neck Extensor co-act: No significant effect Forwards-Thoracal Extensor reciprocal act: Intervention > Control; p<0.01 ^a Forwards:Hamstring co-act: Intervention > Control; p<0.05 ^a Backwards: No significant effect Distal onset of response: Intervention: 50%; Control: 30%; p not reported
Lee (2012) ¹⁶⁸	1 month	22	3 months	Intervention: postural and movement activities by caregivers (20 min, daily, 4 weeks) Control: face-to-face social interaction activities by caregivers (20 min, daily, 4 weeks)	Head control score (Test of Infant Motor Performance): Intervention > Control; p<0.001 ^a % time in lean head posture (observed): No significant effect % time in upright head posture (observed): No significant effect % time in pop-up head posture (observed): Intervention > Control; p<0.001 ^a % time in turn head posture (observed): Intervention < Control; p<0.001 ^b % time in other head posture (observed): No significant effect Head displacement along x-axis (kinematics): No significant effect Head displacement along y-axis (kinematics): Intervention > Control; p=0.009 ^a Average speed of head movements (kinematics): Intervention > Control; p=0.000 ^a Variation in head movement speed (kinematics): No significant effect
Lobo (2012) ¹⁷⁰	I: 8.9 ± 0.7 C: 8.7 ± 0.9 weeks	25	5-10 months	Intervention: perceptual-motor handling and positioning experience by caregivers (15 min, daily, 3 weeks) Control: face-to-face social experience by caregivers (15 min, daily, 3 weeks)	Age of reaching motor ability (parental report) • Reaching for midline objects: Intervention < Control; p≤0.05 ^a • Transferring objects between hands: Intervention < Control; p≤0.05 ^a • Creeping on hands and knees: Intervention < Control; p≤0.05 ^a • Walking with support: Intervention < Control; p≤0.05 ^a • Walking independently: Intervention < Control; p≤0.05 ^a



Study	Age at exposure	N	Follow-up	Condition	Results
De Vries (2015) ¹⁰⁹	2 weeks - 11 months	143	1.5 years	Intervention: nurses advised parents on stimulating motor development and physical activity (during visits at 2 weeks and 2/4/8/11 months old) Control: standard care	Gross motor development score (Dutch 2nd Edition of the Bayley Scales of Infant and Toddler Development-3): No significant effect

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Davis (1998) ¹⁶⁰	1-6 months	97 (supine sleepers)	At 6 months	% time that the infant spent in the prone position while awake (parental log)	Milestone attainment (parental log & assessment by pediatrician) <ul style="list-style-type: none"> • Rolls prone to supine: No significant association • Rolls supine to prone: No significant association • Tripod sit: No significant association • Sits: No significant association • Transfers objects: No significant association • Creeping: No significant association • Crawling: No significant association • Pulls to stand: Earlier attainment ($p < 0.01$)^a • Walks independently: No significant association
Jennings (2005) ¹⁶⁴	6 months	28	1 year	Regularity of placing the baby to play in prone position (parental report)	Locomotion score (Peabody Developmental Motor Scales-2, average): Routinely (84.9) > not routinely (82.1); $p = 0.015$ ^a
Kuo (2008) ¹⁶⁷	4 months	216	2 - 20 months	Time spent in prone position (parental report; in categories)	Gross motor developmental quotient (Comprehensive Developmental Inventory for Infants and Toddlers): No significant association Fine motor developmental quotient (Comprehensive Developmental Inventory for Infants and Toddlers): No significant association Acquisition age of rolling (parental report, log rank): 20.2; $p < 0.167$ (younger age) ^a Acquisition age of crawling-on-abdomen (parental report, log rank): 26.2; $p < 0.167$ (younger age) ^a Acquisition age of crawling-on-all-fours (parental report, log rank): 23.9; $p < 0.167$ (younger age) ^a Acquisition age of transferring objects (parental report): No significant association Acquisition age of sitting (parental report, log rank): 14.2; $p < 0.167$ (younger age) ^a Acquisition age of walking (parental report): No significant association
Carmeli (2009) ¹⁵⁹	4 weeks - 6 months	75	At 6 months	Whether the infant spent less or more than 15 min in the prone position each day (parental log)	Gross motor attainment (Alberta Infant Motor Scale): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Hesketh (2015)* ¹⁶³	4 months	492	16 months	Time/day physically active with parent (maternal report)	Age first sitting (maternal report): No significant association Age first crawling (maternal report): No significant association Age first walking (maternal report): No significant association
				Time/day tummy time (maternal report)	Age first sitting (maternal report): No significant association Age first crawling (maternal report): No significant association Age first walking (maternal report): No significant association
				Time/day outside time (maternal report)	Age first sitting (maternal report): No significant association Age first crawling (maternal report): -0.09; p=0.033 ^a Age first walking (maternal report): No significant association
				Time/day not restricted (maternal report)	Age first sitting (maternal report): No significant association Age first crawling (maternal report): No significant association Age first walking (maternal report): -0.09; p=0.034 ^a
Barnett (2019)* ¹⁵⁷	4 months	256	56 months	Time/day physically active with mum (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association
				Time/day tummy time (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association
				Time/day on the floor/free to move about (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association
				Time/day outside (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
	9 months	259	51 months	Time/day physically active with mum (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association
				Time/day on the floor/free to move about (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association
				Time/day outside (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score (B (95% CI)): Ref = lowest tertile; Middle: 2.50 (0.39 - 4.62) ^a ; Highest: 2.86 (0.47 - 5.26) ^a Object control skill score: No significant association

* These articles are based on the same study, but use different variables

^a These effects/associations were included as 'positive' in the calculations

Table 16 Overview of the reviews that investigated physical activity & 3-4 years & motor development

Review	Review: Exposure	Review: Outcome	Review: Studies	Relevant: Studies	Relevant: N	Relevant: Age	Relevant: Results
Eddy (2019) ¹⁷	School-based motor skill interventions	Objective measures of motor skills	23	12	1798	3-7 years	<p>Fundamental movement skills: "Of the studies investigating FMS interventions, all but two reporting significant benefits at post-test. Risk of bias was variable across studies (0–57%).” “For 22 outcomes, across 7/12 FMS studies, sufficient data were reported to calculate ES estimates with confidence intervals. Summarizing this evidence, for half these outcomes, a “large” ES (>.8) was reported, and for 17 outcomes (77%), positive results were likely replicable (i.e., lower bound for ES > 0).”</p> <p>Object manipulation skills: “Object manipulation skills were the most frequently examined outcome— with significant benefit in this domain reported in 9/10 studies.” “The evidence generally indicated there was some degree of positive benefit on measures of object manipulation, with only one of the five relevant studies potentially reflecting a Type 1 error.”</p> <p>Gross motor skills: “Significant benefits were observed in 4/6 studies assessing effects on gross motor skills.” “Evidence for benefits to gross motor control were more mixed, with confidence intervals crossing 0 for three of six ESs.”</p>
Engel (2018) ¹⁹	Fundamental motor skill interventions	Quantitative measures of fundamental motor skills	14	9	Not reported	3-5 years	Fundamental motor skills: “When analysed by age, preschool-aged children (n =9) had a small, significant improvement (SMD = 0.19 [95% CI 0.07–0.54]; p = 0.001) with insignificant heterogeneity (I ² = 43% and Chi ² p = 0.07).”



Review	Review: Exposure	Review: Outcome	Review: Studies	Relevant: Studies	Relevant: N	Relevant: Age	Relevant: Results
Van Capelle (2017) ⁵⁸	Physical activity interventions	Fundamental motor skills	20	20	4245	4.3 ± 0.4 years (3.3–5.0 years)	<p>Fundamental motor skills: “Pooled sub-analysis of the Teacher-Led interventions (n = 9) revealed a trivial, significant improvement in overall FMS in children aged 3–5 years (SMD = 0.13[0.03, 0.22]; p = 0.008; I2 = 34%; Chi2 p = 0.14).”</p> <p>Object control skills: “Pooled sub-analysis of the Teacher-Led interventions (n = 5) revealed a small, but significant improvement in object control skills in children aged 3–5 years (SMD = 0.47[0.15, 0.80]; p = 0.004; I2 = 60%; Chi2 p = 0.04), however, substantial heterogeneity may be present with I2 = 60%; Chi2 p = 0.04 and therefore results should be interpreted with caution.”</p> <p>Locomotor skills: “Pooled sub-analysis of the Teacher-Led interventions (n = 5) revealed a small, and significant improvement in locomotor skills in children aged 3–5 years (SMD = 0.44[0.16, 0.73]; p = 0.002; I2 = 57%; Chi2 p = 0.06).”</p>
Veldman (2016) ⁶⁰	Gross motor development interventions	Gross motor skill competence	7	7	1403	3.3 - 5 years	<p>Total motor skills score: “Six studies reported a statistically significant effect of the intervention. Three studies reported a significant effect on the total scores of motor skills.”</p> <p>Locomotor, object control, individual skills: “Six studies reported a statistically significant effect of the intervention. Three studies reported significant effects on either locomotor skills, object control skills or on individual skills.”</p>
Zeng (2017) ⁷⁰	Physical activity or exercise-based interventions	Quantitative measures of motor skills	15	10	1602	3 - 6.2 years	<p>Motor skills: Of 10 studies examining the effects of physical activity on preschool children’s motor skill outcomes, eight (80%) reported significant improvements in motor development (e.g., fundamental motor skills and motor abilities) following activity-based interventions.”</p>



Table 17 Overview of the studies that investigated physical activity & 3-4 years & motor development**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Battaglia (2018) ¹⁵⁸	I: 57.4 ± 9.4 C: 52.1 ± 8.7 months	119	16 weeks	Intervention: physical education program (60 min, 2 times/week, 16 weeks) Control: classroom activities (60 min, 2 times/week, 16 weeks)	Gross motor development test (Intervention vs. control): Gross motor development quotient (Mean difference): 11.3 vs 3.2; p=0.0082
Fu (2018) ¹⁶¹	4.9 ± 0.7 years	65	12 weeks	Intervention: exergaming (30 min, 5 days/week, 12 weeks) Control: unstructured free play (30 min, 5 days/week, 12 weeks)	Test for Gross Motor Development-3 (Intervention vs. control): Total motor development score (Mean difference): I > C; 8.7; p=0.019
Ketelhut (2018) ⁹⁰	3.0 ± 0.4 years	172	2 years	Intervention: supervised structured physical activity program (45 min, 3 days/week, 2 years) Control: not reported	Balance reverse gait (cm, Mean (SD)): 195.3 (18.8) vs. 142.1 (62.3); p<0.001
Latorre-Román (2018) ¹²⁴	B: 4.3 ± 0.6 G: 4.6 ± 0.5 years	111	10 weeks	Intervention: aerobic games program (30 min; 3 days/week, 10 weeks) Control: not reported	Balance (sec): No significant effect
Wasenius (2018) ¹⁷⁵	3.5 ± 0.4 - 3.8 ± 0.6 years	127-130	6 months	Intervention 1: workshops for childcare providers, 60 min/day PA program, booster sessions Intervention 2: + webinars, manual and postcards for parents Control: regular curriculum	Test of Gross Motor Development-2: Gross motor quotient: No significant effect
Hacke (2019) ⁸⁹	4.8 ± 0.8 years	135	6 months	Intervention: supervised exercise sessions (60 min, 2 days/week, 6 months) Control: daily routine	Jumping side to side (reps): No significant effect
Johnson (2019) ¹⁶⁵	3-5 years	96	9 months	Intervention: mastery motivational climate physical education program with personal instruction (30 min, 2 times/week, 9 months) Control: same activities but without personal instruction (30 min, 2 times/week, 9 months)	Test of Gross Motor Development-3: Locomotor skills: Intervention > Control; p<0.05 Ball skills: Intervention > Control; p<0.05
Steenbock (2019) ¹⁵⁵	4.3 ± 0.8 years	641	1 year	Intervention: promotion of PA, healthy eating, mental wellbeing in daycare facilities (which were free to choose which modules they would like) Control: usual routine	KindergartenMobil-Test: Lateral jumping (jumps): No significant effect One leg stand (contacts): No significant effect
Kobel (2020) ¹⁵⁴	3.7 ± 0.6 years	419	1 year	Intervention: focus on PA, screen time & diet, including weekly exercises and games lessons, and short activity games (5-7 min, 2 times/day, 1 year) Control: normal kindergarten routine	One-legged stand: No significant effect



Study	Age at exposure	N	Follow-up	Condition	Results
Leis (2020) ¹⁶⁹	4.1 ± 0.8 years	492	9 months	Intervention: training, resources, support, and booster session focused on PA and health eating for early childcare centres (6-8 months) Control: usual practice	Test of Gross Motor Development-2: Locomotor score (B (standard error)): 3.33 (1.28); p=0.009 Object control score: No significant effect

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Barnett (2019) ¹⁵⁷	3.5 years	178	1.5 years	Time/day physically active with mum (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score (B (95% CI), ref = lowest tertile): Middle: -1.12 (-3.52 - 1.30) Highest: -3.73 (-6.68 - -0.78) Object control skill score: No significant association
				Time/day on the floor/free to move about (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association
				Time/day outside (maternal report; tertiles)	Test of Gross Motor Development-2: Locomotor skill score: No significant association Object control skill score: No significant association
Kracht (2020) ¹⁶⁶	3.2 ± 0.5 years	53	1 year	Hours/day LPA (accelerometry; 200-419 counts/15 sec epoch)	Test of Gross Motor Development-3: Total score (B (SE)): -5.88 (2.19); p=0.01
				Hours/day MVPA (accelerometry; ≥420 counts/15 sec epoch)	Test of Gross Motor Development-3: Total score (B (SE)): 4.68 (2.03); p=0.02
				Meeting the physical activity guidelines (accelerometry; PA = ≥200 counts/15 sec epoch, MVPA = ≥420 counts/15 sec epoch; guidelines = ≥3 h/day total PA including ≥1 h/day MVPA)	Test of Gross Motor Development-3: Total score: No significant association
Nilsen (2020) ¹⁷¹	4.7 ± 0.9 years	230	2 years	Total PA (accelerometry; counts/min)	Test of Gross Motor Development-3 & Preschooler Gross Motor Quality Scale: - Locomotor skills (B (95% CI)): 0.23 (0.07 - 0.39); p=0.006 - Object control skills (B (95% CI)): 0.22 (0.07 - 0.36); p=0.004 - Balance skills (B (95% CI)): 0.17 (0.03 - 0.30); p=0.014



Study	Age at exposure	N	Follow-up	Exposure	Results
				Min/day LPA (accelerometry; 101–2295 counts/min)	Test of Gross Motor Development-3 & Preschooler Gross Motor Quality Scale: <ul style="list-style-type: none"> • Locomotor skills: No significant association • Object control skills: No significant association • Balance skills: No significant association
				Min/day MPA (accelerometry; 2296–4011 counts/min)	Test of Gross Motor Development-3 & Preschooler Gross Motor Quality Scale: <ul style="list-style-type: none"> • Locomotor skills (B (95% CI)): 0.22 (0.07 - 0.37); p=0.005 • Object control skills: No significant association • Balance skills (B (95% CI)): 0.15 (0.03 - 0.28); p=0.032
				Min/day VPA (accelerometry; ≥4012 counts/min)	Test of Gross Motor Development-3 & Preschooler Gross Motor Quality Scale: <ul style="list-style-type: none"> • Locomotor skills (B (95% CI)): 0.25 (0.08 - 0.41); p=0.003 • Object control skills (B (95% CI)): 0.19 (0.05 - 0.34); p=0.010 • Balance skills (B (95% CI)): 0.20 (0.06 - 0.33); p=0.005
				Min/day MVPA (accelerometry; ≥2296 cpm)	Test of Gross Motor Development-3 & Preschooler Gross Motor Quality Scale: <ul style="list-style-type: none"> • Locomotor skills (B (95% CI)): 0.26 (0.09 - 0.42); p=0.002 • Object control skills (B (95% CI)): 0.18 (0.03 - 0.33); p=0.017 • Balance skills (B (95% CI)): 0.19 (0.05 - 0.33); p=0.007
Schmutz (2020) ¹⁷⁴	3.9 ± 0.7 years	550	1 year	Total PA (accelerometry; counts/min)	Zurich Neuromotor Assessment 3– 5: No significant association
				Min/day MVPA (accelerometry; ≥ 420 counts/15 sec epoch)	Zurich Neuromotor Assessment 3– 5: No significant association



3.7 Cognitive development

The outcome “cognitive development” included outcome measures such as attention, memory, executive function, academic achievement, literacy, and numeracy.

In addition to the general selection criteria, studies were excluded for the outcome cognitive development if they investigated the effects of:

- a multicomponent intervention that also included a cognitive component and the singular effects of physical activity/sedentary behaviour on cognitive development could not be evaluated (e.g., investigating the effects of an education program aimed to foster creative thinking that also included physical components on children’s creativity);
- a specific (cognitive) exposure (e.g., understanding the meaning of words used in a television program after watching that program);
- background television exposure in the household, without specifying whether the child was watching;
- integrating physical activity into a learning task (e.g., enacting the meaning of words to be learned) on learning abilities.

A total of 31 studies^{82,113,134,140,158,172,173,176-199} were identified in the systematic literature search, 20 through the reviews and 11 through the additional search for individual studies.

The majority of the identified studies investigated the effects/associations of screen time (e.g., television viewing, computer use) on cognitive development. The committee remarks that in these studies, the possible negative effects of sedentary behaviour on cognitive development could be counteracted by the possible positive effects of the content of the screen-based activity on cognitive development. This type of confounding is a point of attention when evaluating these studies.

3.7.1 Physical activity & <1 year & cognitive development

Two studies^{173,183} investigated the effects/associations of physical activity on cognitive development in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children <1 year old and cognitive development.*

3.7.2 Physical activity & 1-2 years & cognitive development

One study¹⁸³ investigated the effects/associations of physical activity on cognitive development in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children 1-2 years old and cognitive development.*



3.7.3 Physical activity & 3-4 years & cognitive development

Eleven studies^{82,113,158,179,187,191-193,195-197} investigated the effects/associations of physical activity on cognitive development in children 3-4 years old. Details of these studies are shown in Table 18. There were 6 RCT studies with a total of 663 participants, and 5 cohort studies with a total of 2025 participants. Overall, 5 out of 11 studies (45%) reported statistically significant effects/associations, 6 out of 34 (18%) of the tested effects/associations were positive (i.e., physical activity was associated with favourable cognitive development), and 1 out of 34 (3%) of the tested effects/associations was negative (i.e., associated with unfavourable cognitive development).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and cognitive development.*

3.7.4 Sedentary behaviour & <1 year & cognitive development

Two studies^{183,194} investigated the effects/associations of sedentary behaviour on cognitive development in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and cognitive development.*

3.7.5 Sedentary behaviour & 1-2 years & cognitive development

Ten studies^{134,140,172,176,177,180,183,186,198,199} investigated the effects/associations of sedentary behaviour on cognitive development in children 1-2 years old. Details of these studies are shown in Table 19. They were all cohort studies with a total of 12059 participants. Overall, 5 out of 10 studies (50%) reported statistically significant associations, and 10 out of 24 (42%) of the tested associations were negative (i.e. sedentary behaviour was associated with unfavourable cognitive development).

As there were ≥ 5 cohort studies with ≥ 500 participants, the evidence was evaluated using the lower route in the decision tree.



*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 1-2 years old and cognitive development.*

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 3-4 years old and cognitive development.*

3.7.6 Sedentary behaviour & 3-4 years & cognitive development

Thirteen studies^{82,178,181,182,184,185,187-190,192,195,198} investigated the effects/associations of sedentary behaviour on cognitive development in children 3-4 years old. Details of these studies are shown in Table 20. There were 3 RCT studies with a total of 213 participants, and 10 cohort studies with a total of 4791 participants. Overall, 5 out of 13 studies (38%) reported statistically significant effects/associations, 2 out of 49 (4%) of the tested effects/associations were positive (i.e., associated with favourable cognitive development), and 9 out of 49 (18%) of the tested effects/associations were negative (i.e. associated with unfavourable cognitive development).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.



Table 18 Overview of the studies that investigated physical activity & 3-4 years & cognitive development**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Teixeira Costa (2015) ¹⁹³	3-5 years	324	24 weeks	Intervention: structured physical education plan (45 min, 2 days/week, 24 weeks) Control: standard education	Spatial organisation (test): Intervention > Control; p<0.001 ¹ Temporal organisation (test): Intervention > Control; p<0.001 ¹
Burkart (2018) ¹⁷⁹	4.3 ± 0.7 years	71	6 months	Intervention: locomotor-skills-based physical activity lessons (30 min, 5 days/week, 6 months) Control: unstructured free playtime (30 min, 5 days/week, 6 months)	Inhibitory control (Computerized go/no-go task): No significant effect
Battaglia (2018) ¹⁵⁸	I: 57.4 ± 9.4 C: 52.1 ± 8.7 months	119	16 weeks	Intervention: physical education program (60 min, 2 times/week, 16 weeks) Control: classroom activities (60 min, 2 times/week, 16 weeks)	Pre-literacy skills (PRCR-2/2009): Printed letters identification (N errors): No significant effect Object naming (N errors): No significant effect Partially hidden object naming (N errors): No significant effect Pointed object naming (N errors): No significant effect
Wen (2018) ¹⁹⁶	4.4 ± 0.3 years	57	10 weeks	Intervention: trampoline training (20 min, 5 days/week, 10 weeks) Control: usual classes and care service	Executive functioning: Inhibitory control (Spatial conflict arrow task): No significant effect Inhibitory control (Animal Go/NoGo task): No significant effect Working memory (Working Memory Span): No significant effect Cognitive flexibility (Flexible item selection): No significant effect
Gao (2019) ¹¹³	4.7 ± 0.7 years	32	12 weeks	Intervention: home-based exergaming (30 min, 5 times/week, 12 weeks) beyond usual physical activity patterns Control: maintain regular PA patterns	Cognitive flexibility (Dimensional Change Card Sort Test): Intervention > Control; p<0.01 ¹
Xiong (2019) ¹⁹⁷	4.5 years	60	8 weeks	Intervention: exergaming in childcare centre (20 min, 5 days/week, 8 weeks) Control: traditional physical activity program (20 min, 5 days/week, 8 weeks)	Executive functions (Dimensional Change Card Sort Test): Intervention > Control; p=0.01 ¹



Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
López-Vicente (2017) ¹⁸⁷	4.3-4.5 ± 0.1-0.3 years	1093	3 years	Hours/week extracurricular physical activity (parental questionnaire; dichotomized)	Working memory accuracy (n-back task): No significant association Working memory detection (n-back task): No significant association
Hinkley (2020) ⁸²	4.6 years	498	4 years	Meeting the physical activity guidelines (accelerometry; 3 hours/day total PA (≥ 25 counts/15 sec epoch) and 1 hour/day MVPA (≥ 420 counts/15 sec epoch))	Academic achievement (National Assessment Program – Literacy and Numeracy): Language score: No significant association Reading score: No significant association Writing score: No significant association Spelling score: No significant association Numeracy score: No significant association
McNeill (2020) ^{*191}	4.2 ± 0.6 years	167-182	1 year	Percentage of time in light physical activity (accelerometry; ≥25–419 counts/15 sec)	Executive functions (Early Years Toolbox): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting: No significant association
				Percentage of time in moderate physical activity (accelerometry; ≥420 – 841 counts/15 sec)	Executive functions (Early Years Toolbox): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting: No significant association
				Percentage of time in vigorous physical activity (accelerometry; ≥ 842 counts/15 sec)	Executive functions (Early Years Toolbox): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting (B (95% CI)): 0.245 (0.006, 0.485); p=0.045 ¹
				Percentage of time in moderate-to-vigorous physical activity (accelerometry; ≥420 counts/15 sec)	Executive functions (Early Years Toolbox): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting: No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
				Percentage of time in total physical activity (accelerometry; ≥ 25 counts/15 sec)	Executive functions (Early Years Toolbox): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting: No significant association
				Participation in modified organized sports (parental report; dichotomized)	Executive functions (Early Years Toolbox, non-participants vs. participants): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition (B (95% CI)): 0.06 (0.00, 0.13); $p=0.046^b$ Shifting: No significant association
McNeill (2020) ^{*192}	4.2 \pm 0.6 years	167-182	1 year	Meeting the physical activity guidelines (accelerometry; ≥ 180 min/day of TPA (≥ 25 counts/15 sec) including ≥ 60 min/day of MVPA (≥ 420 counts/15 sec))	Executive functions (Early Years Toolbox, not meeting vs. meeting): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting (B (95% CI)): -3.946 (-6.191, -1.700); $p<0.01^1$
Verswijveren (2020) ¹⁹⁵	3.7 \pm 0.8 & 4.2 \pm 0.8 & 4.7 \pm 0.8 years	100	6 months & 12 months	Min/day spent in light intensity physical activity (accelerometry; 26–419 counts/15 sec epoch) Min/day spent in moderate-to-vigorous intensity physical activity (accelerometry; ≥ 420 counts/15 sec epoch)	Inhibitory control (Fish-Shark Go/No-Go task): No significant association Working memory (Nebraska Barnyard task): No significant association Cognitive ability (Woodcock-Johnson III test battery): No significant association Inhibitory control (Fish-Shark Go/No-Go task): No significant association Working memory (Nebraska Barnyard task): No significant association Cognitive ability (Woodcock-Johnson III test battery): No significant association

* These articles reported information from the same study but with a different exposure

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



Table 19 Overview of the studies that investigated sedentary behaviour & 1-2 years & cognitive development**Cohort studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Linebarger (2005) ¹⁸⁶	6-30 months	51	At 30 months	Hours/week television watching (parental report; cumulative exposure across 6-30 months)	Vocabulary development (MacArthur Communicative Development Inventory): No significant association Expressive language production (Early Childhood Indicator): No significant association
Zimmerman (2005) ¹⁹⁸	<3 years	1031 - 1797	At 6 years	Hours/day television watching (maternal report)	Peabody Individual Achievement Test: Mathematics score: No significant association Reading recognition score (B (95% CI)): -0.31 (-0.61 - -0.01) ^a Reading comprehension score (B (95% CI)): -0.58 (-0.94 - -0.21) ^a
		1150	At 7 years	Hours/day television watching (maternal report)	Short-term memory (Memory for Digit Span assessment, B (95% CI)): -0.10 (-0.20 - -0.00) ^a
Schmidt (2009) ¹⁴⁰	6 months-2 years	872	At 3 years	Hours/day television watching (maternal report; weighted average 6 months - 2 years)	Receptive vocabulary (Peabody Picture Vocabulary Test-3): No significant association
Zimmerman (2009) ¹⁹⁹	13.7 ± 10.0 months	71	18 months	Hours/day exposed to television (Objectively via Language Environment Analysis)	Language capacity (Preschool Language Scale-4): No significant association
Barr (2010) ¹⁷⁶	15.8 ± 2.7 months	60	33 months	Hours/day total exposure to television (parental diary)	Executive functioning (Behavior Rating Inventory of Executive Functioning-Preschool): No significant association Executive functioning (Shape School): No significant association Intelligence (Wechsler Preschool and Primary Scale of Intelligence-R): No significant association School readiness (Bracken Basic Concept Scale-R): No significant association Receptive vocabulary (Peabody Picture Vocabulary Test-3): No significant association
Pagani (2010) ^{*134}	29/53 months	1314	8 years	Hours/week television viewing (parental report)	Mathematics achievement (teacher report; relative to the distribution of the class, B (SE)): At 29 months: -0.06 (0.01); p<0.05 ^a Change 29-53 months: No significant association Reading achievement (teacher report, relative to the distribution of the class, B (SE)): At 29 months: No significant association Change 29-53 months: No significant association Classroom engagement (teacher report, B (SE)): At 29 months: -0.07 (0.003); p<0.05 ^a Change 29-53 months: No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Pagani (2013) ^{*172}	29 months	1999	3 years	Hours/week television exposure (parental report)	Receptive vocabulary (Peabody Picture Vocabulary Test, B): -0.13; p<0.001 ^a Number knowledge (Number Knowledge Test, B): -0.09; p<0.001 ^a Classroom engagement (teacher report, B): -0.05; p<0.05 ^a
Bittman (2011) ¹⁷⁷	0-5 years	2335	At 4-5 years	Time spent viewing television (time use diary; longitudinal patterns across 0-5 years)	Language ability (Peabody Picture Vocabulary Test-3): No significant association
Duch (2013) ¹⁸⁰	21.1 ± 9.6 months	73	1 year	Hours/day screen time (parental recall; >2 hours/day)	Language development (Ages and Stages Questionnaire-3, GEE): -1.51; p=0.007 ^a
Gialamas (2019) ¹⁸³	33.9 ± 2.9 months	4253	2 years	Hours/day screen time (24-hour time use diary)	Receptive vocabulary (Peabody Picture Vocabulary Test-3, B (95% CI)): -0.34 (-0.64 - -0.04) ^a

* These articles reported information from the same study but with a different follow-up duration and outcome measures

^a These effects/associations were included as 'negative' in the calculations



Table 20 Overview of the studies that investigated sedentary behaviour & 3-4 years & cognitive development**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Fletcher-Flinn (1997) ¹⁸²	49 months	24	2.5 months	Intervention: provided with home computer (with a range of software) for 2.5 months Control: no home computer	Theory of Mind (3 false-belief tasks): No significant effect
Janisse (2018) ¹⁸⁴	48.8 ± 6.2 months	82	1.5 years	Intervention: daily open access to computers with age-appropriate interactive educational software (15 min, 5 days/week, 8 months) Control: standard curriculum	McCarthy Scales of Children's Abilities: Verbal development: No significant effect Perceptual development: No significant effect Quantitative development (Coefficient (SE)): 1.81 (0.85); p=0.033 ^a Memory development: No significant effect
Ellis (2019) ¹⁸¹	4.1 years	107	12 weeks	Intervention: different activities to reduce sitting time in pre-school (including standing tables; 12 weeks) Control: normal routine (12 weeks)	Executive functioning (Early Years Toolbox): Inhibition: No significant effect Working memory: No significant effect Shifting: No significant effect

^a These effects/associations were included as 'positive' in the calculations

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Zimmerman (2005) ¹⁹⁸	3-5 years	1031 - 1797	At 6 years	Hours/day television watching (maternal report)	Peabody Individual Achievement Test: Mathematics score: No significant association Reading recognition score (B (95% CI)): 0.51 (0.17 - 0.85) ^a Reading comprehension score: No significant association
		1150	At 7 years	Hours/day television watching (maternal report)	Short-term memory (Memory for Digit Span assessment): No significant association
Blankson (2015) ¹⁷⁸	3.5 ± 2.4 years	228	2 years	Hours/week television viewing (parental questionnaire)	Vocabulary (Peabody Picture Vocabulary Test-3): No significant association Executive functioning (Animal Stroop task & Kaufman Assessment Battery number recall test): No significant association
	4.5 years	228	1 year	Hours/week television viewing (parental questionnaire)	Vocabulary (Peabody Picture Vocabulary Test-3): No significant association Executive functioning (Animal Stroop task & Kaufman Assessment Battery number recall test): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
McKean (2015) ¹⁸⁹	4 years	763	Up to 3 years	Hours/day television viewing (parental report; into quartiles)	Language progress rate per year 4-7 years (Clinical Evaluation of Language Fundamentals, B (95% CI)): Ref = Q1 (lowest TV viewing) Q2: No significant association Q3: No significant association Q4: -0.07 (-0.13 - -0.03); p<0.01 ^b
López-Vicente (2017) ¹⁸⁷	4.3-4.5 ± 0.1-0.3 years	1093	3 years	Hours/week TV viewing (parental questionnaire; dichotomized) Hours/week other sedentary behaviours (parental questionnaire; dichotomized)	Working memory accuracy (n-back task): No significant association Working memory detection (n-back task): No significant association Working memory accuracy (n-back task): No significant association Working memory detection (n-back task): No significant association
McNeill (2019) ^{*190}	4.2 ± 0.6 years	181-185	1 year	Min/day engaging in electronic media behaviours (parental report)	Executive functions (Early Years Toolbox): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting: No significant association
McNeill (2020) ^{*192}	4.2 ± 0.6 years	167-182	1 year	Meeting the screen time guidelines (parental report; ≤60 min/day)	Executive functions (Early Years Toolbox): Visual-spatial working memory: No significant association Phonological working memory: No significant association Inhibition: No significant association Shifting: No significant association
Hinkley (2020) ⁸²	4.6 ± 0.7 years	498	4 years	Meeting the screen-time guideline (parent report; ≤ 1 hour/day)	Academic achievement (National Assessment Program – Literacy and Numeracy): Language score: No significant association Reading score: No significant association Writing score: No significant association Spelling score: No significant association Numeracy score: No significant association
Kim (2020) ¹⁸⁵	2.2 - 7.3 years	673-979	At 7.3 years	Hours/day television and video watching (parental questionnaire; from 2.2 to 7.3 years; in 4 trajectory categories: low descending (LD); medium flat (MF); high ascending (HA); extremely high descending (XHD))	Receptive and Expressive Vocabulary Test: Receptive language development: No significant association Expressive language development: LD, MF > HA; p=0.002 ^b School achievement language (parental questionnaire): LD > MF > HA; p<0.001 ^b School achievement math (parental questionnaire): LD > MF > HA; p<0.001 ^b School achievement language (teacher questionnaire): LD, MF > HA; p<0.001 ^b School achievement math (teacher questionnaire): LD > HA, XHD; p=0.001 ^b



Study	Age at exposure	N	Follow-up	Exposure	Results
MacGowan (2020) ¹⁸⁸	54.7 ± 2.8 months	57	1 year	Hours/day watching television/ movies/ videos (maternal report)	Receptive vocabulary (Picture Vocabulary Test, B (95% CI)): Boys: -3.79 (-6.37 - -1.17); p<0.01 ^b ; Girls: No significant association Theory of mind (6 Theory of Mind tasks): Boys: No significant association; Girls: No significant association
				Hours/day engaging in nonschool-related activities on a computer/ gaming console (maternal report)	Receptive vocabulary (Picture Vocabulary Test, B (95% CI)): Boys: -4.27 (-8.08 - -0.45); p=0.03 ^b ; Girls: No significant association Theory of mind (6 Theory of Mind tasks, B (95% CI)): Boys: -0.58 (-1.04 - -0.13); p=0.01 ^b ; Girls: No significant association
Verswijveren (2020) ¹⁹⁵	3.7 ± 0.8 & 4.2 ± 0.8 & 4.7 ± 0.8 years	100	6 months & 12 months	Min/day spent sedentary (accelerometry; 0–25 counts/15 sec epoch)	Inhibitory control (Fish-Shark Go/No-Go task): No significant association Working memory (Nebraska Barnyard task): No significant association Cognitive ability (Woodcock-Johnson III test battery): No significant association

* These articles reported information from the same study but with a different exposure

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



3.8 Psychosocial development

The outcome “psychosocial development” included outcome measures such as mental health, behavioural problems, self-regulation, self-esteem, self-concept, social development, emotional development, mood, well-being, and quality of life.

In addition to the general selection criteria, studies were excluded for the outcome psychosocial development if they investigated the effects of:

- a multicomponent intervention that included a psychosocial component where the singular effects of physical activity/sedentary behaviour on psychosocial development could not be evaluated;
- a specific (psychosocial) exposure (e.g., aggressive behaviour after watching violent television programs);
- background television exposure in the household, without specifying whether the child was watching.

A total of 41 studies^{82,106,134,146,149,172,173,179,183,188,190-192,197,200-226} were identified in the systematic literature search, 23 through the reviews and 18 through the additional search for individual studies.

The committee acknowledges that the outcome “psychosocial development” contains several distinct constructs, such as internalising behaviour, externalising behaviour, and hyperactivity/attention problems.

For that reason, the committee also evaluated the effects of physical activity/sedentary behaviour on these different constructs where possible.

3.8.1 Physical activity & <1 year & psychosocial development

Two studies^{173,183} investigated the effects/associations of physical activity on psychosocial development in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children <1 year old and psychosocial development.*

3.8.2 Physical activity & 1-2 years & psychosocial development

One study¹⁸³ investigated the effects/associations of physical activity on psychosocial development in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children 1-2 years old and psychosocial development.*

3.8.3 Physical activity & 3-4 years & psychosocial development

Sixteen studies^{82,106,149,179,191,192,197,200,205,207,211,215,216,220,221,224} investigated the effects/associations of physical activity on psychosocial development in children 3-4 years old. Details of these studies are shown in Table 21.

There were 7 RCT studies with a total of 1292 participants, and 9 cohort



studies with a total of 16392 participants. Overall, 8 out of 16 studies (50%) reported statistically significant effects/associations, 13 out of 39 (33%) of the tested effects/associations were positive (i.e., physical activity was associated with favourable psychosocial development), and 4 out of 39 (10%) of the tested effects/associations were negative (i.e., associated with unfavourable psychosocial development).

Three^{179,211,216} of these studies investigated the effects/associations on externalising behaviour, one²¹¹ on internalising behaviour, and two^{179,216} on hyperactivity/attention problems. For externalising behaviour, 2 out of 3 (67%) of the tested effects/associations were positive (i.e., associated with less externalising behaviour).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and psychosocial development.*

3.8.4 Sedentary behaviour & <1 year & psychosocial development

One study¹⁸³ investigated the effects/associations of sedentary behaviour on psychosocial development in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and psychosocial development.*

3.8.5 Sedentary behaviour & 1-2 years & psychosocial development

Twelve studies^{134,172,183,201-204,209,214,219,222,225} investigated the effects/associations of sedentary behaviour on psychosocial development in children 1-2 years old. Details of these studies are shown in Table 22. They were all cohort studies with a total of 26004 participants. Overall, 10 out of 12 studies (83%) reported statistically significant effects/associations, 1 out of 41 (2%) of the tested effects/associations was positive (i.e., sedentary behaviour was associated with favourable psychosocial development), and 15 out of 41 (37%) of the tested effects/associations were negative (i.e. associated with unfavourable psychosocial development).

Eight^{134,172,183,201,209,214,219,222} of these studies investigated the effects/associations on externalising behaviour, three^{172,201,214} on internalising behaviour, and four^{201,202,204,219} on hyperactivity/attention problems. For externalising behaviour, 5 out of 17 (29%) of the tested effects/



associations were negative (i.e., associated with more externalising behaviour). For internalising behaviour, none of the 3 studies reported statistically significant effects/associations. For hyperactivity/attention problems, 2 out of 5 (40%) of the tested effects/associations were negative (i.e., associated with more hyperactivity/attention problems).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 1-2 years old and psychosocial development.*

3.8.6 Sedentary behaviour & 3-4 years & psychosocial development

Nineteen studies^{29,82,146,188,190,192,202-205,208,210,212,213,216-218,223,226} investigated the effects/associations of sedentary behaviour on psychosocial development in children 3-4 years old. Details of these studies are shown in Table 23. There was 1 RCT study with 363 participants, and 18 cohort studies with a total of 52128 participants. Overall, 10 out of 19 studies (53%) reported statistically significant effects/associations, 4 out of 52 (8%) of the tested effects/associations was positive (i.e., associated with favourable psycho-

social development), and 18 out of 52 (35%) of the tested effects/associations were negative (i.e., associated with unfavourable psychosocial development).

Five^{146,212,213,216,217} of these studies investigated the effects/associations on externalising behaviour, two^{29,212} on internalising behaviour, and four^{202,204,210,216} on hyperactivity/attention problems. For externalising behaviour, 5 out of 9 (56%) of the tested effects/associations were negative (i.e., associated with more externalising behaviour). For hyperactivity/attention problems, 1 out of 4 (25%) of the tested effects/associations was negative (i.e., associated with more hyperactivity/attention problems).

As there were ≥ 5 studies, with ≥ 150 participants in the RCT study and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for sedentary behaviour in children 3-4 years old and psychosocial development.*



Table 21 Overview of the studies that investigated physical activity & 3-4 years & psychosocial development**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Alpert (1990) ¹⁴⁹	44 months	24	8 weeks	Intervention: aerobic exercises (30 min, 5 days/week, 8 weeks) Control: freeplay on the playground (as part of their regular schedule)	Self-esteem (Thomas Self-Concept Values Test): Intervention (12.6±3.8) > Control (8.1±2.6); p=0.01 ^a
Lobo (2006) ²¹¹	50 ± 7.4 months	40	8 weeks	Intervention: instructional program in creative dance/movement (35 min, 2 days/week, 8 weeks) Control: regular curriculum activities (35 min, 2 days/week, 8 weeks)	Social competence (Social Competence Behavior Evaluation-P): Overall social competence: Intervention > Control; p<0.001 ^a Internalizing behavior problems (reversed): Intervention > Control; p<0.001 ^a Externalizing behavior problems (reversed): Intervention > Control; p<0.001 ^a
Bonvin (2013) ¹⁰⁶	3.3 ± 0.6 years	648	10 months	Intervention: training/support of educators, rearrangement of child care environment, encouragement of parental involvement, recommendation of physical activity (no demands regarding daily PA time) Control: regular program	Quality of life (PedsQL): No significant effect
Burkart (2018) ¹⁷⁹	4.3 ± 0.7 years	71	6 months	Intervention: locomotor-skills-based physical activity lessons (30 min, 5 days/week, 6 months) Control: unstructured free playtime (30 min, 5 days/week, 6 months)	Classroom behaviour (Behavior Assessment System for Children): Hyperactivity: Intervention < Control; p<0.001 ^a Aggression: Intervention < Control; p<0.05 ^a Inattention: Intervention < Control; p<0.001 ^a
Truelove (2018) ²²⁰	39.9 ± 7.3 months	234	1 year	Intervention: physical activity intervention, including environmental modification, staff training, curriculum changes (8 weeks) Control: standard curriculum	Health-related quality of life (Pediatric Quality of Life Inventory 4.0): No significant effect
Xiong (2019) ¹⁹⁷	4.5 years	60	8 weeks	Intervention: exergaming in childcare centre (20 min, 5 days/week, 8 weeks) Control: traditional physical activity program (20 min, 5 days/week, 8 weeks)	Perceived social acceptance (The Pictorial Scale of Perceived Competence and Social Acceptance, child report): Intervention > Control; p=0.02 ^a
Nagpal (2020) ²¹⁵	I: 3.6 ± 0.6 C: 3.5 ± 0.5 years	215	6 months	Intervention: activity program including fundamental motor skills training (60 min, daily, 6 months) Control: standard curriculum	Health-related quality of life (Pediatric Quality of Life Inventory Generic Core Scale): No significant effect

^a These effects/associations were included as 'positive' in the calculations

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Buss (1980) ²⁰⁰	3-4 years	129	3-4 years	Activity index (mechanical recording device)	<p>Personality characteristics (California Child Q Set; 100 items, Pearson correlation):</p> <p>Tries to stretch limits: 0.33; p<0.001^b</p> <p>Tries to take advantage of others: 0.25; p<0.05</p> <p>Tries to be the centre of attention: 0.34; p<0.001^b</p> <p>Is obedient and compliant: -0.22; p<0.05</p> <p>Is self-assertive: 0.36; p<0.001^a</p> <p>Likes to compete: 0.21; p<0.05</p> <p>Is aggressive: 0.38; p<0.001^b</p> <p>Is shy and reserved: -0.27; p<0.01</p> <p>Tends to keep thoughts/feelings to self: -0.22; p<0.05</p> <p>Is emotionally expressive: 0.22; p<0.05</p> <p>Is unable to delay gratification: 0.21; p<0.05</p> <p>Is planful, thinks ahead: -0.28; p<0.01</p> <p>Is reflective: -0.27; p<0.01</p> <p>Tends to be indecisive: -0.21; p<0.05</p> <p>Has a readiness to feel guilty: -0.26; p<0.05</p> <p>Develops genuine/close relationships: -0.27; p<0.05</p> <p>Is eager to please: -0.22; p<0.05</p> <p>Is visibly defiant from peers: -0.24; p<0.05</p> <p>Is stubborn: 0.32; p<0.001^b</p>
Wang (2008) ²²⁴	3.4 ± 0.1 years	7289	8-10 years	Relative physical activity (parental questionnaire, in tertiles)	<p>Quality of life (Dartmouth Primary Care Cooperative Project charts, OR (95% CI) for poor Quality of Life, Ref = more active)</p> <p>Average: No significant association</p> <p>Less active: 1.48 (1.06 - 2.07); p=0.022^a</p>
Vella (2015) ²²¹	4-5 years	2785	8 years	<p>Hours/day physical activity (24-hour time use diaries)</p> <p>Sports participation (parental report)</p>	<p>Health-related quality of life (PedsQL; trajectories over time):</p> <p>No significant association</p> <p>Health-related quality of life (PedsQL; trajectories over time, OR (95% CI), ref = healthy trajectory)</p> <p>High risk: 0.52 (0.36 - 0.75); p<0.05^a</p> <p>Rebound: No significant association</p> <p>Recovery: 0.37 (0.17 - 0.82); p<0.05^a</p>
Hinkley (2017) ²⁰⁵	4.4 ± 0.7 years	108	3 years	<p>Minutes/day in light to vigorous physical activity (accelerometry, >100 counts/min)</p> <p>Minutes/day active electronic games (Wii, etc; parental report)</p>	<p>Emotional intelligence (Bar-On Emotional Quotient Inventory-Y):</p> <p>No significant association</p> <p>Emotional intelligence (Bar-On Emotional Quotient Inventory-Y):</p> <p>No significant association</p>



Study	Age at exposure	N	Follow-up	Exposure	Results
Howard (2018) ²⁰⁷	4-5 years	4385	2 years	Participation in team sports (parental report)	Self-regulation (parent, teacher, and observer report): No significant association
				Participation in individual sports (parental report)	Self-regulation (parent, teacher, and observer report, mean difference (95% CI)): 0.04 (0.01 - 0.07); p=0.006 ^a
Peralta (2018) ²¹⁶	4.4 years	817	3 years	Time spent engaging in physical activity (parental report)	Attention-deficit/ hyperactivity disorder symptoms (Conners' Parent Rating Scales): No significant association Behavior problems (Strengths and Difficulties Questionnaire): No significant association
Hinkley (2020) ⁸²	4.6 ± 0.7 years	567	3 years	Meeting the physical activity guidelines (accelerometry; 3 hours/day total PA (≥ 25 counts/15 sec epoch) and 1 hour/day MVPA (≥ 420 counts/15 sec epoch))	Social and emotional skills (BarOn Emotional Quotient Inventory-Y, child report): No significant association
		568	6 years	Meeting the physical activity guidelines (accelerometry; 3 hours/day total PA (≥ 25 counts/15 sec epoch) and 1 hour/day MVPA (≥ 420 counts/15 sec epoch))	Quality of life (Pediatric Quality of Life Inventory): No significant association Self-esteem (Harter's Self-Perception Profile for Children, child report): No significant association Strengths and difficulties (Strengths and Difficulties Questionnaire): No significant association
McNeill (2020) ^{*192}	4.2 ± 0.6 years	156	1 year	Meeting the physical activity guidelines (accelerometry; ≥ 180 min/day of TPA (≥25 counts/15 sec) including ≥60 min/day of MVPA (≥420 counts/15 sec))	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association
McNeill (2020) ^{*191}	4.2 ± 0.6 years	156	1 year	% time in light physical activity (accelerometry; ≥25–419 counts/15 sec)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association
				% time in moderate physical activity (accelerometry; ≥420-841 counts/15 sec)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association
				% time in vigorous physical activity (accelerometry; ≥ 842 counts/15 sec)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association
				% time in mod-to-vig physical activity (accelerometry; ≥420 counts/15 sec)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association
				% time in total physical activity (accelerometry; ≥25 counts/15 sec)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association
				Participation in modified organized sports (parental report; dichotomized)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association

* These articles used the same dataset but with a different exposure

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



Table 22 Overview of the studies that investigated sedentary behaviour & 1-2 years & psychosocial development**Cohort studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Christakis (2004) ^{*202} D. A.	1.8 ± 0.6 years	1278	6 years	Hours/day television watched (maternal report)	Hyperactivity (subscale of Behavioral Problems Index; binary classification ≥1.2 SDs above mean, OR (95% CI)): 1.09 (1.03-1.15) ^b
Foster (2010) ^{*204}	1.8 ± 0.6 years	1039	6 years	Hours/day television watched (maternal report)	Hyperactivity (subscale of Behavioral Problems Index; binary classification ≥1.2 SDs above mean): No significant association
Mistry (2007) ²¹⁴	30-33 months	2707	At 5.5 years	> 2 hours/day television viewing (parental report; early exposure: >2 hours/day @ age 30-33 months but not @ age 5.5 years)	Emotionally reactive (Child Behavior Checklist, B (95% CI)): -0.43 (-0.69 - -0.17); p<0.01 ^b Anxious or depressed (Child Behavior Checklist): No significant association Sleep problems (Child Behavior Checklist): No significant association Externalizing behavior (Child Behavior Checklist): No significant association Total social skills (Social Skills Rating System): No significant association
				> 2 hours/day television viewing (parental report; sustained exposure: >2 hours/day @ age 30-33 months and 5.5 years)	Emotionally reactive (Child Behavior Checklist): No significant association Anxious or depressed (Child Behavior Checklist): No significant association Sleep problems (Child Behavior Checklist, B (95% CI)): 0.38 (0.13 - 0.63); p<0.01 ^b Externalizing behavior (Child Behavior Checklist, B (95% CI)): 1.74 (0.99 - 2.48); p<0.001 ^b Total social skills (Social Skills Rating System): No significant association
Tomopoulos (2007) ²¹⁹	21 months	99	1 year	Min/day total media exposure (parental 24-hour recall diary)	Child Behavior Checklist: Aggressive behavior (OR (95% CI)): 2.0 (1.1 - 3.8); p=0.03 ^b Attention problems: No significant association Oppositional defiant problems: No significant association Attention deficit/hyperactivity problems: No significant association Externalizing problems (OR (95% CI)): 1.7 (1.0 - 2.7); p=0.046 ^b
Pagani (2010) ^{**134}	29/53 months	1314	8 years	Hours/week television exposure (parental report)	Social Behavior Questionnaire: Emotional distress: No significant association Reactive aggression: No significant association Victimization (B (SE)): At 29 months: 0.10 (0.01); p<0.001 ^b Change 29-53 months: 0.06 (0.01); p<0.05 ^b



Study	Age at exposure	N	Follow-up	Exposure	Results
Pagani (2013)** ¹⁷²	29 months	1999	3 years	Hours/week television exposure (parental report)	Social Behavior Questionnaire: Anxiety: No significant association Physical aggression: No significant association Prosocial behavior: No significant association Victimization (B): 0.06; p<0.01 ^b
Watt (2015)** ²²⁵	29 months	1314	9.5 years	Hours/week television exposure (parental report)	Victimization (Social Behavior Questionnaire, child report, B (SE)): 0.03 (0.01); p<0.001 ^b
Cheng (2010) ²⁰¹	18 months	302	1 year	Hours/day television viewing (maternal report, in categories)	Strengths and Difficulties Questionnaire: Emotional symptoms: No significant association Conduct problems: No significant association Hyperactivity-inattention: More TV = more difficulties; p=0.002 ^b Peer problems: No significant association Prosocial behaviour: More TV = less difficulties; p=0.039 ¹
Verlinden (2012) ²²²	24 months	3913	1 year	>1 hour/day television exposure (parental report, @ 24 months)	Externalizing problems (Child Behavior Checklist): No significant association
				Hours/day television exposure (parental report, patterns 24-36 months)	Externalizing problems (Child Behavior Checklist, OR (95%CI), ref = never or <0.5 hours/day): Continued low: No significant association Continued moderate: No significant association Continued high: 2.09 (1.08-4.01); p=0.03 ^b Increased: No significant association
Cliff (2018) ²⁰³	2-3 years	2786	2 years	Hours/day total media exposure (parental questionnaire)	Self-regulation (parent, teacher and observer report): -0.02 (-0.03 - -0.004) ^b
				Hours/day television viewing (parental questionnaire)	Self-regulation (parent, teacher and observer report): -0.02 (-0.03 - -0.006) ^b
			4 years	Hours/day using a computer (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Hours/day playing electronic games (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Hours/day total media exposure (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Hours/day television viewing (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
Jackson (2018) ²⁰⁹	2 years	5000	2 years	Hours/day using a computer (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Hours/day playing electronic games (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Excessive TV viewing (parental report; one 1 SD above the mean)	Preschool and Kindergarten Behavior Scales-2: Social difficulties: No significant association Conduct problems: No significant association
Gialamas (2019) ¹⁸³	33.9 ± 2.9 months	4253	2 years	Hours/day screen time (24-hour time use diary)	Externalizing behaviours (Strengths and Difficulties Questionnaire; parental report, B (95% CI)): 2.57 (0.70 - 4.44) ^b Externalizing behaviours (Strengths and Difficulties Questionnaire; teacher report): No significant association

* These articles are based on the same dataset, with different confounders and analyses

** These articles reported information from the same study, but with a different follow-up duration and outcome measures

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



Table 23 Overview of the studies that investigated sedentary behaviour & 3-4 years & psychosocial development**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Yilmaz (2015) ¹⁴⁶	I: 3.5 ± 1.2 C: 3.5 ± 1.3 years	363	9 months	Intervention: printed materials and interactive CDs, one counselling call, to reduce screen time (over a period of 8 weeks) Control: usual care	Child Behavior Checklist: Aggressive behaviours: Intervention (3.35±1.46) < Control (3.85±1.38); p=0.001 ^a Delinquent behaviours: Intervention (3.45±1.56) < Control (3.83±0.95); p=0.006 ^a

^a These effects/associations were included as 'negative' in the calculations

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Zimmerman (2005) ²²⁶ F. J.	4 years	641 - 1266	2-7 years	Hours/day television viewing (maternal report)	Characterization of the child as a bully (maternal report; often true + sometimes true vs. not true, OR (95% CI)): Complete sample: 1.06 (1.02 - 1.11) ^b Adjusted for bullying age 4: 1.09 (1.01 - 1.17) ^b
Christakis (2004) ^{*202} D. A.	3.8 ± 0.6 years	1345	4 years	Hours/day television watched (maternal report)	Hyperactivity (subscale of Behavioral Problems Index; binary classification ≥1.2 SDs above mean, OR (95% CI)): 1.09 (1.02 - 1.16) ^b
Foster (2010) ^{*204}	3.8 ± 0.6 years	1159	4 years	Hours/day television watched (maternal report)	Hyperactivity (subscale of Behavioral Problems Index; binary classification ≥1.2 SDs above mean): No significant association
Hinkley (2014) ²⁰⁶	4.3 ± 0.9 years	3604	2 years	Hours/week day television viewing (parental report)	(Risk for poorer well-being) Strengths and Difficulties Questionnaire: Peer problems: No significant association Emotional problems: No significant association Questionnaire for Measuring Health-Related Quality of Life in Children and Adolescents–R: Self-esteem: No significant association Emotional well-being: No significant association Family functioning: Girls: 1.3 (1.0 - 1.6); p<0.05 ^b Boys: 1.2 (1.0 - 1.5); p<0.05 ^b Social networks: No significant association
				Hours/weekend day television viewing (parental report)	Peer problems: No significant association Emotional problems: No significant association Self-esteem: No significant association Emotional well-being: No significant association Family functioning: Girls: 1.3 (1.0 - 1.5); p<0.05 ^b Boys: No significant association Social networks: No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
				Hours/week day e-game/computer use (parental report)	Peer problems: No significant association Emotional problems: Girls: 2.0 (1.0 - 4.0); p<0.05 ^b Boys: No significant association Self-esteem: No significant association Emotional well-being: No significant association Family functioning: No significant association Social networks: No significant association
				Hours/weekend day e-game/computer use (parental report)	Peer problems: No significant association Emotional problems: No significant association Self-esteem: No significant association Emotional well-being: No significant association Family functioning: No significant association Social networks: No significant association
Verlinden (2014) ²²³	2-5 years	3423	At 7 years	Hours/day television exposure (parental questionnaire, patterns 2-5 years)	Bullying involvement (teacher report): Uninvolved: No significant association Being a bully: No significant association Being a victim: No significant association Being a bully & victim: No significant association
		1176	At 7.5 years	Hours/day television exposure (parental questionnaire, patterns 2-5 years)	Bullying involvement (self-report): Uninvolved: No significant association Being a bully: No significant association Being a victim: No significant association Being a bully & victim: No significant association
Inoue (2016) ²⁰⁸	3 years	32439	2 years	Hours/day TV viewing (parental report, in categories)	Self-regulation problems (parental report, OR (95%CI), Ref = 1-2 hours/day): Boys: 5 hours or more: 1.77 (1.06 - 2.93) Girls: do not watch: 2.26 (1.01 - 5.08) ^b
				Hours/day video game playing (parental report, in categories)	Self-regulation problems (parental report, OR (95%CI), Ref = do not play): Boys: 1 hour or less: 0.53 (0.37 - 0.76) ^a
	4 years	1 year	Hours/day TV viewing (parental report, in categories)	Self-regulation problems (parental report, OR (95%CI), Ref = 1-2 hours/day): Boys: 4-5 hours/day: 1.79 (1.22 - 2.64) ^b Girls: 2-3 hours/day: 1.40 (1.03 - 1.90) Girls: 3-4 hours/day: 1.65 (1.13 - 2.40) Girls: 4-5 hours/day: 2.59 (1.59 - 4.22) ^b	
			Hours/day video game playing (parental report, in categories)	Self-regulation problems (parental report, OR (95%CI), Ref = do not play): Girls: 1 hour or less: 0.67 (0.47 - 0.95) ^a	



Study	Age at exposure	N	Follow-up	Exposure	Results
Hinkley (2017) ²⁰⁵	4.4 ± 0.7 years	108	3 years	Minutes/day television viewing (television/ DVD/ video; parental report)	Emotional intelligence (Bar-On Emotional Quotient Inventory-Y): No significant association
				Minutes/day sedentary electronic games (Xbox, PlayStation, etc; parental report)	Emotional intelligence (Bar-On Emotional Quotient Inventory-Y, B (95% CI)): 0.12 (0.01 - 0.23); p<0.05 ^a
				Minutes/day computer/internet use (not including games; parental report)	Emotional intelligence (Bar-On Emotional Quotient Inventory-Y): No significant association
Cliff (2018) ²⁰³	4-5 years	3527	2 years	Hours/day total media exposure (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Hours/day television viewing (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Hours/day using a computer (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
				Hours/day playing electronic games (parental questionnaire)	Self-regulation (parent, teacher and observer report): No significant association
Peralta (2018) ²¹⁶	4.4 years	817	3 years	Time spent watching TV (parental report)	Attention-deficit/ hyperactivity disorder symptoms (Conners' Parent Rating Scales): No significant association Behaviour problems (Strengths and Difficulties Questionnaire): No significant association
Poulain (2018) ²¹⁷	3.8 ± 0.9 years	527	1 year	TV/video use (parental report)	Behavioural difficulties (Strengths and Difficulties Questionnaire): No significant association
				Game consoles use (parental report)	Behavioural difficulties (Strengths and Difficulties Questionnaire): No significant association
				Computer/internet use (parental report)	Behavioural difficulties (Strengths and Difficulties Questionnaire): 1.76 (0.43 - 3.09); p<0.01 ^b
				Mobile phone use (parental report)	Behavioural difficulties (Strengths and Difficulties Questionnaire): 2.21 (0.62 - 3.79); p<0.01 ^b
McNeill (2019) ^{**190}	4.2 ± 0.6 years	156	1 year	Min/day engaging in electronic media behaviours (parental report)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association
McNeill (2020) ^{**192}	4.2 ± 0.6 years	156	1 year	Meeting the screen time guidelines (parental report; ≤60 min/day)	Psychosocial difficulties (Strengths and Difficulties Questionnaire): No significant association



Study	Age at exposure	N	Follow-up	Exposure	Results
Skalická (2019) ²¹⁸	4 years	795	2 years	Hours/day spent TV watching (parental report)	Emotion understanding (Test of Emotion Comprehension, B (95% CI)): -0.11 (-0.18 - -0.05) ^b
				Hours/day spent gaming (parental report)	Emotion understanding (Test of Emotion Comprehension): No significant association
				Hours/day total screen time (parental report)	Emotion understanding (Test of Emotion Comprehension, B (95% CI)): -0.09 (-0.16 - -0.02); p<0.05 ^b
Hinkley (2020) ⁸²	4.6 ± 0.7 years	567	3 years	Meeting the screen-time guideline (parent report; ≤ 1 hour/day)	Social and emotional skills (BarOn Emotional Quotient Inventory-Y, child report): No significant association
				568	6 years
Levelink (2020) ²¹⁰	2-6 years	2768	At 8-10 years	Hours/day recreational screen time (TV and computer, parental report)	Attention-deficit/hyperactivity disorder diagnosis (parental report): No significant association
MacGowan (2020) ¹⁸⁸	54.7 ± 2.8 months	57	1 year	Hours/day watching television/ movies/ videos (maternal report)	Prosocial behaviour (2 prosociality tasks, B (95% CI)): Boys: No significant association Girls: 0.87 (0.01 to 1.72); p=0.04 ^a
				Hours/day engaging in nonschool-related activities on a computer/ gaming console (maternal report)	Prosocial behaviour (2 prosociality tasks): Boys: No significant association Girls: No significant association
McArthur (2020) ²¹²	24-60 months	1949	At 60 months	Trajectories of screen use (maternal report; low-to-moderate and high-persistent trajectory)	Behavior Assessment System for Children: Externalising behaviour: High-persistent > Low-to-moderate; p<0.05 ^b Internalising behaviour: No significant association Adaptive skills: High-persistent < Low-to-moderate; p<0.001 ^b
McDaniel (2020) ²¹³	3.0 ± 1.2 years	337	6 months	Hours/day media use (parental report)	Externalising behaviour (Child Behavioral Checklist): No significant association

* These articles are based on the same dataset but used different confounders and analytical methods

** These articles used the same dataset, but with a different exposure

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



3.9 Risks

The outcome “risks” included head deformations such as plagiocephaly and brachycephaly for physical activity and sedentary behaviour, and injuries such as wounds and fractures for physical activity.

A total of 7 studies^{93,227-232} were identified in the systematic literature search, 4 through the reviews and 2 through the additional search for individual studies. Additionally, 1 study was identified during the data extraction for the other outcomes.

3.9.1 Physical activity & <1 year & risks

One study²³² investigated the effects/associations of physical activity on risks in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children <1 year old and risks.*

3.9.2 Physical activity & 1-2 years & risks

One study²²⁹ investigated the effects/associations of physical activity on risks in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on physical activity in children 1-2 years old and risks.*

3.9.3 Physical activity & 3-4 years & risks

Three studies^{93,228,231} investigated the effects/associations of physical activity on risks in children 3-4 years old. Details of these studies are shown in Table 24. There were 2 RCT studies with a total of 1029 participants, and 1 cohort study with 2692 participants. Overall, 1 out of 3 studies (33%) reported statistically significant effects/associations, 1 out of 5 (20%) of the tested effects/associations was positive (i.e., physical activity was associated with less injuries), and 2 out of 5 (40%) of the tested effects/associations were negative (i.e. associated with more injuries).

As there were ≥ 3 studies, with ≥ 90 participants in the RCT studies and ≥ 300 participants in the cohort studies, the evidence was evaluated using the middle route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children 3-4 years old and risks.*



3.9.4 Sedentary behaviour & <1 year & risks

Two studies^{227,230} investigated the effects/associations of sedentary behaviour on risks in children <1 year old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and risks.*

3.9.5 Sedentary behaviour & 1-2 years & risks

There were no studies that investigated the effects/associations of sedentary behaviour on risks in children 1-2 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 1-2 years old and risks.*

3.9.6 Sedentary behaviour & 3-4 years & risks

There were no studies that investigated the effects/associations of sedentary behaviour on risks in children 3-4 years old.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children 3-4 years old and risks.*



Table 24 Overview of the studies that investigated physical activity & 3-4 years & risks**RCT studies**

Study	Age at exposure	N	Follow-up	Condition	Results
Roth (2015) ⁹³	4.7 ± 0.6 years	610	14-16 months	Intervention: physical activity lessons (30 min, daily, 11 months) + homework (1-2 times/week) + interactive parent lectures (3) Control: continued routine schedule	Number of accidents (questionnaire): No significant effect
Razak (2018) ²³¹	3.73±0.59/ 3.80±0.68 years	419	3 months	Intervention: 3 separate periods of outdoor free-play in childcare with a total time equivalent to the usual daily duration Control: usual single continuous period of outdoor free-play in childcare	Number of injuries requiring documentation (reported): No significant effect

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Clark (2008) ²²⁸	4.5 years	2692	5.5-7.5 years	≥28 hours/week spent outdoors in summer (questionnaire)	Fracture incidence (questionnaire, OR (95%CI)): 2.38 (1.56-3.62) ^b
				Least, average, most time/week spent outdoors in winter (questionnaire)	Fracture incidence (questionnaire, OR (95%CI)): Trend: 0.77 (0.61-0.97) ^a
				<4 episodes/week, 4-6 episodes/week, daily vigorous physical activity (questionnaire)	Fracture incidence (questionnaire, OR (95%CI)): Trend: 1.48 (1.22-1.81) ^b

^a These effects/associations were included as 'positive' in the calculations

^b These effects/associations were included as 'negative' in the calculations



3.10 Physical activity/sedentary behaviour at a later age

For the outcome “physical activity /sedentary behaviour at a later age” studies with repeated measurements of physical activity/sedentary behaviour were included.

A total of 28 studies^{123,129,135,142,174,198,201,233-253} were identified in the systematic literature search, 13 through the reviews and 14 through the additional search for individual studies. Additionally, 1 study was identified during the data extraction for the other outcomes.

Most identified studies were based on cohort research, while some studies analysed RCT datasets as if they were cohort studies – generally by adjusting the analyses for group allocation.

3.10.1 Physical activity & <1 year & physical activity at a later age

Three studies^{123,240,245} investigated the effects/associations of physical activity on physical activity at a later age in children <1 year old. Details of these studies are shown in Table 25. There was 1 RCT study with 206 participants, and 2 cohort studies with a total of 4473 participants.

Overall, 2 out of 3 studies (67%) reported statistically significant effects/associations, and 6 out of 11 (55%) of the tested effects/associations were positive (i.e., physical activity in children <1 year old was associated with physical activity at a later age).

As there were ≥ 3 studies, with ≥ 90 participants in the RCT studies and ≥ 300 participants in the cohort studies, the evidence was evaluated using the middle route in the decision tree.

*Conclusion: as >10% of the studies reported statistically significant effects/associations, and <75% of the considered effects/associations were significant and in the same direction, the committee concluded that there were **inconsistent results** for physical activity in children <1 year old and physical activity at a later age.*

3.10.2 Physical activity & 1-2 years & physical activity at a later age

Five studies^{123,129,236,245,246} investigated the effects/associations of physical activity on physical activity at a later age in children 1-2 years old. Details of these studies are shown in Table 26. There were 2 RCT studies with a total of 383 participants, and 3 cohort studies with a total of 4628 participants. Overall, 3 out of 5 studies (60%) reported statistically significant effects/associations, and 10 out of 12 (83%) of the tested effects/associations were positive (i.e. associated with physical activity at a later age).

The committee remarks that all the studies reported prospective associations, and that most of them studied unadjusted correlations, without controlling for possible confounding factors. Therefore, causality could not be proven with their results.



As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as $>10\%$ of the studies reported statistically significant effects/associations, and $\geq 75\%$ of the considered effects/associations were significant and in the same direction, but the studies could not prove a causal relationship, the committee concluded that there was **weak evidence** for an effect of physical activity in children 1-2 years old on physical activity at a later age.*

3.10.3 Physical activity & 3-4 years & physical activity at a later age

Eighteen studies^{123,129,135,174,233,235,237-239,242-245,247-251} investigated the effects/associations of physical activity on physical activity at a later age in children 3-4 years old. Details of these studies are shown in Table 27. There was 1 RCT study with 274 participants, and 17 cohort studies with a total of 11862 participants. Overall, 16 out of 18 studies (89%) reported statistically significant effects/associations, and 42 out of 50 (84%) of the tested effects/associations were positive (i.e., associated with physical activity at a later age).

The committee remarks that all the studies reported prospective associations, and that most of them studied unadjusted correlations,

without controlling for possible confounding factors. Therefore, causality could not be proven with their results.

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as $>10\%$ of the studies reported statistically significant effects/associations, and $\geq 75\%$ of the considered effects/associations were significant and in the same direction, but the studies could not prove a causal relationship, the committee concluded that there was **weak evidence** for an effect of physical activity in children 3-4 years old on physical activity at a later age.*

3.10.4 Sedentary behaviour & <1 year & sedentary behaviour at a later age

There were no studies that investigated the effects/associations of sedentary behaviour in children <1 year old on sedentary behaviour at a later age.

*Conclusion: based on the number of studies, the committee concluded that there was **insufficient research** on sedentary behaviour in children <1 year old and sedentary behaviour at a later age.*



3.10.5 Sedentary behaviour & 1-2 years & sedentary behaviour at a later age

Nine studies^{129,142,198,201,234,236,246,252,253} investigated the effects/associations of sedentary behaviour in children 1-2 years old on sedentary behaviour at a later age. Details of these studies are shown in Table 28. There were 3 RCT studies with a total of 744 participants, and 6 cohort studies with a total of 4903 participants. Overall, 8 out of 9 studies (89%) reported statistically significant effects/associations (the remaining study did not report the statistical significance of their results), and 17 out of 17 (100%) of the tested effects/associations were positive (i.e. sedentary behaviour in children 1-2 years old was associated with sedentary behaviour at a later age).

The committee remarks that all the studies reported prospective associations, and that most of them studied unadjusted correlations, without controlling for possible confounding factors. Therefore, causality could not be proven with their results.

As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

Conclusion: as >10% of the studies reported statistically significant effects/associations, and $\geq 75\%$ of the considered effects/associations

*were significant and in the same direction, but the studies could not prove a causal relationship, the committee concluded that there was **weak evidence** for an effect of sedentary behaviour in children 1-2 years old on sedentary behaviour at a later age.*

3.10.6 Sedentary behaviour & 3-4 years & sedentary behaviour at a later age

Eight studies^{129,135,198,235,237,241,244,250} investigated the effects/associations of sedentary behaviour in children 3-4 years old on sedentary behaviour at a later age. Details of these studies are shown in Table 29. There was 1 RCT study with 274 participants, and 7 cohort studies with a total of 3506 participants. Overall, 7 out of 8 studies (88%) reported statistically significant effects/associations (the remaining study did not report the statistical significance of their results), and 19 out of 19 (100%) of the tested effects/associations were positive (i.e. associated with sedentary behaviour at a later age).

The committee remarks that all the studies reported prospective associations, and that most studies studied unadjusted correlations, without controlling for possible confounding factors. Therefore, causality could not be proven with their results.



As there were ≥ 5 studies, with ≥ 150 participants in the RCT studies and ≥ 500 participants in the cohort studies, the evidence was evaluated using the lower route in the decision tree.

*Conclusion: as $>10\%$ of the studies reported statistically significant effects/associations, and $\geq 75\%$ of the considered effects/associations were significant and in the same direction, but the studies could not prove a causal relationship, the committee concluded that there was **weak evidence** for an effect of sedentary behaviour in children 3-4 years old on sedentary behaviour at a later age.*



Table 25 Overview of the studies that investigated physical activity & <1 year & physical activity at a later age**RCT studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Hnatiuk (2013) ²⁴⁰	3.5 ± 1.0 months	206	15 months	Min/week spent being physically active with mum (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute): No significant association
				Min/week spent having tummy time (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute): No significant association
				Min/week spent on the floor (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute): No significant association
				Min/week spent outside (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute): No significant association
	8.8 ± 1.0 months	206	10 months	Min/week spent being physically active with mum (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute, B (95% CI)): 0.06 (0.01 - 0.12) ³
				Min/week spent having tummy time (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute): No significant association
				Min/week spent on the floor (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute): No significant association
				Min/week spent outside (parental report)	Min/day spent in physical activity (accelerometry; >192 counts/minute): No significant association



Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Ku (1981) ¹²³	6 months	170	Up to 8 years old	Physical activity score (parental report)	Correlation: Boys: 1 year: 0.18; p<0.01 ^a 2 years: No significant correlation 3 years: No significant correlation 4 years: No significant correlation 8 years: No significant correlation Girls: 1 year: 0.33; p<0.01 ^a 2 years: 0.31; p<0.01 ^a 3 years: 0.31; p<0.01 ^a 4 years: 0.20; p<0.05 ^a 8 years: No significant correlation
Mattocks (2008) ²⁴⁵	6 months	4303	Up to 11-12 years old	Activity (questionnaire)	Total physical activity level (accelerometry; average counts/minute): No significant association

^a These effects/associations were included in the calculations as 'tracking'



Table 26 Overview of the studies that investigated physical activity & 1-2 years & physical activity at a later age**RCT studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Meredith-Jones (2018)* ¹²⁹	1 year	230	1 year	Physical activity (accelerometry; counts/minute)	Spearman correlation: 0.36; p<0.001 ^a
	1 year	270	4 years	Physical activity (accelerometry; counts/minute)	Spearman correlation: 0.17; p=0.004 ^a
	2 years	204	1.5 years	Physical activity (accelerometry; counts/minute)	Spearman correlation: 0.41; p<0.001 ^a
Meredith-Jones (2019)* ²⁴⁶	1.0 ± 0.0 years	179	1 year	Meeting the physical activity guideline (accelerometry; at least 180 min of light-to-vigorous intensity physical activity each day; ≥7 counts/15-sec epoch)	No significant association

* These articles use data from the same study, but with different outcomes

^a These effects/associations were included in the calculations as 'tracking'



Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Ku (1981) ¹²³	1 year	170	Up to 8 years old	Physical activity score (parental report)	Correlation: Boys: 2 years: 0.18; p<0.01 3 years: 0.24; p<0.01 4 years: 0.26; p<0.01 8 years: No significant correlation Girls: 2 years: 0.28; p<0.01 ^a 3 years: 0.20; p<0.01 4 years: No significant correlation 8 years: No significant correlation
	2 years	170	Up to 8 years old	Physical activity score (parental report)	Correlation: Boys: 3 years: 0.32; p<0.01 ^a 4 years: 0.32; p<0.01 ^a 8 years: No significant correlation Girls: 3 years: 0.37; p<0.01 ^a 4 years: 0.28; p<0.01 ^a 8 years: No significant correlation
Mattocks (2008) ²⁴⁵	24 months	4381	Up to 11-12 years old	Hours/week spent outside (questionnaire; in categories)	Total physical activity level (accelerometry; average counts/minute): No significant association
Carson (2019) ²³⁶	1.6 ± 0.2 years	77	2 years	Min/day light intensity physical activity (accelerometry; 25–420 counts per 15-sec epoch)	Tracking coefficient (95% CI): 0.35 (0.17 - 0.54); p<0.001 ^a
				Min/day moderate-to-vigorous intensity physical activity (accelerometry; > 420 counts per 15-sec epoch)	Tracking coefficient (95% CI): 0.49 (0.33 - 0.66); p<0.001 ^a

^a These effects/associations were included in the calculations as 'tracking'



Table 27 Overview of the studies that investigated physical activity & 3-4 years & physical activity at a later age**RCT studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Meredith-Jones (2018) ¹²⁹	3.5 years	274	1.5 years	Physical activity (accelerometry; counts/minute)	Spearman correlation: 0.37; p<0.001 ⁴

^a These effects/associations were included in the calculations as 'tracking'

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Ku (1981) ¹²³	3 years	170	Up to 8 years old	Physical activity score (parental report)	Correlation: Boys: 4 years: 0.45; p<0.01 ^a ; 8 years: No significant correlation Girls: 4 years: 0.42; p<0.01 ^a ; 8 years: No significant correlation
	4 years	170	Up to 8 years old	Physical activity score (parental report)	Correlation: Boys: No significant correlation Girls: 0.20; p<0.05 ^a
Sallis (1995) ²⁴⁹	4.4 ± 0.5 years	288	2 years	Physical activity at home (researcher observation using the behaviours of eating and activity for child health: evaluation system; 2 days every 6 months)	Pearson correlation, statistical significance not reported: Single days: 1-week interval: 0.38 ^a 6-month interval: 0.18 12-month interval: 0.15 18-month interval: 0.12 24-month interval: 0.16 Mean of two days: 6-month interval: 0.32 ^a 12-month interval: 0.30 ^a 18-month interval: 0.22 24-month interval: 0.27 Mean of four days: 12-month interval: 0.36 ^a
				Physical activity at recess (researcher observation using the behaviours of eating and activity for child health: evaluation system; 2 days every 6 months)	Pearson correlation, statistical significance not reported: Single days: 1-week interval: 0.29 ^a 6-month interval: 0.11 12-month interval: 0.05 18-month interval: 0.03 24-month interval: 0.04 Mean of two days: 6-month interval: 0.20 12-month interval: 0.09 18-month interval: 0.13 24-month interval: 0.12 Mean of four days: 12-month interval: 0.09



Study	Age at exposure	N	Follow-up	Exposure	Results
Pate (1996) ²⁴⁸	3.5 ± 0.5 years	47	1 year	Physical activity (heart rate monitor; percentage of observed minutes during which heart rate was 50% or more above individual resting heart rate (PAHR-50 index))	Pearson correlation: 0.53; p=0.0001 ^a Spearman correlation: 0.66; p=0.0001 % agreement (tertiles): 57% Cohen's kappa: 0.35
	3.5 ± 0.5 years		2 years	Physical activity (heart rate monitor; percentage of observed minutes during which heart rate was 50% or more above individual resting heart rate (PAHR-50 index))	Pearson correlation: 0.63; p=0.0001 ^a Spearman correlation: 0.57; p=0.0001 % agreement (tertiles): 62% Cohen's kappa: 0.43
	4.5 years		1 year	Physical activity (heart rate monitor; percentage of observed minutes during which heart rate was 50% or more above individual resting heart rate (PAHR-50 index))	Pearson correlation: 0.58; p=0.0001 ^a Spearman correlation: 0.61; p=0.0001 % agreement (tertiles): 49% Cohen's kappa: 0.23
Jackson (2003) ^{*243}	B: 3.8 ± 0.4 G: 3.7 ± 0.5 years	60	1 year	Habitual physical activity (accelerometry; mean counts/minute)	Rank order correlation: 0.40; p<0.001 ^a
Kelly (2007) ^{*244}	3.8 ± 0.5 years	42	2 years	Total physical activity (accelerometry; counts/minute)	Spearman rank correlation: 0.35; p=0.02 ^a Percentage agreement: 38% Kappa statistics: 0.17
				Percentage of time spent in moderate-to-vigorous intensity physical activity (accelerometry; >3200 counts/minute)	Spearman rank correlation: 0.37; p=0.02 ^a Percentage agreement: 26% Kappa statistics: 0.013
Iannotti (2005) ²⁴²	4.4 ± 0.5 years	270	6 months	Energy expenditure based on physical activity (researcher observation using the behaviors of eating and activity for child health evaluation system; 2 days every 6 months)	Correlation: 0.36; p<0.01 ^a
Hallal (2006) ²³⁸	4 years	634	6-8 years	Relative physical activity (maternal report; below average; average; above average)	Min/week median physical activity score (child report, p for trend = 0.001) ^a : Below average: 178 min/wk; Average: 270 min/wk; Above average: 280 min/wk;
				Relative sports performance (maternal report; below average; average; above average)	Min/week median physical activity score (child report): No significant association
Mattocks (2008) ²⁴⁵	38 months	4317	Up to 11-12 years old	Hours/week spent outside (questionnaire; in categories)	Total physical activity level (accelerometry; average counts/minute): No significant association
	54 months	4182	Up to 11-12 years old	Hours/week spent outside (questionnaire; in categories)	Total physical activity level (accelerometry; average counts/minute): No significant association
Metcalfe (2008) ²⁴⁷	4.9 years	212	3 years	Weekly physical activity (accelerometry)	Year-on-year correlations: Range 0.44 - 0.54; all p<0.001 ^a



Study	Age at exposure	N	Follow-up	Exposure	Results		
Taylor (2009) ²⁵⁰	3 years	224	1 year	Min/day total active time (parental report)	Spearman correlation: 0.32; p<0.001 ^a		
				Average accelerometry count (accelerometry)	Spearman correlation: 0.32; p<0.001 ^a		
	3 years	224	2 years	Min/day total active time (parental report)	Spearman correlation: 0.29; p<0.001 ^a		
				Average accelerometry count (accelerometry)	Spearman correlation: 0.21; p<0.001 ^a		
	4 years	234	1 year	Min/day total active time (parental report)	Spearman correlation: 0.41; p<0.001 ^a		
				Average accelerometry count (accelerometry)	Spearman correlation: 0.20; p<0.001		
Edwards (2013) ²³⁷	3.4 ± 0.3 years	234	1 year	Physical activity (accelerometry); Total = counts/day Min/day moderate/vigorous; ≥1400 counts Min/day light; ≥175 - <1400 counts	Spearman correlation: Total = counts/day: 0.42; p≤0.01 ^a Min/day moderate/vigorous; ≥1400 counts: 0.43; p≤0.01 ^a Min/day light; ≥175 - <1400 counts: 0.45; p≤0.01 ^a		
				2 years	Physical activity (accelerometry); Total = counts/day Min/day moderate/vigorous; ≥1400 counts Min/day light; ≥175 - <1400 counts	Spearman correlation: Total = counts/day: 0.33; p≤0.01 ^a Min/day moderate/vigorous; ≥1400 counts: 0.35; p≤0.01 ^a Min/day light; ≥175 - <1400 counts: 0.33; p≤0.01	
					3 years	Physical activity (accelerometry); Total = counts/day Min/day moderate/vigorous; ≥1400 counts Min/day light; ≥175 - <1400 counts	Spearman correlation: Total = counts/day: 0.26; p≤0.01 Min/day moderate/vigorous; ≥1400 counts: 0.27; p≤0.01 Min/day light; ≥175 - <1400 counts: 0.29; p≤0.01
						4 years	Physical activity (accelerometry); Total = counts/day Min/day moderate/vigorous; ≥1400 counts Min/day light; ≥175 - <1400 counts
			3 years	3596	6 years	Physical activity index (maternal report)	Physical activity (child questionnaire, spearman correlation): Boys: 0.38; p<0.01 ^a ; Girls: 0.26; p<0.01 ^a
						27 years	Physical activity index (maternal report)



Study	Age at exposure	N	Follow-up	Exposure	Results
Caldwell (2016) ²³⁵	4.5 ± 0.9 years	400	1 year	Total physical activity (accelerometry; ≥ 8 counts/3-sec epoch, min/day & percentage of time)	Min/day: Spearman correlation: 0.49; p<0.001; Kappa statistics: 0.26; p<0.001 % time: Spearman correlation: 0.59 ^a ; p<0.001; Kappa statistics: 0.34; p<0.001
				Light intensity physical activity (accelerometry; ≥8 counts - <84 counts/3-sec epoch, min/day & percentage of time)	Min/day: Spearman correlation: 0.45; p<0.001; Kappa statistics: 0.29; p<0.001 % time: Spearman correlation: 0.59 ^a ; p<0.001; Kappa statistics: 0.26; p<0.001
				Moderate intensity physical activity (accelerometry; ≥84 - <164 counts/3-sec epoch, min/day & percentage of time)	Min/day: Spearman correlation: 0.53; p<0.001; Kappa statistics: 0.30; p<0.001 % time: Spearman correlation: 0.59 ^a ; p<0.001; Kappa statistics: 0.30; p<0.001
				Moderate-to-vigorous intensity physical activity (accelerometry; ≥84 counts/3-sec epoch, min/day & percentage of time)	Min/day: Spearman correlation: 0.47; p<0.001; Kappa statistics: 0.27; p<0.001 % time: Spearman correlation: 0.59 ^a ; p<0.001; Kappa statistics: 0.28; p<0.001
				Vigorous intensity physical activity (accelerometry; ≥164 counts/3-sec epoch, min/day & percentage of time)	Min/day: Spearman correlation: 0.53; p<0.001; Kappa statistics: 0.31; p<0.001 % time: Spearman correlation: 0.57 ^a ; p<0.001; Kappa statistics: 0.38; p<0.001
Henrique (2016) ²³⁹	57.9 ± 9.3 months	206	2 years	Sports participation (parental report)	OR (95% CI): 9.68 (3.46 - 27.13); p<0.01 ^a
Potter (2018) ¹³⁵	4.5 ± 0.5 years	649	3 years	Hours/week physical activity (parental report)	Spearman correlation: 0.30; p=0.01 ^a
Barros (2019) ²³³	4.8 ± 0.8 years	700	2 years	Min/day spent on outdoor games and plays (parental report; 60+ minutes vs <60 minutes)	OR (95% CI): 1.45 (1.02-2.07); p=0.04 ^a
		98	2 years	Physical activity level (accelerometry; 300+ counts/minute vs <300 counts/minute)	No significant association
Schmutz (2020) ¹⁷⁴	3.9 ± 0.7 years	550	1 year	Total physical activity (accelerometry; counts/minute)	Correlation: 0.37; p<0.001 ^a
				Min/day spent in moderate-to-vigorous intensity physical activity (accelerometry; ≥420 counts/15-sec epoch)	Correlation: 0.48; p<0.001 ^a

* These articles are based on the same study but with a different follow-up duration

^a These effects/associations were included in the calculations as 'tracking'



Table 28 Overview of the studies that investigated sedentary behaviour & 1-2 years & sedentary behaviour at a later age**RCT studies**

Study	Age at exposure	N	Follow-up	Exposure	Results
Xu (2016) ²⁵³	1 year	369	1 - 4 years	Hours/day screen time (maternal report)	B (95% CI): 15.2 (7.28 - 23.11); p<0.0001 ^a
Meredith-Jones (2018) ^{*129}	1 year	230	1 year	Proportion of time spent in sedentary activity (accelerometry; Adolph's equation)	Spearman correlation: 0.32; p<0.001 ^a
	1 year	270	4 years	Proportion of time spent in sedentary activity (accelerometry; Adolph's equation)	Spearman correlation: 0.21; p<0.001 ^a
	2 years	204	1.5 years	Proportion of time spent in sedentary activity (accelerometry; Adolph's equation)	Spearman correlation: 0.31; p<0.001 ^a
Meredith-Jones (2019) ^{*246}	1.0 ± 0.0 years	179	1 year	Meeting the screen time guideline (maternal report; no screen time)	OR (95% CI): 9.3 (2.1 - 40.7); p=0.003 ^a
	2.0 ± 0.0 years	171	3 years	Meeting the screen time guideline (maternal report; no screen time)	OR (95% CI): 2.4 (1.0 - 5.4); p=0.045 ^a

* These articles used data from the same study, but with different exposures

^a These effects/associations were included in the calculations as 'tracking'

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Zimmerman (2005) ¹⁹⁸	Younger than 3 years old	1797	At 3 to 5 years old	Hours/day TV watching (parental report)	Correlation coefficient, statistical significance not reported: 0.47 ^a
			At 6 years old	Hours/day TV watching (parental report)	Correlation coefficient, statistical significance not reported: 0.29 ^a
Cheng (2010) ²⁰¹	18 months	302	1 year	Hours/day TV watching (parental report)	Correlation coefficient: 0.54; p<0.0001 ^a
Beyens (2017) ²³⁴	2.2 ± 0.8 years	404	6 months	Hours/week television viewing (parental report)	Correlation: 0.70; p<0.001 ^a
Simonato (2018) ¹⁴²	29 months	1234	11 years	Hours/day television exposure (parental report; incl dvd/video)	Hours/day screen time (child report; incl computer, console, television, B (95% CI)): 0.06 (0.02 - 0.11); p≤0.05 ^a
Carson (2019) ²³⁶	1.6 ± 0.2 years	77	2 years	Min/day sedentary (accelerometry; 0–24 counts per 15-sec epoch)	Tracking coefficient (95% CI): 0.44 (0.26 - 0.62); p<0.001 ^a
				Min/day screen time (parental report)	Tracking coefficient (95% CI): 0.63 (0.45 - 0.81); p<0.001 ^a
				Min/day television/videos (parental report)	Tracking coefficient (95% CI): 0.49 (0.33 - 0.64); p<0.001 ^a
				Min/day computer games (parental report)	Tracking coefficient (95% CI): 0.45 (0.18 - 0.72); p=0.001 ^a



Study	Age at exposure	N	Follow-up	Exposure	Results
Trinh (2019) ²⁵²	12, 18, 24, 30, and 36 months	1089	At 7 years old	Min/day screen time (maternal report; increasing trajectory vs. low trajectory)	Min/day screen time (maternal report, B (95% CI)): 15.73 (5.37 - 26.10); p<=0.003 ^a
		1156	At 8 years old	Min/day screen time (maternal report; increasing trajectory vs. low trajectory)	Min/day screen time (maternal report, B (95% CI)): 21.89 (11.04 - 32.74); p<0.001 ^a

^a These effects/associations were included in the calculations as 'tracking'

Table 29 Overview of the studies that investigated sedentary behaviour & 3-4 years & sedentary behaviour at a later age

RCT studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Meredith-Jones (2018) ¹²⁹	3.5 years	274	1.5 years	Proportion of time spent in sedentary activity (accelerometry; Adolph's equation)	Spearman correlation: 0.24; p=0.001 ^a

^a These effects/associations were included in the calculations as 'tracking'

Cohort studies

Study	Age at exposure	N	Follow-up	Exposure	Results
Huston (1990) ²⁴¹	3 years	160	Up to 2 years	Hours/week television viewing (parental report using diaries; 1 week every 6 months)	Correlation: 6 months: 0.66; p<0.01 ^a 12 months: 0.63; p<0.01 ^a 18 months: 0.54; p<0.01 ^a 24 months: 0.57; p<0.01 ^a
Zimmerman (2005) ¹⁹⁸	3 to 5 years	1797	At 6 years old	Hours/day TV watching (parental report)	Correlation coefficient (statistical significance not reported): 0.60 ^a
Kelly (2007) ²⁴⁴	3.8 ± 0.5 years	42	2 years	Percentage of time spent in sedentary behaviour (accelerometry; <1100 counts/minute)	Spearman rank correlation: 0.35; p=0.02 ^a Percentage agreement: 41% Kappa statistics: 0.21



Study	Age at exposure	N	Follow-up	Exposure	Results
Taylor (2009) ²⁵⁰	3 years	224	1 year	Min/day television time (parental report) Min/day VHS/DVD time (parental report) Min/day total screen time (parental report) Min/day total sedentary time (parental report)	Spearman correlation: 0.56; p<0.001 ^a Spearman correlation: 0.48; p<0.001 Spearman correlation: 0.56; p<0.001 ^a Spearman correlation: 0.48; p<0.001
	3 years	224	2 years	Min/day television time (parental report) Min/day VHS/DVD time (parental report) Min/day total screen time (parental report) Min/day total sedentary time (parental report)	Spearman correlation: 0.56; p<0.001 ^a Spearman correlation: 0.42; p<0.001 Spearman correlation: 0.58; p<0.001 ^a Spearman correlation: 0.40; p<0.001
	4 years	224	1 year	Min/day television time (parental report) Min/day VHS/DVD time (parental report) Min/day total screen time (parental report) Min/day total sedentary time (parental report)	Spearman correlation: 0.56; p<0.001 Spearman correlation: 0.44; p<0.001 Spearman correlation: 0.59; p<0.001 ^a Spearman correlation: 0.46; p<0.001
Edwards (2013) ²³⁷	3.4 ± 0.3 years	234	1 year	Min/day inactivity (accelerometry; <175 counts)	Spearman correlation: 0.45; p≤0.01 ^a
			2 years	Min/day inactivity (accelerometry; <175 counts)	Spearman correlation: 0.35; p≤0.01 ^a
			3 years	Min/day inactivity (accelerometry; <175 counts)	Spearman correlation: 0.31; p≤0.01 ^a
			4 years	Min/day inactivity (accelerometry; <175 counts)	Spearman correlation: 0.20; p≤0.01 ^a
Caldwell (2016) ²³⁵	4.5 ± 0.9 years	400	1 year	Sedentary (accelerometry; < 8 counts/3-sec epoch, min/day & percentage of time)	Min/day: Spearman correlation: 0.61; p<0.001 ^a ; Kappa statistics: 0.32; p<0.001 % time: Spearman correlation: 0.60; p<0.001 ^a ; Kappa statistics: 0.33; p<0.001
Potter (2018) ¹³⁵	4.5 ± 0.5 years	649	3 years	Hours/week screen time (parental report)	Spearman correlation: 0.53; p=0.01 ^a

^a These effects/associations were included in the calculations as 'tracking'



3.11 Summary

Table 30 shows an overview of the results and conclusions for each combination of exposure (physical activity and sedentary behaviour), age group (<1 year, 1-2 years, and 3-4 years), and outcome (bone health, cardiometabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, risks, and physical activity/sedentary behaviour at a later age).

For the majority of the combinations of exposure, age group and outcome the committee concluded that there was “insufficient research”, and for most other combinations that there were “inconsistent results.” For physical activity and sedentary behaviour in children 1-2 and 3-4 years old, the committee concluded that there was “weak evidence” for an effect on physical activity/sedentary behaviour at a later age.



Table 30 Overview of the results and conclusions for each combination of exposure, age group, and outcome

Age	Bone health	Cardio-metabolic health	Body composition: BMI	Body composition: other	Fitness	Motor development	Cognitive development	Psychosocial development	Risks	Behaviour at a later age
Physical activity										
<1 year	1 study; Insufficient research	0 studies; Insufficient research	4 studies; Insufficient research	8 studies; Inconsistent results; 23% positive 77% n.s.	0 studies; Insufficient research	11 studies; Inconsistent results; 64% positive 3% negative 33% n.s.	2 studies; Insufficient research	2 studies; Insufficient research	1 study; Insufficient research	3 studies Inconsistent results; 55% tracking 45% n.s.
1-2 years	1 study; Insufficient research	0 studies; Insufficient research	3 studies; Inconsistent results; 15% positive 85% n.s.	3 studies; Inconsistent results; 18% positive 82% n.s.	0 studies; Insufficient research	1 study; Insufficient research	1 study; Insufficient research	1 study; Insufficient research	1 study; Insufficient research	5 studies; Weak evidence; 83% tracking 17% n.s.
3-4 years	6 studies; Inconsistent results; 50% positive 50% n.s.	7 studies; Inconsistent results; 31% positive 7% negative 62% n.s.	30 studies; Inconsistent results; 12% positive 8% negative 80% n.s.	18 studies; Inconsistent results; 29% positive 2% negative 69% n.s.	15 studies; Inconsistent results; 53% positive 47% n.s.	5 reviews (R) & 14 studies (S); Inconsistent results; R: positive S: 43% positive 7% negative 50% n.s.	11 studies; Inconsistent results; 18% positive 3% negative 79% n.s.	16 studies; Inconsistent results; 33% positive 10% negative 57% n.s.	3 studies; Inconsistent results; 20% positive 40% negative 40% n.s.	18 studies; Weak evidence; 84% tracking 16% n.s.
Sedentary behaviour										
<1 year	0 studies; Insufficient research	0 studies; Insufficient research	0 studies; Insufficient research	2 studies; Insufficient research	0 studies; Insufficient research	1 study; Insufficient research	2 studies; Insufficient research	1 study; Insufficient research	2 studies; Insufficient research	0 studies; Insufficient research
1-2 years	1 study; Insufficient research	2 studies; Insufficient research	9 studies; Inconsistent results; 47% negative 53% n.s.	4 studies; Inconsistent results; 45% negative 55% n.s.	2 studies; Insufficient research	2 studies; Insufficient research	10 studies; Inconsistent results; 42% negative 58% n.s.	12 studies; Inconsistent results; 37% negative 2% positive 61% n.s.	0 studies; Insufficient research	9 studies; Weak evidence; 100% tracking



Age	Bone health	Cardio-metabolic health	Body composition: BMI	Body composition: other	Fitness	Motor development	Cognitive development	Psychosocial development	Risks	Behaviour at a later age
3-4 years	3 studies; Inconsistent results; 22% <i>negative</i> 78% <i>n.s.</i>	2 studies; Insufficient research	22 studies; Inconsistent results; 24% <i>negative</i> 76% <i>n.s.</i>	12 studies; Inconsistent results; 19% <i>negative</i> 81% <i>n.s.</i>	2 studies; Insufficient research	2 studies; Insufficient research	13 studies; Inconsistent results; 18% <i>negative</i> 4% <i>positive</i> 78% <i>n.s.</i>	19 studies; Inconsistent results; 35% <i>negative</i> 8% <i>positive</i> 57% <i>n.s.</i>	0 studies; Insufficient research	8 studies; Weak evidence; 100% <i>tracking</i>

'X% positive' means that X% of the tested effects/associations were positive, i.e. associated with favourable health/development

'X% negative' means that X% of the tested effects/associations were negative. i.e. associated with unfavourable health/development

'X% tracking' means that X% of the tested effects/associations showed an association between physical activity/sedentary behaviour in children 0-4 years old and physical activity/sedentary behaviour at a later age

'X% n.s.' means that X% of the tested effects/associations were not statistically significant



04 appendices



A Search strings literature searches

A1 Search string literature search reviews – all outcomes except physical activity/sedentary behaviour at a later age

This search was conducted on 27-07-2020.

Database: PubMed

Filters: published since: 01-01-2000; language: English, Dutch
(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR

“screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

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obese[tiab] OR obesity[tiab] OR “muscle mass”[tiab] OR “body fat”[tiab] OR “fat mass”[tiab] OR “skinfold thickness”[tiab] OR “skin fold thickness”[tiab] OR “fat distribution”[tiab] OR “waist circumference”[tiab] OR adipos*[tiab] OR “lean body mass”[tiab] OR plagioceph*[tiab] OR torticollis[tiab] OR injur*[tiab] OR scoliosis[tiab] OR kyphosis[tiab] OR growth[tiab] OR “motor development”[tiab] OR “motor performance”[tiab] OR “motor competence”[tiab] OR “motor coordination”[tiab] OR “motor skill”[tiab] OR “movement skill”[tiab] OR balance[tiab] OR “fine motor”[tiab] OR “gross motor”[tiab] OR “locomotor control”[tiab] OR “locomotor skill”[tiab] OR “locomotion control”[tiab] OR “locomotion skill”[tiab] OR “object control”[tiab] OR “object manipulation”[tiab] OR “object play”[tiab] OR agility[tiab] OR “developmental milestone”[tiab] OR cognitive[tiab] OR cognition[tiab] OR attention[tiab] OR “executive function”[tiab] OR “processing speed”[tiab] OR planning[tiab] OR “set shift”[tiab] OR “set-shift”[tiab] OR intelligen*[tiab] OR “academic achievement”[tiab] OR “educational achievement”[tiab] OR “school achievement”[tiab] OR “academic perform”[tiab] OR “educational perform”[tiab] OR “school perform”[tiab] OR “academic outcome”[tiab] OR “learning outcome”[tiab] OR “school grade”[tiab] OR “grade point”[tiab] OR learn*[tiab] OR memory[tiab] OR “language development”[tiab] OR vocabulary[tiab] OR literacy[tiab] OR numeracy[tiab] OR “mental health”[tiab] OR psychosocial[tiab] OR psycho-social[tiab] OR anxiety[tiab] OR depress*[tiab] OR sadness[tiab] OR anger[tiab] OR angry[tiab] OR aggression[tiab] OR “aggressive

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Kyphosis[mesh] OR Motor Skills[mesh] OR Cognition[mesh:noexp] OR Attention[mesh:noexp] OR Executive Function[mesh] OR Intelligence[mesh:noexp] OR Academic Performance[mesh] OR Learning[mesh:noexp] OR Memory[mesh:noexp] OR Language Development[mesh] OR Literacy[mesh] OR Mental Health[mesh] OR Anxiety[mesh:noexp] OR Anxiety Disorders[mesh] OR Depression[mesh] OR Depressive Disorder[mesh:noexp] OR Aggression[mesh] OR Problem Behavior[mesh] OR Conduct Disorder[mesh] OR Self Concept[mesh] OR Social Behavior[mesh] OR Quality of Life[mesh] OR Myopia[mesh:noexp])
 AND
 (review[ti] OR “systematic review”[tiab] OR meta-analys*[tiab] OR “pooled analys*”[tiab])
 NOT
 (pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2000; language: English, Dutch

(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR TITLE-ABS-KEY (“young child”) OR TITLE-ABS-KEY (

“early childhood*”) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“ early life”))
 AND
 (TITLE-ABS-KEY (“physical activ*”) OR TITLE-ABS-KEY (physically activ*”) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (“active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (“child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY (“screen AND time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”) OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”) OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”) OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (



“tablet time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smartphone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))

AND

(((TITLE-ABS-KEY (bone AND health) OR TITLE-ABS-KEY (skeletal AND health) OR TITLE-ABS-KEY (fracture*) OR TITLE-ABS-KEY (bone AND density) OR TITLE-ABS-KEY (bone AND mass) OR TITLE-ABS-KEY (bone AND mineral AND density) OR TITLE-ABS-KEY (bone AND mineral AND content) OR TITLE-ABS-KEY (vitamin AND d) OR TITLE-ABS-KEY (cardiometabolic AND health) OR TITLE-ABS-KEY (blood AND pressure) OR TITLE-ABS-KEY (hypertens*) OR TITLE-ABS-KEY (blood AND glucose) OR TITLE-ABS-KEY (hyperglycemi*) OR TITLE-ABS-KEY (diabet*) OR TITLE-ABS-KEY (glucose AND intolerance) OR TITLE-ABS-KEY (insulin AND resistance)))) OR ((TITLE-ABS-KEY (fasting AND insulin) OR TITLE-ABS-KEY (cholesterol) OR TITLE-ABS-KEY (hypercholester*) OR TITLE-ABS-KEY (hyperlipid*) OR TITLE-ABS-KEY (metabolic AND syndrome) OR TITLE-ABS-KEY (fitness) OR TITLE-ABS-KEY (endurance) OR TITLE-ABS-KEY (aerobic AND capacity) OR TITLE-ABS-KEY (exercise AND ability) OR TITLE-ABS-KEY (muscle AND strength) OR TITLE-ABS-KEY (sprint AND power) OR TITLE-ABS-KEY (sprint AND strength) OR TITLE-ABS-KEY

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developmental AND milestone*) OR TITLE-ABS-KEY (cognitive) OR TITLE-ABS-KEY (cognition) OR TITLE-ABS-KEY (attention) OR TITLE-ABS-KEY (executive AND function*) OR TITLE-ABS-KEY (processing AND speed) OR TITLE-ABS-KEY (planning) OR TITLE-ABS-KEY (set AND shift*) OR TITLE-ABS-KEY (set-shift*) OR TITLE-ABS-KEY (intel- ligen*) OR TITLE-ABS-KEY (academic AND achievement*))) OR ((TITLE-ABS-KEY (educational AND achievement*) OR TITLE-ABS-KEY (school AND achievement*) OR TITLE-ABS-KEY (academic AND perform*) OR TITLE-ABS-KEY (educational AND perform*) OR TITLE-ABS-KEY (school AND perform*) OR TITLE-ABS-KEY (academic AND outcome*) OR TITLE-ABS-KEY (learning AND outcome*) OR TITLE-ABS-KEY (school AND grade*) OR TITLE-ABS-KEY (grade AND point*) OR TITLE-ABS-KEY (learn*) OR TITLE-ABS-KEY (memory) OR TITLE-ABS-KEY (language AND development) OR TITLE-ABS-KEY (vocabu- lary) OR TITLE-ABS-KEY (literacy) OR TITLE-ABS-KEY (numeracy) OR TITLE-ABS-KEY (mental AND health)))) OR (((TITLE-ABS-KEY (psychosocial) OR TITLE-ABS-KEY (psycho-social) OR TITLE-ABS-KEY (anxiety) OR TITLE-ABS-KEY (depress*) OR TITLE-ABS-KEY (sadness) OR TITLE-ABS-KEY (anger) OR TITLE-ABS-KEY (angry) OR TITLE-ABS-KEY (aggression) OR TITLE-ABS-KEY (aggressive AND behavio*) OR TITLE-ABS-KEY (behavioural AND problem*) OR TITLE-ABS-KEY (behavioral AND problem*) OR TITLE-ABS-KEY (behavioural AND conduct) OR TITLE-ABS-KEY (behavioral AND conduct) OR TITLE-ABS-KEY (conduct AND disorder*) OR TITLE-ABS-KEY (hyper-

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Database: PsycInfo

Filters: published since: 01-01-2000; language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title: “early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR

abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting OR abstract: sporting OR title: sports OR abstract: sports OR title: playground OR abstract: playground OR title: playgrounds OR abstract: playgrounds OR title: “prone position” OR abstract: “prone position” OR title: sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR title: seated OR abstract: seated OR title: “car seat” OR abstract: “car seat” OR title: “active play” OR abstract: “active play” OR title: “active playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract: “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing” OR title: playtime OR abstract: playtime OR title: “child play” OR abstract: “child play” OR title: “children’s play” OR abstract: “children’s play” OR title: “childhood play” OR abstract: “childhood play” OR title: “tummy time” OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time” OR title: “supine position” OR abstract: “supine position” OR title: stroller OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR title: screen-time OR abstract: screen-time OR title: “screen use” OR abstract: “screen use” OR title: “screen based” OR abstract: “screen based” OR title: screen-based OR abstract: screen-based OR title: “televi-



sion viewing” OR abstract: “television viewing” OR title: “TV viewing” OR abstract: “TV viewing” OR title: “television time” OR abstract: “television time” OR title: “TV time” OR abstract: “TV time” OR title: “television use” OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR title: “computer time” OR abstract: “computer time” OR title: “computer use” OR abstract: “computer use” OR title: “tablet time” OR abstract: “tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use” OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR abstract: “phone use” OR title: “smartphone time” OR abstract: “smartphone time” OR title: “smartphone use” OR abstract: “smartphone use” OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR abstract: “iphone use OR title: videogame OR abstract: videogame OR title: videogames OR abstract: videogames OR title: videogaming OR abstract: videogaming OR Index Terms: Sedentary Behavior OR index Terms: Screen Time OR Index Terms: Computer Games OR Index Terms: walking OR Index Terms: running OR Index Terms: swimming OR Index Terms: sport

AND

Title: “bone health” OR abstract: “bone health” OR title: “skeletal health” OR abstract: “skeletal health” OR title: fracture OR abstract: fracture OR title: fractures OR abstract: fractures OR title: “bone density” OR abstract: “bone density” OR title: “bone mass” OR abstract: “bone mass” OR title: “bone mineral density” OR abstract: “bone mineral density” OR title: “bone

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OR abstract: “weight status” OR title: overweight OR abstract: overweight
 OR title: obese OR abstract: obese OR title: obesity OR abstract: obesity
 OR title: “muscle mass” OR abstract: “muscle mass” OR title: “body fat”
 OR abstract: “body fat” OR title: “fat mass” OR abstract: “fat mass” OR
 title: “skinfold thickness” OR abstract: “skinfold thickness” OR title: “skin
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 OR abstract: “fat distribution” OR title: “waist circumference” OR abstract:
 “waist circumference” OR title: adipose OR abstract: adipose OR title:
 adiposity OR abstract: adiposity OR title: “lean body mass” OR abstract:
 “lean body mass” OR title: plagiocephaly OR abstract: plagiocephaly OR
 title: torticollis OR abstract: torticollis OR title: injury OR abstract: injury
 OR title: injuries OR abstract: injuries OR title: injured OR abstract: injured
 OR title: scoliosis OR abstract: scoliosis OR title: kyphosis OR abstract:
 kyphosis OR title: growth OR abstract: growth OR title: “motor develop-
 ment” OR abstract: “motor development” OR title: “motor performance”
 OR abstract: “motor performance” OR title: “motor competence” OR
 abstract: “motor competence” OR title: “motor coordination” OR abstract:
 “motor coordination” OR title: “motor skills” OR abstract: “motor skills” OR
 title: “motor skill” OR abstract: “motor skill” OR title: “movement skill” OR
 abstract: “movement skill” OR title: “movement skills” OR abstract: “move-
 ment skills” OR title: balance OR abstract: balance OR title: “fine motor”
 OR abstract: “fine motor” OR title: “gross motor” OR abstract: “gross
 motor” OR title: “locomotor control” OR abstract: “locomotor control” OR
 title: “locomotor skill” OR abstract: “locomotor skill” OR title: “locomotor

skills” OR abstract: “locomotor skills” OR title: “locomotion control” OR
 abstract: “locomotion control” OR title: “locomotion skill” OR abstract:
 “locomotion skill” OR title: “locomotion skills” OR abstract: “locomotion
 skills” OR title: “object control” OR abstract: “object control” OR title:
 “object manipulation” OR abstract: “object manipulation” OR title: “object
 play” OR abstract: “object play” OR title: agility OR abstract: agility OR
 title: “developmental milestone” OR abstract: “developmental milestone”
 OR title: “developmental milestones” OR abstract: “developmental mile-
 stones” OR title: cognitive OR abstract: cognitive OR title: cognition OR
 abstract: cognition OR title: attention OR abstract: attention OR title:
 “executive function” OR abstract: “executive function” OR title: “executive
 functions” OR abstract: “executive functions” OR title: “executive func-
 tioning” OR abstract: “executive functioning” OR title: “processing speed”
 OR abstract: “processing speed” OR title: planning OR abstract: planning
 OR title: “set shift” OR abstract: “set shift” OR title: “set shifting” OR
 abstract: “set shifting” OR title: set-shift OR abstract: set-shift OR title:
 set-shifting OR abstract: set-shifting OR title: intelligence OR abstract:
 intelligence OR title: intelligent OR abstract: intelligent OR title: “academic
 achievement” OR abstract: “academic achievement” OR title: “academic
 achievements” OR abstract: “academic achievements” OR title: “educa-
 tional achievement” OR abstract: “educational achievement” OR title:
 “educational achievements” OR abstract: “educational achievements” OR
 title: “school achievement” OR abstract: “school achievement” OR title:
 “school achievements” OR abstract: “school achievements” OR title:



“academic performance” OR abstract: “academic performance” OR title:
 “educational performance” OR abstract: “educational performance” OR
 title: “school performance” OR abstract: “school performance” OR title:
 “academic outcome” OR abstract: “academic outcome” OR title:
 “academic outcomes” OR abstract: “academic outcomes” OR title:
 “learning outcome” OR abstract: “learning outcome” OR title: “learning
 outcomes” OR abstract: “learning outcomes” OR title: “school grade” OR
 abstract: “school grade” OR title: “school grades” OR abstract: “school
 grades” OR title: “grade point” OR “grade point” OR title: “grade points”
 OR abstract: “grade points” OR title: learn OR abstract: learn OR title:
 learning OR abstract: learning OR title: memory OR abstract: memory OR
 title: “language development” OR abstract: “language development” OR
 title: vocabulary OR abstract: vocabulary OR title: literacy OR abstract:
 literacy OR title: numeracy OR abstract: numeracy OR title: “mental
 health” OR abstract: “mental health” OR title: psychosocial OR abstract:
 psychosocial OR title: psycho-social OR abstract: psycho-social OR title:
 anxiety OR abstract: anxiety OR title: depression OR abstract: depression
 OR title: depressed OR abstract: depressed OR title: depressive OR
 abstract: depressive OR title: sadness OR abstract: sadness OR title:
 anger OR abstract: anger OR title: angry OR abstract: angry OR title:
 aggression OR abstract: aggression OR title: “aggressive behavior” OR
 abstract: “aggressive behavior” OR title: “aggressive behaviour” OR
 abstract: “aggressive behaviour” OR title: “behavioral problem” OR
 abstract: “behavioral problem” OR title: “behavioral problems” OR

abstract: “behavioral problems” OR title: “behavioural problem” OR
 abstract: “behavioural problem” OR title: “behavioural problems” OR
 abstract: “behavioural problems” OR title: “behavioral conduct” OR
 abstract: “behavioral conduct” OR title: “behavioural conduct” OR abstract:
 “behavioural conduct” OR title: “conduct disorder” OR abstract: “conduct
 disorder” OR title: “conduct disorders” OR abstract: “conduct disorders”
 OR title: hyperactivity OR abstract: hyperactivity OR title: “self-control” OR
 abstract: “self-control” OR title: “self control” OR abstract: “self control” OR
 title: “self-regulation” OR abstract: “self-regulation” OR title: “self regula-
 tion” OR abstract: “self regulation” OR title: “self- efficacy” OR abstract:
 “self-efficacy” OR title: “self efficacy” OR abstract: “self efficacy” OR title:
 “self-esteem” OR abstract: “self-esteem” OR title: “self esteem” OR
 abstract: “self esteem” OR title: “self-concept” OR abstract: “self-concept”
 OR title: “self concept” OR abstract: “self concept” OR title: “perceived
 competence” OR abstract: “perceived competence” OR title: “social
 behavior” OR abstract: “social behavior” OR title: “social behaviour” OR
 abstract: “social behaviour” OR title: “prosocial behavior” OR abstract:
 “prosocial behavior” OR title: “prosocial behaviour” OR abstract: “prosocial
 behaviour” OR title: “pro-social behavior” OR abstract: “pro-social
 behavior” OR title: “pro-social behaviour” OR abstract: “pro-social behav-
 iour” OR title: “social function” OR abstract: “social function” OR title:
 “social functioning” OR abstract: “social functioning” OR title: “social skill”
 OR abstract: “social skill” OR title: “social skills” OR abstract: “social skills”
 OR title: “social development” OR abstract: “social development” OR title:



“emotional development” OR abstract: “emotional development” OR title:
 social-cognitive OR abstract: social-cognitive OR title: social-emotional
 OR abstract: social-emotional OR title: mood OR abstract: mood OR title:
 happiness OR abstract: happiness OR title: wellbeing OR abstract: “well-
 being” OR title: “well-being” OR abstract: “well-being” OR title: “quality of
 life” OR abstract: “quality of life” OR title: myopia OR abstract: myopia OR
 title: nearsightedness OR abstract: nearsightedness OR title: “dry eyes”
 OR abstract: “dry eyes” OR title: “irritated eyes” OR abstract: “irritated
 eyes” OR title: “blurry vision” OR abstract: “blurry vision” OR Index Terms:
 “Bone disorder” OR Index Terms: “Skeletomuscular Disorders” OR index
 Terms: “Blood pressure” OR index Terms: Hypertension OR Index Terms:
 “Blood glucose” OR Index Terms: “Hyperglycemia” OR Index Terms:
 Diabetes OR Index terms: “ Insulin resistance syndrome” OR index Terms:
 Cholesterol OR Index Terms: Hypercholesterolemia OR Index Terms:
 “Metabolic syndrome” OR index Terms: “Physical Fitness” OR Index
 Terms: “body mass index” OR Index Terms: overweight OR Index Terms:
 obesity OR Index Terms: anxiety OR Index Terms: Depression (Emotion)
 OR Index Terms: “Conduct Disorder” OR Index Terms: “Attention Deficit
 Disorder with Hyperactivity” OR Index Terms: “Quality of Life” OR Index
 Terms: Torticollis OR Index Terms: Development OR index Terms: “Motor
 development” OR Index Terms: “Cognitive development” OR Index Terms:
 Attention OR Index Terms: “Executive Function” OR Index Terms: “Cogni-
 tive Ability” OR Index Terms: Intelligence OR Index Terms: Memory OR

Index Terms: “Language Development” OR Index Terms: “Self-Concept”
 OR Index Terms: “Social Behavior”

AND

Title: review OR Title: “systematic review” OR Abstract: “systematic
 review” OR Index Terms: systematic review OR Index Terms: meta-anal-
 ysis OR Title: meta-analyses OR Abstract: meta-analyses OR title: meta-
 analysis OR abstract: meta-analysis OR Title: “pooled analysis” OR
 Abstract: “pooled analysis” OR title: “pooled analyses” OR abstract:
 “pooled analyses”

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR
 Title: Pregnant OR Abstract: Pregnant



A2 Search string literature search reviews – outcome physical activity/sedentary behaviour at a later age

This search was conducted on 17-11-2020.

Database: PubMed

Filters: published since: 01-01-2000; language: English, Dutch

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR “early years”[tiab] OR “early life”[tiab] OR youth[tiab] OR child*[tiab] OR Child[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR

“TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(tracking[tiab] OR trajector*[tiab] OR “temporal stability”[tiab] OR longitudinal*[tiab] OR prospective*[tiab])

AND

(review[ti] OR “systematic review”[tiab] OR meta-analys*[tiab] OR “pooled analys*”[tiab])

Database: Scopus

Filters: published since: 01-01-2000; language: English, Dutch

(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten)



OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“ early life”) OR TITLE-ABS-KEY (youth) OR TITLE-ABS-KEY (child*)

AND

(TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (“active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (“child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY (“screen time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”) OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”) OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”)

OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (“tablet time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smart-phone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))

AND

TITLE-ABS-KEY (tracking) OR TITLE-ABS-KEY (trajector) OR TITLE-ABS-KEY (temporal AND stability) OR TITLE-ABS-KEY (longitudinal*) OR TITLE-ABS-KEY (prospective*)

AND

TITLE (review*) OR TITLE-ABS-KEY (systematic review) OR TITLE-ABS-KEY (meta-analys*) OR TITLE-ABS-KEY (pooled analys*)

Database: PsycInfo

Filters: published since: 01-01-2000; language: English, Dutch

Title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: preschool OR abstract: preschool OR title:



preschoolers OR abstract: preschoolers OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: “early years” OR abstract: “early years” OR title: “early life” OR abstract: “early life” OR title: youth OR abstract: youth OR title: child OR abstract: child OR title: children OR abstract: children

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting OR abstract: sporting OR title: sports OR abstract: sports OR title: playground OR abstract: playground OR title: playgrounds OR abstract: playgrounds OR title: “prone position” OR abstract: “prone position” OR title:

sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR title: seated OR abstract: seated OR title: “car seat” OR abstract: “car seat” OR title: “active play” OR abstract: “active play” OR title: “active playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract: “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing” OR title: playtime OR abstract: playtime OR title: “child play” OR abstract: “child play” OR title: “children’s play” OR abstract: “children’s play” OR title: “childhood play” OR abstract: “childhood play” OR title: “tummy time” OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time” OR title: “supine position” OR abstract: “supine position” OR title: stroller OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR title: screen-time OR abstract: screen-time OR title: “screen use” OR abstract: “screen use” OR title: “screen based” OR abstract: “screen based” OR title: screen-based OR abstract: screen-based OR title: “television viewing” OR abstract: “television viewing” OR title: “TV viewing” OR abstract: “TV viewing” OR title: “television time” OR abstract: “television time” OR title: “TV time” OR abstract: “TV time” OR title: “television use” OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR title: “computer time” OR abstract: “computer time” OR title: “computer use” OR abstract: “computer use” OR title: “tablet time” OR abstract: “tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use” OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR abstract: “phone use” OR title: “smartphone time” OR abstract: “smart-



phone time” OR title: “smartphone use” OR abstract: “smartphone use”
OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR
abstract: “iphone use OR title: videogame OR abstract: videogame OR
title: videogames OR abstract: videogames OR title: videogaming OR
abstract: videogaming OR Index Terms: Sedentary Behavior OR index
Terms: Screen Time OR Index Terms: Computer Games OR Index Terms:
walking OR Index Terms: running OR Index Terms: swimming OR Index
Terms: sport

AND

Index Terms: Tracking OR Title: tracking OR abstract: tracking OR Title:
trajector* OR Abstract: trajector* OR Title: temporal stability OR Abstract:
temporal stability OR Title: longitudinal* OR Abstract: longitudinal* OR
Title: prospective* OR Abstract: prospective*

AND

Title: review OR Title: “systematic review” OR Abstract: “systematic
review” OR Index Terms: systematic review OR Index Terms: meta-anal-
ysis OR Title: meta-analyses OR Abstract: meta-analyses OR title: meta-
analysis OR abstract: meta-analysis OR Title: “pooled analysis” OR
Abstract: “pooled analysis” OR title: “pooled analyses” OR abstract:
“pooled analyses”



A3 Search string literature search individual studies – outcome bone health

This search was conducted on 08-09-2020 (PubMed) and 29-09-2020 (Scopus and PsycInfo).

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

(longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh])

AND

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(“bone health”[tiab] OR “skeletal health”[tiab] OR fracture*[tiab] OR “bone density”[tiab] OR “bone mass”[tiab] OR “bone mineral density”[tiab] OR



“bone mineral content”[tiab] OR “vitamin D”[tiab] OR Bone Density[mesh]
OR Fractures, Bone[mesh] OR Vitamin D Deficiency[mesh:noexp])
NOT
(pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABS(randomised trial) OR TITLE-ABS(randomized trial) OR TITLE-ABS(RCT) OR TITLE-ABS(clinical trial) OR TITLE-ABS(Randomized Controlled Trials) OR TITLE-ABS(Non-Randomized Controlled) OR TITLE-ABS(Controlled Clinical Trials) OR TITLE-ABS(Cross-Over Studies) OR TITLE-ABS(Cohort Studies) OR TITLE-ABS(Follow-Up Studies) OR TITLE-ABS(Longitudinal Studies) OR TITLE-ABS(Prospective Studies)
AND
(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR TITLE-ABS-KEY (“young child”) OR TITLE-ABS-KEY (“early childhood*”) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“ early life”))
AND

(TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (“active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (“child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY (“screen time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”) OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”) OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”) OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (“tablet time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smart-



phone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))

AND

(((TITLE-ABS-KEY (bone AND health) OR TITLE-ABS-KEY (skeletal AND health) OR TITLE-ABS-KEY (fracture*) OR TITLE-ABS-KEY (bone AND density) OR TITLE-ABS-KEY (bone AND mass) OR TITLE-ABS-KEY (bone AND mineral AND density) OR TITLE-ABS-KEY (bone AND mineral AND content) OR TITLE-ABS-KEY (vitamin AND d)

AND NOT

(TITLE-ABS-KEY (pregnan*))

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title: “early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR

abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting OR abstract: sporting OR title: sports OR abstract: sports OR title: playground OR abstract: playground OR title: playgrounds OR abstract: playgrounds OR title: “prone position” OR abstract: “prone position” OR title: sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR title: seated OR abstract: seated OR title: “car seat” OR abstract: “car



seat" OR title: "active play" OR abstract: "active play" OR title: "active playing" OR abstract: "active playing" OR title: "outdoor play" OR abstract: "outdoor play" OR title: "outdoor playing" OR abstract: "outdoor playing" OR title: playtime OR abstract: playtime OR title: "child play" OR abstract: "child play" OR title: "children's play" OR abstract: "children's play" OR title: "childhood play" OR abstract: "childhood play" OR title: "tummy time" OR abstract: "tummy time" OR title: "floor time" OR abstract: "floor time" OR title: "supine position" OR abstract: "supine position" OR title: stroller OR abstract: stroller OR title: "screen time" OR abstract: "screen time" OR title: screen-time OR abstract: screen-time OR title: "screen use" OR abstract: "screen use" OR title: "screen based" OR abstract: "screen based" OR title: screen-based OR abstract: screen-based OR title: "television viewing" OR abstract: "television viewing" OR title: "TV viewing" OR abstract: "TV viewing" OR title: "television time" OR abstract: "television time" OR title: "TV time" OR abstract: "TV time" OR title: "television use" OR abstract: "television use" OR title: "TV use" OR abstract: "TV use" OR title: "computer time" OR abstract: "computer time" OR title: "computer use" OR abstract: "computer use" OR title: "tablet time" OR abstract: "tablet time" OR title: "tablet use" OR abstract: "tablet use" OR title: "ipad time" OR abstract: "ipad time" OR title: "ipad use" OR abstract: "ipad use" OR title: "phone time" OR abstract: "phone time" OR title: "phone use" OR abstract: "phone use" OR title: "smartphone time" OR abstract: "smartphone time" OR title: "smartphone use" OR abstract: "smartphone use" OR title: "iphone time" OR abstract: "iphone time" OR title: "iphone use OR

abstract: "iphone use OR title: videogame OR abstract: videogame OR title: videogames OR abstract: videogames OR title: videogaming OR abstract: videogaming OR Index Terms: Sedentary Behavior OR index Terms: Screen Time OR Index Terms: Computer Games OR Index Terms: walking OR Index Terms: running OR Index Terms: swimming OR Index Terms: sport

AND

Title: "bone health" OR abstract: "bone health" OR title: "skeletal health" OR abstract: "skeletal health" OR title: fracture OR abstract: fracture OR title: fractures OR abstract: fractures OR title: "bone density" OR abstract: "bone density" OR title: "bone mass" OR abstract: "bone mass" OR title: "bone mineral density" OR abstract: "bone mineral density" OR title: "bone mineral content" OR abstract: "bone mineral content" OR title: "vitamin D" OR abstract: "vitamin D" OR Index Terms: "Bone disorder" OR Index Terms: "Skeletomuscular Disorders"

AND

title: "Controlled Clinical Trials" OR abstract: "Controlled Clinical Trials" OR Keywords: "Controlled Clinical Trials" OR title: "Cross-Over Studies" OR abstract: "Cross-Over Studies" OR Keywords: "Cross-Over Studies" OR title: "Cohort Studies" OR abstract: "Cohort Studies" OR Keywords: "Cohort Studies" OR title: "Follow-Up Studies" OR abstract: "Follow-Up Studies" OR Keywords: "Follow-Up Studies" OR title: "Longitudinal Studies" OR abstract: "Longitudinal Studies" OR Keywords: "Longitudinal Studies" OR title: "Prospective Studies" OR abstract: "Prospective



Studies” OR Keywords: “Prospective Studies” OR title: longitudinal* OR abstract: longitudinal* OR title: prospective* OR abstract: prospective* OR title: cohort OR abstract: cohort OR title: “randomised trial” OR abstract: “randomised trial” OR title: “randomized trial” OR abstract: “randomized trial” OR title: follow-up OR abstract: follow-up OR title: cross-over OR abstract: cross-over OR title: “Randomized Controlled Trials” OR abstract: “Randomized Controlled Trials” OR Keywords: “Randomized Controlled Trials” OR title: “Non-Randomized Controlled Trials” OR abstract: “Non-Randomized Controlled Trials” OR Keywords: “Non-Randomized Controlled Trials” OR Any Field: Index Terms: Controlled Clinical Trials OR Any Field: Index Terms: Cross-Over Studies OR Any Field: Index Terms: Cohort Studies OR Any Field: Index Terms: Follow-Up Studies OR Any Field: Index Terms: Longitudinal Studies OR Any Field: Index Terms: Prospective Studies.

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR Title: Pregnant OR Abstract: Pregnant



A4 Search string literature search individual studies – outcome cardiometabolic health

This search was conducted on 07-10-2020.

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

(longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh])
 AND
 (newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])
 AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])
 AND
 (“cardiometabolic health”[tiab] OR “blood pressure”[tiab] OR hypertens*[tiab] OR “blood glucose”[tiab] OR hyperglycemi*[tiab] OR diabet*[tiab] OR “glucose intolerance”[tiab] OR “insulin resistance”[tiab])



OR “fasting insulin”[tiab] OR cholesterol[tiab] OR hypercholester*[tiab] OR hyperlipid*[tiab] OR “metabolic syndrome”[tiab] OR Blood Pressure[mesh] OR Hypertension[mesh:noexp] OR Blood Glucose[mesh] OR Hyperglycemia[mesh] OR Diabetes Mellitus, type 2[mesh] OR Insulin Resistance[mesh] OR Hyperlipidemias[mesh])

NOT

(pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABS(randomised trial) OR TITLE-ABS(randomized trial) OR TITLE-ABS(RCT) OR TITLE-ABS(clinical trial) OR TITLE-ABS(Randomized Controlled Trials) OR TITLE-ABS(Non-Randomized Controlled) OR TITLE-ABS(Controlled Clinical Trials) OR TITLE-ABS(Cross-Over Studies) OR TITLE-ABS(Cohort Studies) OR TITLE-ABS(Follow-Up Studies) OR TITLE-ABS(Longitudinal Studies) OR TITLE-ABS(Prospective Studies)

AND

(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR

TITLE-ABS-KEY (“young child”) OR TITLE-ABS-KEY (“early childhood”) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“ early life”)) AND

(TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (“active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (“child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY (“screen time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”) OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”) OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”) OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (“tablet



time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smartphone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))

AND

TITLE-ABS (cardiometabolic AND health) OR TITLE-ABS (blood AND pressure) OR TITLE-ABS (hypertens*) OR TITLE-ABS (blood AND glucose) OR TITLE-ABS (hyperglycemi*) OR TITLE-ABS (diabet*) OR TITLE-ABS (glucose AND intolerance) OR TITLE-ABS (insulin AND resistance) OR TITLE-ABS (fasting AND insulin) OR TITLE-ABS (cholesterol) OR TITLE-ABS (hypercholester*) OR TITLE-ABS (hyperlipid*) OR TITLE-ABS (metabolic AND syndrome) OR TITLE-ABS (Diabetes Mellitus, type 2)

AND NOT

(TITLE-ABS-KEY (pregnan*))

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title:

“early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing



OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting
 OR abstract: sporting OR title: sports OR abstract: sports OR title: play-
 ground OR abstract: playground OR title: playgrounds OR abstract: play-
 grounds OR title: “prone position” OR abstract: “prone position” OR title:
 sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR
 title: seated OR abstract: seated OR title: “car seat” OR abstract: “car
 seat” OR title: “active play” OR abstract: “active play” OR title: “active
 playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract:
 “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing”
 OR title: playtime OR abstract: playtime OR title: “child play” OR abstract:
 “child play” OR title: “children’s play” OR abstract: “children’s play” OR
 title: “childhood play” OR abstract: “childhood play” OR title: “tummy time”
 OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time”
 OR title: “supine position” OR abstract: “supine position” OR title: stroller
 OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR
 title: screen-time OR abstract: screen-time OR title: “screen use” OR
 abstract: “screen use” OR title: “screen based” OR abstract: “screen
 based” OR title: screen-based OR abstract: screen-based OR title: “televi-
 sion viewing” OR abstract: “television viewing” OR title: “TV viewing” OR
 abstract: “TV viewing” OR title: “television time” OR abstract: “television
 time” OR title: “TV time” OR abstract: “TV time” OR title: “television use”
 OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR
 title: “computer time” OR abstract: “computer time” OR title: “computer
 use” OR abstract: “computer use” OR title: “tablet time” OR abstract:

“tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad
 time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use”
 OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR
 abstract: “phone use” OR title: “smartphone time” OR abstract: “smart-
 phone time” OR title: “smartphone use” OR abstract: “smartphone use”
 OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR
 abstract: “iphone use OR title: videogame OR abstract: videogame OR
 title: videogames OR abstract: videogames OR title: videogaming OR
 abstract: videogaming OR Index Terms: Sedentary Behavior OR index
 Terms: Screen Time OR Index Terms: Computer Games OR Index Terms:
 walking OR Index Terms: running OR Index Terms: swimming OR Index
 Terms: sport

AND

Title: “cardiometabolic health” OR abstract: “cardiometabolic health” OR
 title: “blood pressure” OR abstract: “blood pressure” OR title: hypertension
 OR abstract: hypertension OR title: “blood glucose” OR abstract: “blood
 glucose” OR title: hyperglycemia OR abstract: hyperglycemia OR title:
 hyperglycemic OR abstract: hyperglycemic OR title: diabetes OR abstract:
 diabetes OR title: diabetic OR abstract: diabetic OR title: “glucose intoler-
 ance” OR abstract: “glucose intolerance” OR title: “insulin resistance” OR
 abstract: “insulin resistance” OR title: “fasting insulin” OR abstract: “fasting
 insulin” OR title: cholesterol OR abstract: cholesterol OR title: hypercho-
 lesterolemia OR abstract: hypercholesterolemia OR title: hypercholester-
 olemic OR abstract: hypercholesterolemic OR title: hyperlipidemia OR



abstract: hyperlipidemia OR title: hyperlipidemias OR abstract: hyperlipidemias OR title: “metabolic syndrome” OR abstract: “metabolic syndrome” OR index Terms: “Blood pressure” OR index Terms: Hypertension OR Index Terms: “Blood glucose” OR Index Terms: “Hyperglycemia” OR Index Terms: Diabetes OR Index terms: “ Insulin resistance syndrome” OR index Terms: Cholesterol OR Index Terms: Hypercholesterolemia OR Index Terms: “Metabolic syndrome”

AND

title: “Controlled Clinical Trials” OR abstract: “Controlled Clinical Trials” OR Keywords: “Controlled Clinical Trials” OR title: “Cross-Over Studies” OR abstract: “Cross-Over Studies” OR Keywords: “Cross-Over Studies” OR title: “Cohort Studies” OR abstract: “Cohort Studies” OR Keywords: “Cohort Studies” OR title: “Follow-Up Studies” OR abstract: “Follow-Up Studies” OR Keywords: “Follow-Up Studies” OR title: “Longitudinal Studies” OR abstract: “Longitudinal Studies” OR Keywords: “Longitudinal Studies” OR title: “Prospective Studies” OR abstract: “Prospective Studies” OR Keywords: “Prospective Studies” OR title: longitudinal* OR abstract: longitudinal* OR title: prospective* OR abstract: prospective* OR title: cohort OR abstract: cohort OR title: “randomised trial” OR abstract: “randomised trial” OR title: “randomized trial” OR abstract: “randomized trial” OR title: follow-up OR abstract: follow-up OR title: cross-over OR abstract: cross-over OR title: “Randomized Controlled Trials” OR abstract: “Randomized Controlled Trials” OR Keywords: “Randomized Controlled Trials” OR title: “Non-Randomized Controlled Trials” OR abstract: “Non-

Randomized Controlled Trials” OR Keywords: “Non-Randomized Controlled Trials” OR Any Field: Index Terms: Controlled Clinical Trials OR Any Field: Index Terms: Cross-Over Studies OR Any Field: Index Terms: Cohort Studies OR Any Field: Index Terms: Follow-Up Studies OR Any Field: Index Terms: Longitudinal Studies OR Any Field: Index Terms: Prospective Studies.

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR Title: Pregnant OR Abstract: Pregnant



A5 Search string literature search individual studies – outcome body composition

This search was conducted on 12-10-2020.

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

(longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh])

AND

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediater*[tiab] OR paediatric*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(“body composition”[tiab] OR “body mass index”[tiab] OR BMI[tiab] OR “weight status”[tiab] OR overweight[tiab] OR obese[tiab] OR obesity[tiab] OR “muscle mass”[tiab] OR “body fat”[tiab] OR “fat mass”[tiab] OR “skin-



fold thickness"[tiab] OR "skin fold thickness"[tiab] OR "fat distribution"[tiab] OR "waist circumference"[tiab] OR adipos*[tiab] OR "lean body mass"[tiab] OR Body Composition[mesh] OR Body Mass Index[mesh] OR Overweight[mesh:noexp] OR Obesity[mesh:noexp] OR Pediatric Obesity[mesh] OR Skinfold Thickness[mesh] OR Waist Circumference[mesh:noexp])
NOT
(pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABS(randomised trial) OR TITLE-ABS(randomized trial) OR TITLE-ABS(RCT) OR TITLE-ABS(clinical trial) OR TITLE-ABS(Randomized Controlled Trials) OR TITLE-ABS(Non-Randomized Controlled) OR TITLE-ABS(Controlled Clinical Trials) OR TITLE-ABS(Cross-Over Studies) OR TITLE-ABS(Cohort Studies) OR TITLE-ABS(Follow-Up Studies) OR TITLE-ABS(Longitudinal Studies) OR TITLE-ABS(Prospective Studies)
AND
(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediatri*) OR TITLE-ABS-KEY (paediatr*) OR

TITLE-ABS-KEY ("young child") OR TITLE-ABS-KEY ("early childhood") OR TITLE-ABS-KEY ("early years") OR TITLE-ABS-KEY ("early life"))
AND
(TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY ("active play") OR TITLE-ABS-KEY ("outdoor play") OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY ("child play") OR TITLE-ABS-KEY ("children's play") OR TITLE-ABS-KEY ("childhood play") OR TITLE-ABS-KEY ("prone position") OR TITLE-ABS-KEY ("tummy time") OR TITLE-ABS-KEY ("floor time") OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY ("supine position") OR TITLE-ABS-KEY ("car seat") OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY ("screen time") OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY ("screen use") OR TITLE-ABS-KEY ("screen based") OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY ("television view") OR TITLE-ABS-KEY ("tv view") OR TITLE-ABS-KEY ("television time") OR TITLE-ABS-KEY ("tv time") OR TITLE-ABS-KEY ("television use") OR TITLE-ABS-KEY ("tv use") OR TITLE-ABS-KEY ("computer time") OR TITLE-ABS-KEY ("computer use") OR TITLE-ABS-KEY ("tablet



time") OR TITLE-ABS-KEY ("tablet use") OR TITLE-ABS-KEY ("ipad time") OR TITLE-ABS-KEY ("ipad use") OR TITLE-ABS-KEY ("phone time") OR TITLE-ABS-KEY ("phone use") OR TITLE-ABS-KEY ("smartphone time") OR TITLE-ABS-KEY ("smartphone use") OR TITLE-ABS-KEY ("iphone time") OR TITLE-ABS-KEY ("iphone use") OR TITLE-ABS-KEY (videogam*))

AND

TITLE-ABS (body AND composition) OR TITLE-ABS (body AND mass AND index) OR TITLE-ABS (bmi) OR TITLE-ABS (weight AND status) OR TITLE-ABS (overweight) OR TITLE-ABS (obese) OR TITLE-ABS (obesity) OR TITLE-ABS (muscle AND mass) OR TITLE-ABS (body AND fat) OR TITLE-ABS (fat AND mass) OR TITLE-ABS (skinfold AND thickness) OR TITLE-ABS (skin AND fold AND thickness) OR TITLE-ABS (fat AND distribution) OR TITLE-ABS (waist AND circumference) OR TITLE-ABS (adipos*) OR TITLE-ABS (lean AND body AND mass) AND NOT (TITLE-ABS-KEY (pregnan*))

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: "early life" OR abstract: "early life" OR title: "young child" OR abstract: "young child" OR title: "young children" OR abstract: "young children" OR title: "early childhood" OR abstract: "early childhood" OR title:

"early years" OR abstract: "early years" OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: "physical activity" OR abstract: "physical activity" OR title: "physical activities" OR abstract: "physical activities" OR title: "physically active" OR abstract: "physically active" OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing



OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting
 OR abstract: sporting OR title: sports OR abstract: sports OR title: play-
 ground OR abstract: playground OR title: playgrounds OR abstract: play-
 grounds OR title: “prone position” OR abstract: “prone position” OR title:
 sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR
 title: seated OR abstract: seated OR title: “car seat” OR abstract: “car
 seat” OR title: “active play” OR abstract: “active play” OR title: “active
 playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract:
 “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing”
 OR title: playtime OR abstract: playtime OR title: “child play” OR abstract:
 “child play” OR title: “children’s play” OR abstract: “children’s play” OR
 title: “childhood play” OR abstract: “childhood play” OR title: “tummy time”
 OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time”
 OR title: “supine position” OR abstract: “supine position” OR title: stroller
 OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR
 title: screen-time OR abstract: screen-time OR title: “screen use” OR
 abstract: “screen use” OR title: “screen based” OR abstract: “screen
 based” OR title: screen-based OR abstract: screen-based OR title: “televi-
 sion viewing” OR abstract: “television viewing” OR title: “TV viewing” OR
 abstract: “TV viewing” OR title: “television time” OR abstract: “television
 time” OR title: “TV time” OR abstract: “TV time” OR title: “television use”
 OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR
 title: “computer time” OR abstract: “computer time” OR title: “computer
 use” OR abstract: “computer use” OR title: “tablet time” OR abstract:

“tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad
 time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use”
 OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR
 abstract: “phone use” OR title: “smartphone time” OR abstract: “smart-
 phone time” OR title: “smartphone use” OR abstract: “smartphone use”
 OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR
 abstract: “iphone use OR title: videogame OR abstract: videogame OR
 title: videogames OR abstract: videogames OR title: videogaming OR
 abstract: videogaming OR Index Terms: Sedentary Behavior OR index
 Terms: Screen Time OR Index Terms: Computer Games OR Index Terms:
 walking OR Index Terms: running OR Index Terms: swimming OR Index
 Terms: sport

AND

title: “body composition” OR abstract: “body composition” OR title: “body
 mass index” OR abstract: “body mass index” OR title: BMI OR abstract:
 BMI OR title: “weight status” OR abstract: “weight status” OR title: over-
 weight OR abstract: overweight OR title: obese OR abstract: obese OR
 title: obesity OR abstract: obesity OR title: “muscle mass” OR abstract:
 “muscle mass” OR title: “body fat” OR abstract: “body fat” OR title: “fat
 mass” OR abstract: “fat mass” OR title: “skinfold thickness” OR abstract:
 “skinfold thickness” OR title: “skin fold thickness” OR abstract: “skin fold
 thickness” OR title: “fat distribution” OR abstract: “fat distribution” OR title:
 “waist circumference” OR abstract: “waist circumference” OR title: adipose
 OR abstract: adipose OR title: adiposity OR abstract: adiposity OR title:



“lean body mass” OR abstract: “lean body mass” OR Index Terms: “body mass index” OR Index Terms: overweight OR Index Terms: obesity

AND

title: “Controlled Clinical Trials” OR abstract: “Controlled Clinical Trials” OR

Keywords: “Controlled Clinical Trials” OR title: “Cross-Over Studies” OR

abstract: “Cross-Over Studies” OR Keywords: “Cross-Over Studies” OR

title: “Cohort Studies” OR abstract: “Cohort Studies” OR Keywords:

“Cohort Studies” OR title: “Follow-Up Studies” OR abstract: “Follow-Up

Studies” OR Keywords: “Follow-Up Studies” OR title: “Longitudinal

Studies” OR abstract: “Longitudinal Studies” OR Keywords: “Longitudinal

Studies” OR title: “Prospective Studies” OR abstract: “Prospective

Studies” OR Keywords: “Prospective Studies” OR title: longitudinal* OR

abstract: longitudinal* OR title: prospective* OR abstract: prospective* OR

title: cohort OR abstract: cohort OR title: “randomised trial” OR abstract:

“randomised trial” OR title: “randomized trial” OR abstract: “randomized

trial” OR title: follow-up OR abstract: follow-up OR title: cross-over OR

abstract: cross-over OR title: “Randomized Controlled Trials” OR abstract:

“Randomized Controlled Trials” OR Keywords: “Randomized Controlled

Trials” OR title: “Non-Randomized Controlled Trials” OR abstract: “Non-

Randomized Controlled Trials” OR Keywords: “Non-Randomized

Controlled Trials” OR Any Field: Index Terms: Controlled Clinical Trials OR

Any Field: Index Terms: Cross-Over Studies OR Any Field: Index Terms:

Cohort Studies OR Any Field: Index Terms: Follow-Up Studies OR Any

Field: Index Terms: Longitudinal Studies OR Any Field: Index Terms: Prospective Studies.

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR

Title: Pregnant OR Abstract: Pregnant



A6 Search string literature search individual studies – outcome fitness

This search was conducted on 12-10-2020.

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

(longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh])

AND

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediater*[tiab] OR paediatric*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(fitness[tiab] OR endurance[tiab] OR “aerobic capacity”[tiab] OR “exercise ability”[tiab] OR “muscle strength”[tiab] OR “sprint power”[tiab] OR “sprint



strength"[tiab] OR "explosive power"[tiab] OR "explosive strength"[tiab] OR Athletic Performance[mesh] OR Muscle Strength[mesh])

NOT

(pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABS(randomised trial) OR TITLE-ABS(randomized trial) OR TITLE-ABS(RCT) OR TITLE-ABS(clinical trial) OR TITLE-ABS(Randomized Controlled Trials) OR TITLE-ABS(Non-Randomized Controlled) OR TITLE-ABS(Controlled Clinical Trials) OR TITLE-ABS(Cross-Over Studies) OR TITLE-ABS(Cohort Studies) OR TITLE-ABS(Follow-Up Studies) OR TITLE-ABS(Longitudinal Studies) OR TITLE-ABS(Prospective Studies)

AND

(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR TITLE-ABS-KEY ("young child") OR TITLE-ABS-KEY ("early childhood*") OR TITLE-ABS-KEY ("early years") OR TITLE-ABS-KEY (" early life"))

AND

(TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY ("active play") OR TITLE-ABS-KEY ("outdoor play") OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY ("child play") OR TITLE-ABS-KEY ("children's play") OR TITLE-ABS-KEY ("childhood play") OR TITLE-ABS-KEY ("prone position") OR TITLE-ABS-KEY ("tummy time") OR TITLE-ABS-KEY ("floor time") OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY ("supine position") OR TITLE-ABS-KEY ("car seat") OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY ("screen time") OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY ("screen use") OR TITLE-ABS-KEY ("screen based") OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY ("television view") OR TITLE-ABS-KEY ("tv view") OR TITLE-ABS-KEY ("television time") OR TITLE-ABS-KEY ("tv time") OR TITLE-ABS-KEY ("television use") OR TITLE-ABS-KEY ("tv use") OR TITLE-ABS-KEY ("computer time") OR TITLE-ABS-KEY ("computer use") OR TITLE-ABS-KEY ("tablet time") OR TITLE-ABS-KEY ("tablet use") OR TITLE-ABS-KEY ("ipad time") OR TITLE-ABS-KEY ("ipad use") OR TITLE-ABS-KEY ("phone time") OR TITLE-ABS-KEY ("phone use") OR TITLE-ABS-KEY ("smart-



phone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))

AND

TITLE-ABS (fitness) OR TITLE-ABS (endurance) OR TITLE-ABS (aerobic AND capacity) OR TITLE-ABS (exercise AND ability) OR TITLE-ABS (muscle AND strength) OR TITLE-ABS (sprint AND power) OR TITLE-ABS (sprint AND strength) OR TITLE-ABS (explosive AND power) OR TITLE-ABS (explosive AND strength)

AND NOT

(TITLE-ABS-KEY (pregnan*))

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title: “early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR

abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting OR abstract: sporting OR title: sports OR abstract: sports OR title: playground OR abstract: playground OR title: playgrounds OR abstract: playgrounds OR title: “prone position” OR abstract: “prone position” OR title: sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR title: seated OR abstract: seated OR title: “car seat” OR abstract: “car



seat" OR title: "active play" OR abstract: "active play" OR title: "active playing" OR abstract: "active playing" OR title: "outdoor play" OR abstract: "outdoor play" OR title: "outdoor playing" OR abstract: "outdoor playing" OR title: playtime OR abstract: playtime OR title: "child play" OR abstract: "child play" OR title: "children's play" OR abstract: "children's play" OR title: "childhood play" OR abstract: "childhood play" OR title: "tummy time" OR abstract: "tummy time" OR title: "floor time" OR abstract: "floor time" OR title: "supine position" OR abstract: "supine position" OR title: stroller OR abstract: stroller OR title: "screen time" OR abstract: "screen time" OR title: screen-time OR abstract: screen-time OR title: "screen use" OR abstract: "screen use" OR title: "screen based" OR abstract: "screen based" OR title: screen-based OR abstract: screen-based OR title: "television viewing" OR abstract: "television viewing" OR title: "TV viewing" OR abstract: "TV viewing" OR title: "television time" OR abstract: "television time" OR title: "TV time" OR abstract: "TV time" OR title: "television use" OR abstract: "television use" OR title: "TV use" OR abstract: "TV use" OR title: "computer time" OR abstract: "computer time" OR title: "computer use" OR abstract: "computer use" OR title: "tablet time" OR abstract: "tablet time" OR title: "tablet use" OR abstract: "tablet use" OR title: "ipad time" OR abstract: "ipad time" OR title: "ipad use" OR abstract: "ipad use" OR title: "phone time" OR abstract: "phone time" OR title: "phone use" OR abstract: "phone use" OR title: "smartphone time" OR abstract: "smartphone time" OR title: "smartphone use" OR abstract: "smartphone use" OR title: "iphone time" OR abstract: "iphone time" OR title: "iphone use OR

abstract: "iphone use OR title: videogame OR abstract: videogame OR title: videogames OR abstract: videogames OR title: videogaming OR abstract: videogaming OR Index Terms: Sedentary Behavior OR index Terms: Screen Time OR Index Terms: Computer Games OR Index Terms: walking OR Index Terms: running OR Index Terms: swimming OR Index Terms: sport

AND

title: fitness OR abstract: fitness OR title: endurance OR abstract: endurance OR title: "aerobic capacity" OR abstract: "aerobic capacity" OR title: "exercise ability" OR abstract: "exercise ability" OR title: "muscle strength" OR abstract: "muscle strength" OR title: "sprint power" OR abstract: "sprint power" OR title: "sprint strength" OR abstract: "sprint strength" OR title: "explosive power" OR abstract: "explosive power" OR title: "explosive strength" OR abstract: "explosive strength" OR index Terms: "Physical Fitness"

AND

title: "Controlled Clinical Trials" OR abstract: "Controlled Clinical Trials" OR Keywords: "Controlled Clinical Trials" OR title: "Cross-Over Studies" OR abstract: "Cross-Over Studies" OR Keywords: "Cross-Over Studies" OR title: "Cohort Studies" OR abstract: "Cohort Studies" OR Keywords: "Cohort Studies" OR title: "Follow-Up Studies" OR abstract: "Follow-Up Studies" OR Keywords: "Follow-Up Studies" OR title: "Longitudinal Studies" OR abstract: "Longitudinal Studies" OR Keywords: "Longitudinal Studies" OR title: "Prospective Studies" OR abstract: "Prospective



Studies” OR Keywords: “Prospective Studies” OR title: longitudinal* OR abstract: longitudinal* OR title: prospective* OR abstract: prospective* OR title: cohort OR abstract: cohort OR title: “randomised trial” OR abstract: “randomised trial” OR title: “randomized trial” OR abstract: “randomized trial” OR title: follow-up OR abstract: follow-up OR title: cross-over OR abstract: cross-over OR title: “Randomized Controlled Trials” OR abstract: “Randomized Controlled Trials” OR Keywords: “Randomized Controlled Trials” OR title: “Non-Randomized Controlled Trials” OR abstract: “Non-Randomized Controlled Trials” OR Keywords: “Non-Randomized Controlled Trials” OR Any Field: Index Terms: Controlled Clinical Trials OR Any Field: Index Terms: Cross-Over Studies OR Any Field: Index Terms: Cohort Studies OR Any Field: Index Terms: Follow-Up Studies OR Any Field: Index Terms: Longitudinal Studies OR Any Field: Index Terms: Prospective Studies.

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR Title: Pregnant OR Abstract: Pregnant



A7 Search string literature search individual studies – outcome motor development

This search was conducted on 12-10-2020.

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

(longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh])

AND

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediater*[tiab] OR paediatric*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(“motor development”[tiab] OR “motor performance*”[tiab] OR “motor competence*”[tiab] OR “motor coordination”[tiab] OR “motor skill*”[tiab] OR “movement skill*”[tiab] OR balance[tiab] OR “fine motor”[tiab] OR



“gross motor”[tiab] OR “locomotor control”[tiab] OR “locomotor skill”[tiab]
 OR “locomotion control”[tiab] OR “locomotion skill”[tiab] OR “object
 control”[tiab] OR “object manipulation”[tiab] OR “object play”[tiab] OR
 agility[tiab] OR “developmental milestone”[tiab] OR Motor Skills[mesh]
 NOT
 (pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABS(randomised trial) OR TITLE-ABS(randomized trial) OR TITLE-
 ABS(RCT) OR TITLE-ABS(clinical trial) OR TITLE-ABS(Randomized
 Controlled Trials) OR TITLE-ABS(Non-Randomized Controlled) OR
 TITLE-ABS(Controlled Clinical Trials) OR TITLE-ABS(Cross-Over Studies)
 OR TITLE-ABS(Cohort Studies) OR TITLE-ABS(Follow-Up Studies) OR
 TITLE-ABS(Longitudinal Studies) OR TITLE-ABS(Prospective Studies)
 AND

(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-
 ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (
 infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*
) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten)
 OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR
 TITLE-ABS-KEY (“young child”) OR TITLE-ABS-KEY (“early childhood”
) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“ early life”)

AND

(TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically
 activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR
 TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-
 KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike
) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-
 ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (
 “active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY
 (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (
 “child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY
 (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-
 ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-
 ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-
 KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR
 TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-
 ABS-KEY (“screen time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-
 ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR
 TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”
) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”)
 OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”)
 OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”)
 OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (“tablet
 time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad
 time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone



time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smart-phone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))

AND

TITLE-ABS (motor AND development) OR TITLE-ABS (motor AND performance*) OR TITLE-ABS (motor AND competence*) OR TITLE-ABS (motor AND coordination) OR TITLE-ABS (motor AND skill*) OR TITLE-ABS (movement AND skill*) OR TITLE-ABS (balance) OR TITLE-ABS (fine AND motor) OR TITLE-ABS (gross AND motor) OR TITLE-ABS (locomotor AND control) OR TITLE-ABS (locomotor AND skill*) OR TITLE-ABS (locomotion AND control) OR TITLE-ABS (locomotion AND skill*) OR TITLE-ABS (object AND control*) OR TITLE-ABS (object AND manipulation*) OR TITLE-ABS (object AND play) OR TITLE-ABS (agility) OR TITLE-ABS (developmental AND milestone*)

AND NOT

(TITLE-ABS-KEY (pregnan*))

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title:

“early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing



OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting
 OR abstract: sporting OR title: sports OR abstract: sports OR title: play-
 ground OR abstract: playground OR title: playgrounds OR abstract: play-
 grounds OR title: “prone position” OR abstract: “prone position” OR title:
 sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR
 title: seated OR abstract: seated OR title: “car seat” OR abstract: “car
 seat” OR title: “active play” OR abstract: “active play” OR title: “active
 playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract:
 “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing”
 OR title: playtime OR abstract: playtime OR title: “child play” OR abstract:
 “child play” OR title: “children’s play” OR abstract: “children’s play” OR
 title: “childhood play” OR abstract: “childhood play” OR title: “tummy time”
 OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time”
 OR title: “supine position” OR abstract: “supine position” OR title: stroller
 OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR
 title: screen-time OR abstract: screen-time OR title: “screen use” OR
 abstract: “screen use” OR title: “screen based” OR abstract: “screen
 based” OR title: screen-based OR abstract: screen-based OR title: “televi-
 sion viewing” OR abstract: “television viewing” OR title: “TV viewing” OR
 abstract: “TV viewing” OR title: “television time” OR abstract: “television
 time” OR title: “TV time” OR abstract: “TV time” OR title: “television use”
 OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR
 title: “computer time” OR abstract: “computer time” OR title: “computer
 use” OR abstract: “computer use” OR title: “tablet time” OR abstract:

“tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad
 time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use”
 OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR
 abstract: “phone use” OR title: “smartphone time” OR abstract: “smart-
 phone time” OR title: “smartphone use” OR abstract: “smartphone use”
 OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR
 abstract: “iphone use OR title: videogame OR abstract: videogame OR
 title: videogames OR abstract: videogames OR title: videogaming OR
 abstract: videogaming OR Index Terms: Sedentary Behavior OR index
 Terms: Screen Time OR Index Terms: Computer Games OR Index Terms:
 walking OR Index Terms: running OR Index Terms: swimming OR Index
 Terms: sport

AND

title: “motor development” OR abstract: “motor development” OR title:
 “motor performance” OR abstract: “motor performance” OR title: “motor
 competence” OR abstract: “motor competence” OR title: “motor coordina-
 tion” OR abstract: “motor coordination” OR title: “motor skills” OR abstract:
 “motor skills” OR title: “motor skill” OR abstract: “motor skill” OR title:
 “movement skill” OR abstract: “movement skill” OR title: “movement skills”
 OR abstract: “movement skills” OR title: balance OR abstract: balance OR
 title: “fine motor” OR abstract: “fine motor” OR title: “gross motor” OR
 abstract: “gross motor” OR title: “locomotor control” OR abstract: “loco-
 motor control” OR title: “locomotor skill” OR abstract: “locomotor skill” OR
 title: “locomotor skills” OR abstract: “locomotor skills” OR title: “locomotion



control” OR abstract: “locomotion control” OR title: “locomotion skill” OR abstract: “locomotion skill” OR title: “locomotion skills” OR abstract: “locomotion skills” OR title: “object control” OR abstract: “object control” OR title: “object manipulation” OR abstract: “object manipulation” OR title: “object play” OR abstract: “object play” OR title: agility OR abstract: agility OR title: “developmental milestone” OR abstract: “developmental milestone” OR title: “developmental milestones” OR abstract: “developmental milestones” OR index Terms: “Motor development”

AND

title: “Controlled Clinical Trials” OR abstract: “Controlled Clinical Trials” OR Keywords: “Controlled Clinical Trials” OR title: “Cross-Over Studies” OR abstract: “Cross-Over Studies” OR Keywords: “Cross-Over Studies” OR title: “Cohort Studies” OR abstract: “Cohort Studies” OR Keywords: “Cohort Studies” OR title: “Follow-Up Studies” OR abstract: “Follow-Up Studies” OR Keywords: “Follow-Up Studies” OR title: “Longitudinal Studies” OR abstract: “Longitudinal Studies” OR Keywords: “Longitudinal Studies” OR title: “Prospective Studies” OR abstract: “Prospective Studies” OR Keywords: “Prospective Studies” OR title: longitudinal* OR abstract: longitudinal* OR title: prospective* OR abstract: prospective* OR title: cohort OR abstract: cohort OR title: “randomised trial” OR abstract: “randomised trial” OR title: “randomized trial” OR abstract: “randomized trial” OR title: follow-up OR abstract: follow-up OR title: cross-over OR abstract: cross-over OR title: “Randomized Controlled Trials” OR abstract: “Randomized Controlled Trials” OR Keywords: “Randomized Controlled

Trials” OR title: “Non-Randomized Controlled Trials” OR abstract: “Non-Randomized Controlled Trials” OR Keywords: “Non-Randomized Controlled Trials” OR Any Field: Index Terms: Controlled Clinical Trials OR Any Field: Index Terms: Cross-Over Studies OR Any Field: Index Terms: Cohort Studies OR Any Field: Index Terms: Follow-Up Studies OR Any Field: Index Terms: Longitudinal Studies OR Any Field: Index Terms: Prospective Studies.

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR Title: Pregnant OR Abstract: Pregnant



A8 Search string literature search individual studies – outcome cognitive development

This search was conducted on 12-10-2020.

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

(longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh])

AND

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(cognitive[tiab] OR cognition[tiab] OR attention[tiab] OR “executive function*”[tiab] OR “processing speed”[tiab] OR planning[tiab] OR “set shift*”[tiab] OR “set-shift*”[tiab] OR intelligen*[tiab] OR “academic



achievement*[tiab] OR “educational achievement*[tiab] OR “school achievement*[tiab] OR “academic perform*[tiab] OR “educational perform*[tiab] OR “school perform*[tiab] OR “academic outcome*[tiab] OR “learning outcome*[tiab] OR “school grade*[tiab] OR “grade point*[tiab] OR learn*[tiab] OR memory[tiab] OR “language development*[tiab] OR vocabulary[tiab] OR literacy[tiab] OR numeracy[tiab] OR Cognition[mesh:noexp] OR Attention[mesh:noexp] OR Executive Function[mesh] OR Intelligence[mesh:noexp] OR Academic Performance[mesh] OR Learning[mesh:noexp] OR Memory[mesh:noexp] OR Language Development[mesh] OR Literacy[mesh])
 NOT
 (pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABS(randomised trial) OR TITLE-ABS(randomized trial) OR TITLE-ABS(RCT) OR TITLE-ABS(clinical trial) OR TITLE-ABS(Randomized Controlled Trials) OR TITLE-ABS(Non-Randomized Controlled) OR TITLE-ABS(Controlled Clinical Trials) OR TITLE-ABS(Cross-Over Studies) OR TITLE-ABS(Cohort Studies) OR TITLE-ABS(Follow-Up Studies) OR TITLE-ABS(Longitudinal Studies) OR TITLE-ABS(Prospective Studies)
 AND

(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediater*) OR TITLE-ABS-KEY (paediatr*) OR TITLE-ABS-KEY (“young child”) OR TITLE-ABS-KEY (“early childhood”) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“early life”))
 AND
 (TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (“active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (“child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY (“screen time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR



TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”) OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”) OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”) OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (“tablet time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smartphone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))

AND

TITLE-ABS (cognitive) OR TITLE-ABS (cognition) OR TITLE-ABS (attention) OR TITLE-ABS (executive AND function*) OR TITLE-ABS (processing AND speed) OR TITLE-ABS (planning) OR TITLE-ABS (set AND shift*) OR TITLE-ABS (set-shift*) OR TITLE-ABS (intelligen*) OR TITLE-ABS (academic AND achievement*) OR TITLE-ABS (educational AND achievement*) OR TITLE-ABS (school AND achievement*) OR TITLE-ABS (academic AND perform*) OR TITLE-ABS (educational AND perform*) OR TITLE-ABS (school AND perform*) OR TITLE-ABS (academic AND outcome*) OR TITLE-ABS (learning AND outcome*) OR TITLE-ABS (school AND grade*) OR TITLE-ABS (grade AND point*) OR TITLE-ABS (learn*) OR TITLE-ABS (memory) OR TITLE-ABS (

language AND development) OR TITLE-ABS (vocabulary) OR TITLE-ABS (literacy) OR TITLE-ABS (numeracy) AND NOT (TITLE-ABS-KEY (pregnan*))

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title: “early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND



Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting OR abstract: sporting OR title: sports OR abstract: sports OR title: playground OR abstract: playground OR title: playgrounds OR abstract: playgrounds OR title: “prone position” OR abstract: “prone position” OR title: sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR title: seated OR abstract: seated OR title: “car seat” OR abstract: “car seat” OR title: “active play” OR abstract: “active play” OR title: “active playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract: “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing” OR title: playtime OR abstract: playtime OR title: “child play” OR abstract: “child play” OR title: “children’s play” OR abstract: “children’s play” OR title: “childhood play” OR abstract: “childhood play” OR title: “tummy time” OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time”

OR title: “supine position” OR abstract: “supine position” OR title: stroller OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR title: screen-time OR abstract: screen-time OR title: “screen use” OR abstract: “screen use” OR title: “screen based” OR abstract: “screen based” OR title: screen-based OR abstract: screen-based OR title: “television viewing” OR abstract: “television viewing” OR title: “TV viewing” OR abstract: “TV viewing” OR title: “television time” OR abstract: “television time” OR title: “TV time” OR abstract: “TV time” OR title: “television use” OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR title: “computer time” OR abstract: “computer time” OR title: “computer use” OR abstract: “computer use” OR title: “tablet time” OR abstract: “tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use” OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR abstract: “phone use” OR title: “smartphone time” OR abstract: “smartphone time” OR title: “smartphone use” OR abstract: “smartphone use” OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR abstract: “iphone use OR title: videogame OR abstract: videogame OR title: videogames OR abstract: videogames OR title: videogaming OR abstract: videogaming OR index Terms: “Blood pressure” OR index Terms: Hypertension OR Index Terms: “Blood glucose” OR Index Terms: “Hyperglycemia” OR Index Terms: Diabetes OR Index terms: “ Insulin resistance syndrome” OR index Terms: Cholesterol OR Index Terms: Hypercholesterolemia OR Index Terms: “Metabolic syndrome”



AND

title: cognitive OR abstract: cognitive OR title: cognition OR abstract: cognition OR title: attention OR abstract: attention OR title: “executive function” OR abstract: “executive function” OR title: “executive functions” OR abstract: “executive functions” OR title: “executive functioning” OR abstract: “executive functioning” OR title: “processing speed” OR abstract: “processing speed” OR title: planning OR abstract: planning OR title: “set shift” OR abstract: “set shift” OR title: “set shifting” OR abstract: “set shifting” OR title: set-shift OR abstract: set-shift OR title: set-shifting OR abstract: set-shifting OR title: intelligence OR abstract: intelligence OR title: intelligent OR abstract: intelligent OR title: “academic achievement” OR abstract: “academic achievement” OR title: “academic achievements” OR abstract: “academic achievements” OR title: “educational achievement” OR abstract: “educational achievement” OR title: “educational achievements” OR abstract: “educational achievements” OR title: “school achievement” OR abstract: “school achievement” OR title: “school achievements” OR abstract: “school achievements” OR title: “academic performance” OR abstract: “academic performance” OR title: “educational performance” OR abstract: “educational performance” OR title: “school performance” OR abstract: “school performance” OR title: “academic outcome” OR abstract: “academic outcome” OR title: “academic outcomes” OR abstract: “academic outcomes” OR title: “learning outcome” OR abstract: “learning outcome” OR title: “learning outcomes” OR abstract: “learning outcomes” OR title: “school grade” OR abstract: “school

grade” OR title: “school grades” OR abstract: “school grades” OR title: “grade point” OR “grade point” OR title: “grade points” OR abstract: “grade points” OR title: learn OR abstract: learn OR title: learning OR abstract: learning OR title: memory OR abstract: memory OR title: “language development” OR abstract: “language development” OR title: vocabulary OR abstract: vocabulary OR title: literacy OR abstract: literacy OR title: numeracy OR abstract: numeracy OR Index Terms: “Cognitive development” OR Index Terms: Attention OR Index Terms: “Executive Function” OR Index Terms: “Cognitive Ability” OR Index Terms: Intelligence OR Index Terms: Memory OR Index Terms: “Language Development”

AND

title: “Controlled Clinical Trials” OR abstract: “Controlled Clinical Trials” OR Keywords: “Controlled Clinical Trials” OR title: “Cross-Over Studies” OR abstract: “Cross-Over Studies” OR Keywords: “Cross-Over Studies” OR title: “Cohort Studies” OR abstract: “Cohort Studies” OR Keywords: “Cohort Studies” OR title: “Follow-Up Studies” OR abstract: “Follow-Up Studies” OR Keywords: “Follow-Up Studies” OR title: “Longitudinal Studies” OR abstract: “Longitudinal Studies” OR Keywords: “Longitudinal Studies” OR title: “Prospective Studies” OR abstract: “Prospective Studies” OR Keywords: “Prospective Studies” OR title: longitudinal* OR abstract: longitudinal* OR title: prospective* OR abstract: prospective* OR title: cohort OR abstract: cohort OR title: “randomised trial” OR abstract: “randomised trial” OR title: “randomized trial” OR abstract: “randomized trial” OR title: follow-up OR abstract: follow-up OR title: cross-over OR



abstract: cross-over OR title: "Randomized Controlled Trials" OR abstract:
"Randomized Controlled Trials" OR Keywords: "Randomized Controlled
Trials" OR title: "Non-Randomized Controlled Trials" OR abstract: "Non-
Randomized Controlled Trials" OR Keywords: "Non-Randomized
Controlled Trials" OR Any Field: Index Terms: Controlled Clinical Trials OR
Any Field: Index Terms: Cross-Over Studies OR Any Field: Index Terms:
Cohort Studies OR Any Field: Index Terms: Follow-Up Studies OR Any
Field: Index Terms: Longitudinal Studies OR Any Field: Index Terms:
Prospective Studies.

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR
Title: Pregnant OR Abstract: Pregnant



A9 Search string literature search individual studies – outcome psychosocial development

This search was conducted on 12-10-2020 (PubMed and Scopus) and 21-01-2021 (PsycInfo).

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh]

AND

newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediater*[tiab] OR paediatric*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh]

AND

“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh]

AND

“mental health”[tiab] OR psychosocial[tiab] OR psycho-social[tiab] OR anxiety[tiab] OR depress*[tiab] OR sadness[tiab] OR anger[tiab] OR angry[tiab] OR aggression[tiab] OR “aggressive behavio*”[tiab] OR “behav-



ioural problem*[tiab] OR "behavioral problem*[tiab] OR "behavioural
 conduct"[tiab] OR "behavioral conduct"[tiab] OR "conduct disorder*[tiab]
 OR hyperactivity[tiab] OR self-control[tiab] OR "self control"[tiab] OR self-
 regulation[tiab] OR "self regulation"[tiab] OR self-efficacy[tiab] OR "self
 efficacy"[tiab] OR self-esteem[tiab] OR "self esteem"[tiab] OR self-
 concept[tiab] OR "self concept"[tiab] OR "perceived competence"[tiab] OR
 "social behavio*[tiab] OR "prosocial behavio*[tiab] OR "pro-social
 behavio*[tiab] OR "social function*[tiab] OR "social skill*[tiab] OR "social
 development"[tiab] OR "emotional development"[tiab] OR social-
 cognitive[tiab] OR social-emotional[tiab] OR mood[tiab] OR
 happiness[tiab] OR wellbeing[tiab] OR well-being[tiab] OR "quality of
 life"[tiab] OR Mental Health[mesh] OR Anxiety[mesh:noexp] OR Anxiety
 Disorders[mesh] OR Depression[mesh] OR Depressive
 Disorder[mesh:noexp] OR Aggression[mesh] OR Problem Behavior[mesh]
 OR Conduct Disorder[mesh] OR Self Concept[mesh] OR Social
 Behavior[mesh] OR Quality of Life[mesh]
 NOT
 pregnan*[tiab] OR pregnancy[mesh]

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABSrandomised trial OR TITLE-ABSrandomized trial OR TITLE-
 ABSRCT OR TITLE-ABSclinical trial OR TITLE-ABSRandomized

Controlled Trials OR TITLE-ABSNon-Randomized Controlled OR TITLE-
 ABSControlled Clinical Trials OR TITLE-ABSCross-Over Studies OR
 TITLE-ABSCohort Studies OR TITLE-ABSFollow-Up Studies OR TITLE-
 ABSLongitudinal Studies OR TITLE-ABSProspective Studies
 AND
 TITLE-ABS-KEY newborn OR TITLE-ABS-KEY neonate OR TITLE-ABS-
 KEY baby OR TITLE-ABS-KEY babies OR TITLE-ABS-KEY infan* OR
 TITLE-ABS-KEY toddler* OR TITLE-ABS-KEY preschool* OR TITLE-
 ABS-KEY pre-school OR TITLE-ABS-KEY kindergarten OR TITLE-ABS-
 KEY pediatr* OR TITLE-ABS-KEY paediatr* OR TITLE-ABS-KEY "young
 child" OR TITLE-ABS-KEY "early childhood*" OR TITLE-ABS-KEY "early
 years" OR TITLE-ABS-KEY " early life"
 AND
 TITLE-ABS-KEY physical activ* OR TITLE-ABS-KEY physically activ* OR
 TITLE-ABS-KEY exercis* OR TITLE-ABS-KEY crawl* OR TITLE-ABS-
 KEY walk* OR TITLE-ABS-KEY run OR TITLE-ABS-KEY running OR
 TITLE-ABS-KEY bicycl* OR TITLE-ABS-KEY bike OR TITLE-ABS-KEY
 biking OR TITLE-ABS-KEY swim* OR TITLE-ABS-KEY danc* OR TITLE-
 ABS-KEY sport* OR TITLE-ABS-KEY "active play" OR TITLE-ABS-KEY
 "outdoor play" OR TITLE-ABS-KEY playground OR TITLE-ABS-KEY play-
 time OR TITLE-ABS-KEY "child play" OR TITLE-ABS-KEY "children's
 play" OR TITLE-ABS-KEY "childhood play" OR TITLE-ABS-KEY "prone
 position" OR TITLE-ABS-KEY "tummy time" OR TITLE-ABS-KEY "floor
 time" OR TITLE-ABS-KEY sedentary OR TITLE-ABS-KEY sitting OR



TITLE-ABS-KEY seated OR TITLE-ABS-KEY “supine position” OR TITLE-ABS-KEY “car seat” OR TITLE-ABS-KEY stroller OR TITLE-ABS-KEY “screen time” OR TITLE-ABS-KEY screen-time OR TITLE-ABS-KEY “screen use” OR TITLE-ABS-KEY “screen based” OR TITLE-ABS-KEY screen-based OR TITLE-ABS-KEY “television view” OR TITLE-ABS-KEY “tv view” OR TITLE-ABS-KEY “television time” OR TITLE-ABS-KEY “tv time” OR TITLE-ABS-KEY “television use” OR TITLE-ABS-KEY “tv use” OR TITLE-ABS-KEY “computer time” OR TITLE-ABS-KEY “computer use” OR TITLE-ABS-KEY “tablet time” OR TITLE-ABS-KEY “tablet use” OR TITLE-ABS-KEY “ipad time” OR TITLE-ABS-KEY “ipad use” OR TITLE-ABS-KEY “phone time” OR TITLE-ABS-KEY “phone use” OR TITLE-ABS-KEY “smartphone time” OR TITLE-ABS-KEY “smartphone use” OR TITLE-ABS-KEY “iphone time” OR TITLE-ABS-KEY “iphone use” OR TITLE-ABS-KEY videogam*

AND

TITLE-ABS mental AND health OR TITLE-ABS psychosocial OR TITLE-ABS psycho-social OR TITLE-ABS anxiety OR TITLE-ABS depress* OR TITLE-ABS sadness OR TITLE-ABS anger OR TITLE-ABS angry OR TITLE-ABS aggression OR TITLE-ABS aggressive AND behavio* OR TITLE-ABS behavioural AND problem* OR TITLE-ABS behavioral AND problem* OR TITLE-ABS behavioural AND conduct OR TITLE-ABS behavioral AND conduct OR TITLE-ABS conduct AND disorder* OR TITLE-ABS hyperactivity OR TITLE-ABS self-control OR TITLE-ABS self AND control OR TITLE-ABS self-regulation OR TITLE-ABS self AND regu-

lation OR TITLE-ABS self-efficacy OR TITLE-ABS self AND efficacy OR TITLE-ABS self-esteem OR TITLE-ABS self AND esteem OR TITLE-ABS self-concept OR TITLE-ABS self AND concept OR TITLE-ABS perceived AND competence OR TITLE-ABS social AND behavio* OR TITLE-ABS prosocial AND behavio* OR TITLE-ABS pro-social AND behavio* OR TITLE-ABS social AND function* OR TITLE-ABS social AND skill* OR TITLE-ABS social AND development OR TITLE-ABS emotional AND development OR TITLE-ABS social-cognitive OR TITLE-ABS social-emotional OR TITLE-ABS mood OR TITLE-ABS happiness OR TITLE-ABS wellbeing OR TITLE-ABS well-being OR TITLE-ABS quality AND of AND life AND NOT TITLE-ABS-KEY pregnan*

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title: “early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR



abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting OR abstract: sporting OR title: sports OR abstract: sports OR title: playground OR abstract: playground OR title: playgrounds OR abstract: playgrounds OR title: “prone position” OR abstract: “prone position” OR title:

sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR title: seated OR abstract: seated OR title: “car seat” OR abstract: “car seat” OR title: “active play” OR abstract: “active play” OR title: “active playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract: “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing” OR title: playtime OR abstract: playtime OR title: “child play” OR abstract: “child play” OR title: “children’s play” OR abstract: “children’s play” OR title: “childhood play” OR abstract: “childhood play” OR title: “tummy time” OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time” OR title: “supine position” OR abstract: “supine position” OR title: stroller OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR title: screen-time OR abstract: screen-time OR title: “screen use” OR abstract: “screen use” OR title: “screen based” OR abstract: “screen based” OR title: screen-based OR abstract: screen-based OR title: “television viewing” OR abstract: “television viewing” OR title: “TV viewing” OR abstract: “TV viewing” OR title: “television time” OR abstract: “television time” OR title: “TV time” OR abstract: “TV time” OR title: “television use” OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR title: “computer time” OR abstract: “computer time” OR title: “computer use” OR abstract: “computer use” OR title: “tablet time” OR abstract: “tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use” OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR abstract: “phone use” OR title: “smartphone time” OR abstract: “smart-



phone time” OR title: “smartphone use” OR abstract: “smartphone use”
 OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR
 abstract: “iphone use OR title: videogame OR abstract: videogame OR
 title: videogames OR abstract: videogames OR title: videogaming OR
 abstract: videogaming OR Index Terms: Sedentary Behavior OR index
 Terms: Screen Time OR Index Terms: Computer Games OR Index Terms:
 walking OR Index Terms: running OR Index Terms: swimming OR Index
 Terms: sport

AND

title: “mental health” OR abstract: “mental health” OR title: psychosocial
 OR abstract: psychosocial OR title: psycho-social OR abstract: psycho-
 social OR title: anxiety OR abstract: anxiety OR title: depression OR
 abstract: depression OR title: depressed OR abstract: depressed OR title:
 depressive OR abstract: depressive OR title: sadness OR abstract:
 sadness OR title: anger OR abstract: anger OR title: angry OR abstract:
 angry OR title: aggression OR abstract: aggression OR title: “aggressive
 behavior” OR abstract: “aggressive behavior” OR title: “aggressive behav-
 iour” OR abstract: “aggressive behaviour” OR title: “behavioral problem”
 OR abstract: “behavioral problem” OR title: “behavioral problems” OR
 abstract: “behavioral problems” OR title: “behavioural problem” OR
 abstract: “behavioural problem” OR title: “behavioural problems” OR
 abstract: “behavioural problems” OR title: “behavioral conduct” OR
 abstract: “behavioral conduct” OR title: “behavioural conduct” OR abstract:
 “behavioural conduct” OR title: “conduct disorder” OR abstract: “conduct

disorder” OR title: “conduct disorders” OR abstract: “conduct disorders”
 OR title: hyperactivity OR abstract: hyperactivity OR title: “self-control” OR
 abstract: “self-control” OR title: “self control” OR abstract: “self control” OR
 title: “self-regulation” OR abstract: “self-regulation” OR title: “self regula-
 tion” OR abstract: “self regulation” OR title: “self- efficacy” OR abstract:
 “self-efficacy” OR title: “self efficacy” OR abstract: “self efficacy” OR title:
 “self-esteem” OR abstract: “self-esteem” OR title: “self esteem” OR
 abstract: “self esteem” OR title: “self-concept” OR abstract: “self-concept”
 OR title: “self concept” OR abstract: “self concept” OR title: “perceived
 competence” OR abstract: “perceived competence” OR title: “social
 behavior” OR abstract: “social behavior” OR title: “social behaviour” OR
 abstract: “social behaviour” OR title: “prosocial behavior” OR abstract:
 “prosocial behavior” OR title: “prosocial behaviour” OR abstract: “prosocial
 behaviour” OR title: “pro-social behavior” OR abstract: “pro-social
 behavior” OR title: “pro-social behaviour” OR abstract: “pro-social behav-
 iour” OR title: “social function” OR abstract: “social function” OR title:
 “social functioning” OR abstract: “social functioning” OR title: “social skill”
 OR abstract: “social skill” OR title: “social skills” OR abstract: “social skills”
 OR title: “social development” OR abstract: “social development” OR title:
 “emotional development” OR abstract: “emotional development” OR title:
 social-cognitive OR abstract: social-cognitive OR title: social-emotional
 OR abstract: social-emotional OR title: mood OR abstract: mood OR title:
 happiness OR abstract: happiness OR title: wellbeing OR abstract: “well-
 being” OR title: “well-being” OR abstract: “well-being” OR title: “quality of



life” OR abstract: “quality of life” OR Index Terms: “Mental Health” OR Index Terms: anxiety OR Index Terms: Depression Emotion OR Index Terms: “Conduct Disorder” OR Index Terms: “Attention Deficit Disorder with Hyperactivity” OR Index Terms: “Quality of Life” OR Index Terms: “Self-Concept” OR Index Terms: “Social Behavior”

AND

title: “Controlled Clinical Trials” OR abstract: “Controlled Clinical Trials” OR title: “Cross-Over Studies” OR abstract: “Cross-Over Studies” OR title: “Cohort Studies” OR abstract: “Cohort Studies” OR title: “Follow-Up Studies” OR abstract: “Follow-Up Studies” OR title: “Longitudinal Studies” OR abstract: “Longitudinal Studies” OR title: “Prospective Studies” OR abstract: “Prospective Studies” OR title: longitudinal* OR abstract: longitudinal* OR title: prospective* OR abstract: prospective* OR title: cohort OR abstract: cohort OR title: “randomised trial” OR abstract: “randomised trial” OR title: “randomized trial” OR abstract: “randomized trial” OR title: follow-up OR abstract: follow-up OR title: cross-over OR abstract: cross-over OR title: “Randomized Controlled Trials” OR abstract: “Randomized Controlled Trials” OR title: “Non-Randomized Controlled Trials” OR abstract: “Non-Randomized Controlled Trials” OR Any Field: Index Terms: Controlled Clinical Trials OR Any Field: Index Terms: Cross-Over Studies OR Any Field: Index Terms: Cohort Studies OR Any Field: Index Terms: Follow-Up Studies OR Any Field: Index Terms: Longitudinal Studies OR Any Field: Index Terms: Prospective Studies.

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR Title: Pregnant OR Abstract: Pregnant



A10 Search string literature search individual studies – outcome risks

This search was conducted on 12-10-2020.

Database: PubMed

Filters: published since: 01-01-2015; language: English, Dutch

(longitudinal*[tiab] OR prospective*[tiab] OR cohort[tiab] OR “randomised trial”[tiab] OR “randomized trial”[tiab] OR “controlled trial”[tiab] OR RCT[tiab] OR “clinical trial”[tiab] OR follow-up[tiab] OR cross-over[tiab] OR “Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Non-Randomized Controlled Trials as Topic”[Mesh:NoExp] OR “Controlled Clinical Trials as Topic”[Mesh:NoExp] OR “Cross-Over Studies”[Mesh] OR “Cohort Studies”[Mesh:NoExp] OR “Follow-Up Studies”[Mesh] OR “Longitudinal Studies”[Mesh:NoExp] OR “Prospective Studies”[Mesh])

AND

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR screen-time[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR “TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(plagioceph*[tiab] OR torticollis[tiab] OR injur*[tiab] OR scoliosis[tiab] OR kyphosis[tiab] OR Plagiocephaly[mesh] OR Torticollis[mesh] OR Wounds and Injuries[mesh:noexp] OR Scoliosis[mesh] OR Kyphosis[mesh])



NOT
(pregnan*[tiab] OR pregnancy[mesh])

Database: Scopus

Filters: published since: 01-01-2015; language: English, Dutch

TITLE-ABS(randomised trial) OR TITLE-ABS(randomized trial) OR TITLE-ABS(RCT) OR TITLE-ABS(clinical trial) OR TITLE-ABS(Randomized Controlled Trials) OR TITLE-ABS(Non-Randomized Controlled) OR TITLE-ABS(Controlled Clinical Trials) OR TITLE-ABS(Cross-Over Studies) OR TITLE-ABS(Cohort Studies) OR TITLE-ABS(Follow-Up Studies) OR TITLE-ABS(Longitudinal Studies) OR TITLE-ABS(Prospective Studies)

AND

(TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR TITLE-ABS-KEY (“young child”) OR TITLE-ABS-KEY (“early childhood*”) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“ early life”))

AND

(TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*) OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-

KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (“active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (“child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY (“screen time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”) OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”) OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”) OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (“tablet time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smartphone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*))



AND

TITLE-ABS (plagioceph*) OR TITLE-ABS (torticollis) OR TITLE-ABS (injur*) OR TITLE-ABS (scoliosis) OR TITLE-ABS (kyphosis)

AND NOT

(TITLE-ABS-KEY (pregnan*))

Database: PsycInfo

Filters: published since: 01-01-2015 language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title: “early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR abstract: babies OR title: neonate OR abstract: neonate OR title: neonates OR abstract: neonates OR title: newborn OR abstract: newborn OR title: newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical activities” OR abstract: “physical activities” OR title: “physically active” OR abstract: “physically active” OR title: exercise OR abstract: exercise OR title: exercises OR abstract: exercises OR title: exercising OR abstract: exercising OR title: crawling OR abstract: crawling OR title: crawl OR abstract: crawl OR title: walk OR abstract: walk OR title: walking OR abstract: walking OR title: running OR abstract: running OR title: run OR abstract: run OR title: bicycle OR abstract: bicycle OR title: bicycling OR abstract: bicycling OR title: bike OR abstract: bike OR title: biking OR abstract: biking OR title: swim OR abstract: swim OR title: swimming OR abstract: swimming OR title: dance OR abstract: dance OR title: dancing OR abstract: dancing OR title: sport OR abstract: sport OR title: sporting OR abstract: sporting OR title: sports OR abstract: sports OR title: playground OR abstract: playground OR title: playgrounds OR abstract: playgrounds OR title: “prone position” OR abstract: “prone position” OR title: sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR title: seated OR abstract: seated OR title: “car seat” OR abstract: “car seat” OR title: “active play” OR abstract: “active play” OR title: “active playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract: “outdoor play” OR title: “outdoor playing” OR abstract: “outdoor playing” OR title: playtime OR abstract: playtime OR title: “child play” OR abstract: “child play” OR title: “children’s play” OR abstract: “children’s play” OR title: “childhood play” OR abstract: “childhood play” OR title: “tummy time”



OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time”
 OR title: “supine position” OR abstract: “supine position” OR title: stroller
 OR abstract: stroller OR title: “screen time” OR abstract: “screen time” OR
 title: screen-time OR abstract: screen-time OR title: “screen use” OR
 abstract: “screen use” OR title: “screen based” OR abstract: “screen
 based” OR title: screen-based OR abstract: screen-based OR title: “televi-
 sion viewing” OR abstract: “television viewing” OR title: “TV viewing” OR
 abstract: “TV viewing” OR title: “television time” OR abstract: “television
 time” OR title: “TV time” OR abstract: “TV time” OR title: “television use”
 OR abstract: “television use” OR title: “TV use” OR abstract: “TV use” OR
 title: “computer time” OR abstract: “computer time” OR title: “computer
 use” OR abstract: “computer use” OR title: “tablet time” OR abstract:
 “tablet time” OR title: “tablet use” OR abstract: “tablet use” OR title: “ipad
 time” OR abstract: “ipad time” OR title: “ipad use” OR abstract: “ipad use”
 OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR
 abstract: “phone use” OR title: “smartphone time” OR abstract: “smart-
 phone time” OR title: “smartphone use” OR abstract: “smartphone use”
 OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR
 abstract: “iphone use OR title: videogame OR abstract: videogame OR
 title: videogames OR abstract: videogames OR title: videogaming OR
 abstract: videogaming OR Index Terms: Sedentary Behavior OR index
 Terms: Screen Time OR Index Terms: Computer Games OR Index Terms:
 walking OR Index Terms: running OR Index Terms: swimming OR Index
 Terms: sport

AND
 title: plagiocephaly OR abstract: plagiocephaly OR title: torticollis OR
 abstract: torticollis OR title: injury OR abstract: injury OR title: injuries OR
 abstract: injuries OR title: injured OR abstract: injured OR title: scoliosis
 OR abstract: scoliosis OR title: kyphosis OR abstract: kyphosis OR Index
 Terms: Torticollis

AND
 ((title: (“Controlled Clinical Trials”) OR (abstract: (“Controlled Clinical
 Trials”) OR (title: (“Cross-Over Studies”) OR (abstract: (“Cross-Over
 Studies”) OR (title: (“Cohort Studies”) OR (abstract: (“Cohort Studies”) OR
 (title: (“Follow-Up Studies”) OR (abstract: (“Follow-Up Studies”) OR (title:
 (“Longitudinal Studies”) OR (abstract: (“Longitudinal Studies”) OR (title:
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 omized trial”) OR abstract: (“randomized trial”) OR title: (follow-up) OR
 abstract: (follow-up) OR title: (cross-over) OR abstract: (cross-over) OR
 title: (“Randomized Controlled Trials”) OR abstract: (“Randomized
 Controlled Trials”) OR title: (“Non-Randomized Controlled Trials”) OR
 abstract: (“Non-Randomized Controlled Trials”) OR Any Field: (Index
 Terms: Controlled Clinical Trials) OR Any Field: (Index Terms: Cross-Over
 Studies) OR Any Field: (Index Terms: Cohort Studies) OR Any Field:



(Index Terms: Follow-Up Studies) OR Any Field: (Index Terms: Longitudinal Studies) OR Any Field: (Index Terms: Prospective Studies.)

AND NOT

Index Terms: Pregnancy OR Title: Pregnancy OR Abstract: Pregnancy OR Title: Pregnant OR Abstract: Pregnant



A11 Search string literature search individual studies – outcome physical activity/sedentary behaviour at a later age

This search was conducted on 09-02-2021.

Database: PubMed

Filters: published since: 01-01-2012; language: English, Dutch

(newborn*[tiab] OR neonate*[tiab] OR baby[tiab] OR babies[tiab] OR infan*[tiab] OR toddler*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR kindergarten*[tiab] OR pediatr*[tiab] OR paediatr*[tiab] OR “young child”[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR “early life”[tiab] OR Infant[mesh:noexp] OR Infant, Newborn[mesh:noexp] OR Child, Preschool[mesh])

AND

(“physical activ*”[tiab] OR “physically activ*”[tiab] OR exercis*[tiab] OR crawl*[tiab] OR walk*[tiab] OR run[tiab] OR running[tiab] OR bicycl*[tiab] OR bike[tiab] OR biking[tiab] OR swim*[tiab] OR danc*[tiab] OR sport*[tiab] OR “active play*”[tiab] OR “outdoor play*”[tiab] OR playground*[tiab] OR playtime[tiab] OR “child play”[tiab] OR “children’s play”[tiab] OR “childhood play”[tiab] OR “prone position”[tiab] OR “tummy time”[tiab] OR “floor time”[tiab] OR sedentary[tiab] OR sitting[tiab] OR seated[tiab] OR “supine position”[tiab] OR “car seat”[tiab] OR stroller[tiab] OR “screen time”[tiab] OR “screen-time”[tiab] OR “screen use”[tiab] OR “screen based”[tiab] OR screen-based[tiab] OR “television view*”[tiab] OR

“TV view*”[tiab] OR “television time”[tiab] OR “TV time”[tiab] OR “television use”[tiab] OR “TV use”[tiab] OR “computer time”[tiab] OR “computer use”[tiab] OR “tablet time”[tiab] OR “tablet use”[tiab] OR “ipad time”[tiab] OR “ipad use”[tiab] OR “phone time”[tiab] OR “phone use”[tiab] OR “smartphone time”[tiab] OR “smartphone use”[tiab] OR “iphone time”[tiab] OR “iphone use”[tiab] OR videogam*[tiab] OR Exercise[mesh] OR Sports[mesh:noexp] OR Youth Sports[mesh] OR Play and Playthings[mesh:noexp] OR Prone Position[mesh] OR Sedentary Behavior[mesh] OR Sitting Position[mesh] OR Screen Time[mesh] OR Video Games[mesh] OR Supine Position[mesh])

AND

(tracking[tiab] OR trajector*[tiab] OR “temporal stability”[tiab] OR longitudinal*[tiab] OR prospective*[tiab])

Database: Scopus

Filters: published since: 01-01-2012; language: English, Dutch

TITLE-ABS-KEY (newborn) OR TITLE-ABS-KEY (neonate) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) OR TITLE-ABS-KEY (infan*) OR TITLE-ABS-KEY (toddler*) OR TITLE-ABS-KEY (preschool*) OR TITLE-ABS-KEY (pre-school) OR TITLE-ABS-KEY (kindergarten) OR TITLE-ABS-KEY (pediatr*) OR TITLE-ABS-KEY (paediatr*) OR TITLE-ABS-KEY (“young child”) OR TITLE-ABS-KEY (“early childhood”) OR TITLE-ABS-KEY (“early years”) OR TITLE-ABS-KEY (“ early life”)



AND

TITLE-ABS-KEY (physical activ*) OR TITLE-ABS-KEY (physically activ*)
 OR TITLE-ABS-KEY (exercis*) OR TITLE-ABS-KEY (crawl*) OR TITLE-ABS-KEY (walk*) OR TITLE-ABS-KEY (run) OR TITLE-ABS-KEY (running) OR TITLE-ABS-KEY (bicycl*) OR TITLE-ABS-KEY (bike) OR TITLE-ABS-KEY (biking) OR TITLE-ABS-KEY (swim*) OR TITLE-ABS-KEY (danc*) OR TITLE-ABS-KEY (sport*) OR TITLE-ABS-KEY (“active play”) OR TITLE-ABS-KEY (“outdoor play”) OR TITLE-ABS-KEY (playground) OR TITLE-ABS-KEY (playtime) OR TITLE-ABS-KEY (“child play”) OR TITLE-ABS-KEY (“children’s play”) OR TITLE-ABS-KEY (“childhood play”) OR TITLE-ABS-KEY (“prone position”) OR TITLE-ABS-KEY (“tummy time”) OR TITLE-ABS-KEY (“floor time”) OR TITLE-ABS-KEY (sedentary) OR TITLE-ABS-KEY (sitting) OR TITLE-ABS-KEY (seated) OR TITLE-ABS-KEY (“supine position”) OR TITLE-ABS-KEY (“car seat”) OR TITLE-ABS-KEY (stroller) OR TITLE-ABS-KEY (“screen time”) OR TITLE-ABS-KEY (screen-time) OR TITLE-ABS-KEY (“screen use”) OR TITLE-ABS-KEY (“screen based”) OR TITLE-ABS-KEY (screen-based) OR TITLE-ABS-KEY (“television view”) OR TITLE-ABS-KEY (“tv view”) OR TITLE-ABS-KEY (“television time”) OR TITLE-ABS-KEY (“tv time”) OR TITLE-ABS-KEY (“television use”) OR TITLE-ABS-KEY (“tv use”) OR TITLE-ABS-KEY (“computer time”) OR TITLE-ABS-KEY (“computer use”) OR TITLE-ABS-KEY (“tablet time”) OR TITLE-ABS-KEY (“tablet use”) OR TITLE-ABS-KEY (“ipad time”) OR TITLE-ABS-KEY (“ipad use”) OR TITLE-ABS-KEY (“phone

time”) OR TITLE-ABS-KEY (“phone use”) OR TITLE-ABS-KEY (“smartphone time”) OR TITLE-ABS-KEY (“smartphone use”) OR TITLE-ABS-KEY (“iphone time”) OR TITLE-ABS-KEY (“iphone use”) OR TITLE-ABS-KEY (videogam*)

AND

TITLE-ABS (tracking) OR TITLE-ABS (trajector*) OR TITLE-ABS (“temporal stability”) OR TITLE-ABS (longitudinal*) OR TITLE-ABS (prospective*)

Database: PsycInfo

Filters: published since: 01-01-2012; language: English, Dutch

Title: “early life” OR abstract: “early life” OR title: “young child” OR abstract: “young child” OR title: “young children” OR abstract: “young children” OR title: “early childhood” OR abstract: “early childhood” OR title: “early years” OR abstract: “early years” OR title: preschool OR abstract: preschool OR title: preschoolers OR abstract: preschoolers OR title: pediatric OR abstract: pediatric OR title: paediatric OR abstract: paediatric OR title: kindergarten OR abstract: kindergarten OR title: kindergartens OR abstract: kindergartens OR title: pre-school OR abstract: pre-school OR title: pre-schoolers OR abstract: pre-schoolers OR title: toddler OR abstract: toddler OR title: toddlers OR abstract: toddlers OR title: infant OR abstract: infant OR title: infants OR abstract: infants OR title: infancy OR abstract: infancy OR title: baby OR abstract: baby OR title: babies OR



abstract: babies OR title: neonate OR abstract: neonate OR title: neonates
 OR abstract: neonates OR title: newborn OR abstract: newborn OR title:
 newborns OR abstract: newborns

AND

Title: “physical activity” OR abstract: “physical activity” OR title: “physical
 activities” OR abstract: “physical activities” OR title: “physically active” OR
 abstract: “physically active” OR title: exercise OR abstract: exercise OR
 title: exercises OR abstract: exercises OR title: exercising OR abstract:
 exercising OR title: crawling OR abstract: crawling OR title: crawl OR
 abstract: crawl OR title: walk OR abstract: walk OR title: walking OR
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 ground OR abstract: playground OR title: playgrounds OR abstract: play-
 grounds OR title: “prone position” OR abstract: “prone position” OR title:
 sedentary OR abstract: sedentary OR title: sitting OR abstract: sitting OR
 title: seated OR abstract: seated OR title: “car seat” OR abstract: “car
 seat” OR title: “active play” OR abstract: “active play” OR title: “active
 playing” OR abstract: “active playing” OR title: “outdoor play” OR abstract:
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OR title: playtime OR abstract: playtime OR title: “child play” OR abstract:
 “child play” OR title: “children’s play” OR abstract: “children’s play” OR
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 OR abstract: “tummy time” OR title: “floor time” OR abstract: “floor time”
 OR title: “supine position” OR abstract: “supine position” OR title: stroller
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 title: screen-time OR abstract: screen-time OR title: “screen use” OR
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 based” OR title: screen-based OR abstract: screen-based OR title: “televi-
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 OR title: “phone time” OR abstract: “phone time” OR title: “phone use” OR
 abstract: “phone use” OR title: “smartphone time” OR abstract: “smart-
 phone time” OR title: “smartphone use” OR abstract: “smartphone use”
 OR title: “iphone time” OR abstract: “iphone time” OR title: “iphone use OR
 abstract: “iphone use OR title: videogame OR abstract: videogame OR
 title: videogames OR abstract: videogames OR title: videogaming OR
 abstract: videogaming OR Index Terms: Sedentary Behavior OR index



Terms: Screen Time OR Index Terms: Computer Games OR Index Terms:
walking OR Index Terms: running OR Index Terms: swimming OR Index
Terms: sport

AND

Index Terms: tracking OR Title: tracking OR Abstract: tracking OR Title:
trajector* OR Abstract: trajector* OR Title: “temporal stability” OR Abstract:
“temporal stability” OR Title: longitudinal* OR Abstract: longitudinal* OR
Title: prospective* OR Abstract: prospective*



B Study selection criteria

B1 Study selection criteria reviews

All outcomes except physical activity/sedentary behaviour at a later age

Type of article	Study	Population	Exposure(s)	Outcome(s)
Systematic literature reviews, meta-analyses, and pooled analyses (from now on: “reviews”) published since 01-01-2000 in an English or Dutch article in a peer-reviewed scientific journal with the full-text available.	Prospective research, both experimental and observational. <i>If a review itself was used and other study designs were included in said review, the results of the prospective studies must be reported separately. Reviews must have included at least 5 studies, with a total of at least 100 participants.</i>	Children with a mean age of under five years old when the exposure was measured. Reviews that were specifically focused on children with chronic diseases, physical limitations, or developmental delays were excluded. <i>If a review itself was used and other age groups were included in said review, the results for children under five years old must be reported separately.</i>	All forms of physical activity (“any bodily movement produced by skeletal muscles that requires energy expenditure”) and sedentary behaviour (“any waking behaviour characterised by a low energy expenditure, while in a sitting, reclining or lying posture”).	Bone health, cardiometabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, and risks.

B2 Study selection criteria reviews

Outcome: physical activity/sedentary behaviour at a later age

Type of article	Study	Population	Exposure(s)	Outcome(s)
Systematic literature reviews, meta-analyses, and pooled analyses (from now on: “reviews”) published since 01-01-2000 in an English or Dutch article in a peer-reviewed scientific journal with the full-text available.	Prospective research, both experimental and observational, in which individual physical activity behaviour and/or sedentary behaviour is tracked over time.	Children with a mean age of under five years old when the exposure was measured. Reviews that were specifically focused on children with chronic diseases, physical limitations, or developmental delays were excluded.	All forms of physical activity (“any bodily movement produced by skeletal muscles that requires energy expenditure”) and sedentary behaviour (“any waking behaviour characterised by a low energy expenditure, while in a sitting, reclining or lying posture”).	All forms of physical activity (“any bodily movement produced by skeletal muscles that requires energy expenditure”) and sedentary behaviour (“any waking behaviour characterised by a low energy expenditure, while in a sitting, reclining or lying posture”).



B3 Study selection criteria individual studies

All outcomes except physical activity/sedentary behaviour at a later age

Type of article	Study	Population	Exposure(s)	Outcome(s)
Original research published in an English or Dutch article in a peer-reviewed scientific journal with the full-text available.	Prospective research, both experimental and observational.	Children with a mean age of under five years old when the exposure was measured. Studies that were specifically focused on children with chronic diseases, physical limitations, or developmental delays were excluded.	All forms of physical activity (“any bodily movement produced by skeletal muscles that requires energy expenditure”) and sedentary behaviour (“any waking behaviour characterised by a low energy expenditure, while in a sitting, reclining or lying posture”). In experimental studies, the difference in physical activity or sedentary behaviour content between intervention conditions must at least have been described. Experimental studies that focused on the acute effects of a singular intervention activity were excluded.	Bone health, cardiometabolic health, body composition, fitness, motor development, cognitive development, psychosocial development, and risks.

B4 Study selection criteria individual studies

Outcome: physical activity/sedentary behaviour at a later age

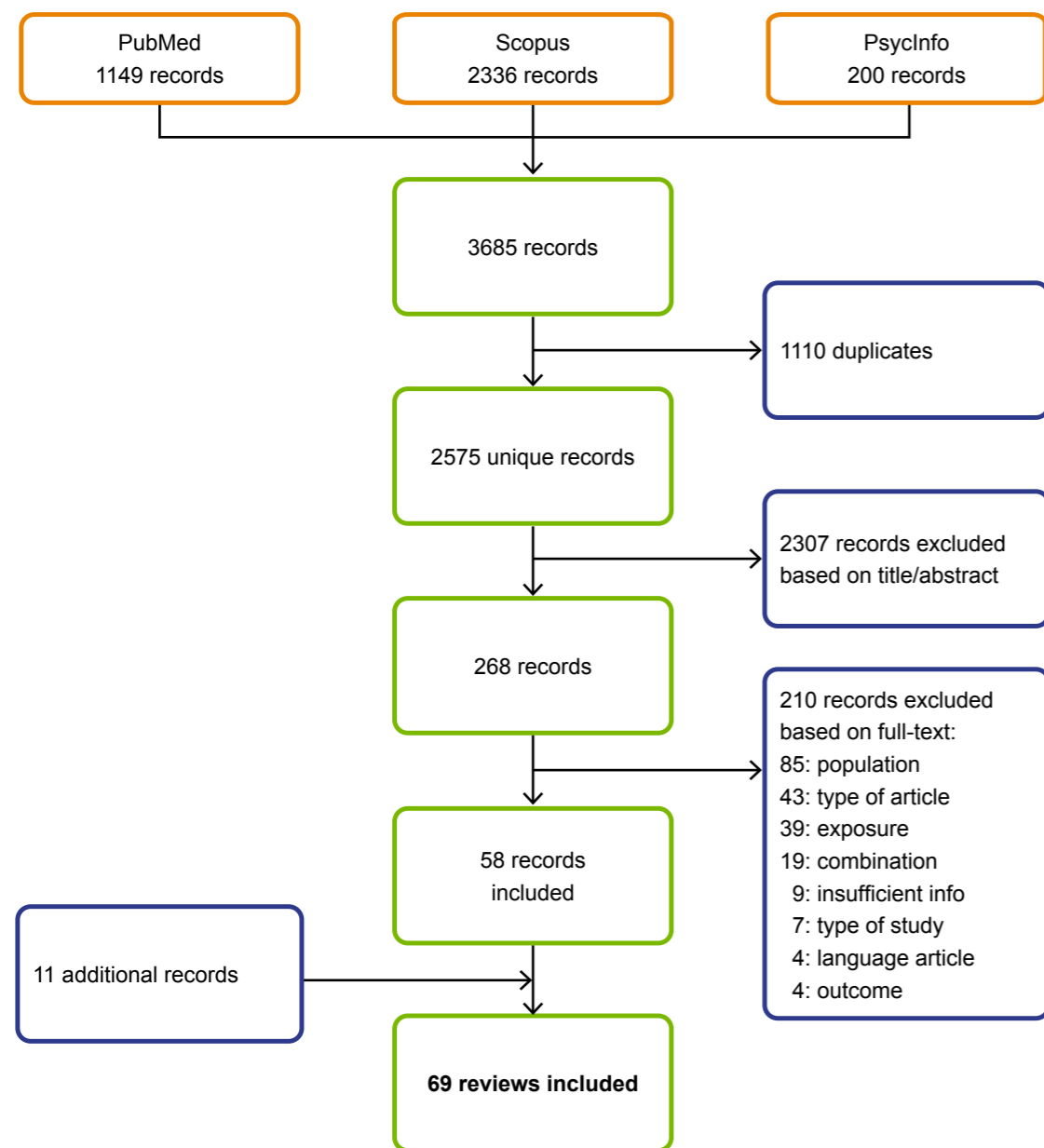
Type of article	Study	Population	Exposure(s)	Outcome(s)
Original research published in an English or Dutch article in a peer-reviewed scientific journal with the full-text available.	Prospective research, both experimental and observational, in which individual physical activity behaviour and/or sedentary behaviour is tracked over time.	Children with a mean age of under five years old when the exposure was measured. Studies that were specifically focused on children with chronic diseases, physical limitations, or developmental delays were excluded.	All forms of physical activity (“any bodily movement produced by skeletal muscles that requires energy expenditure”) and sedentary behaviour (“any waking behaviour characterised by a low energy expenditure, while in a sitting, reclining or lying posture”).	All forms of physical activity (“any bodily movement produced by skeletal muscles that requires energy expenditure”) and sedentary behaviour (“any waking behaviour characterised by a low energy expenditure, while in a sitting, reclining or lying posture”).



C Flow charts literature searches

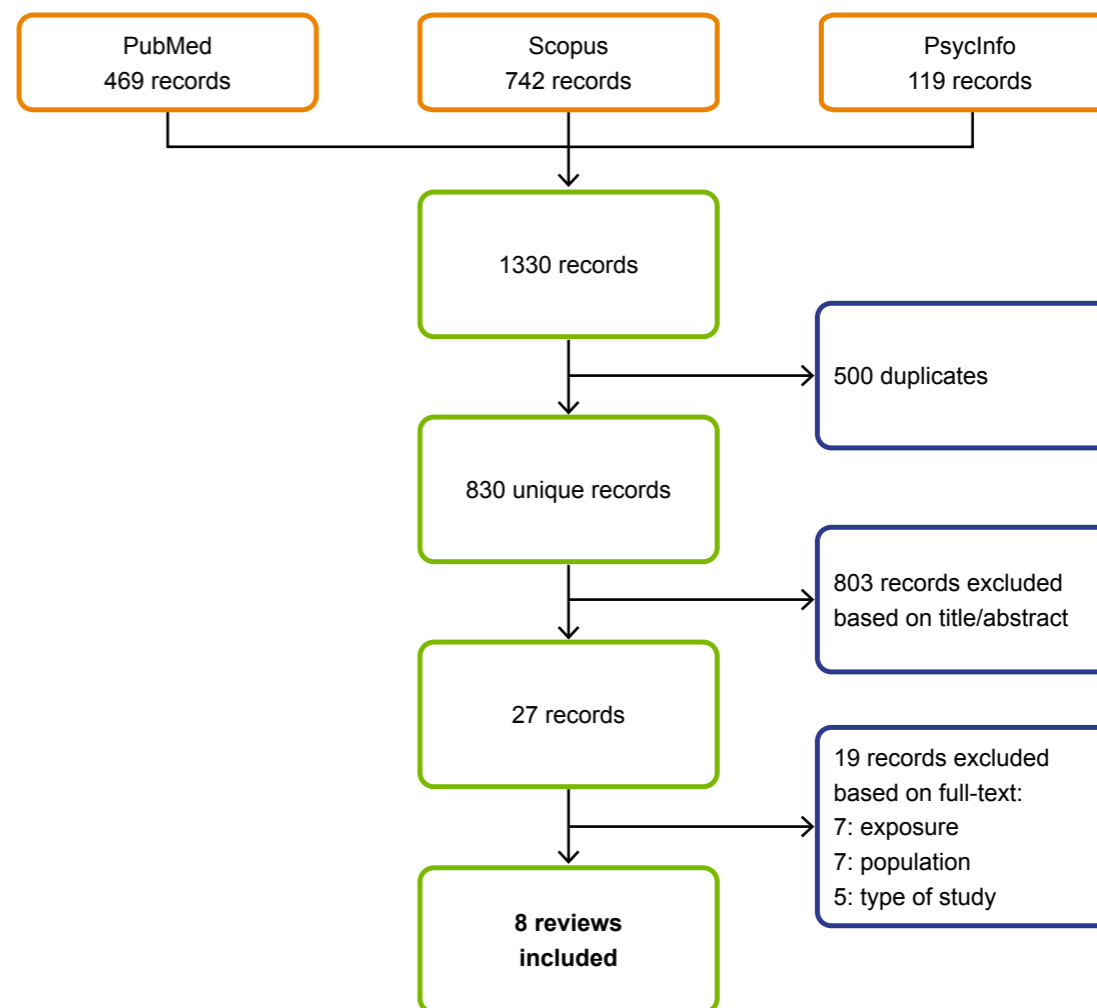
C1 Literature search reviews

All outcomes except physical activity/sedentary behaviour at a later age



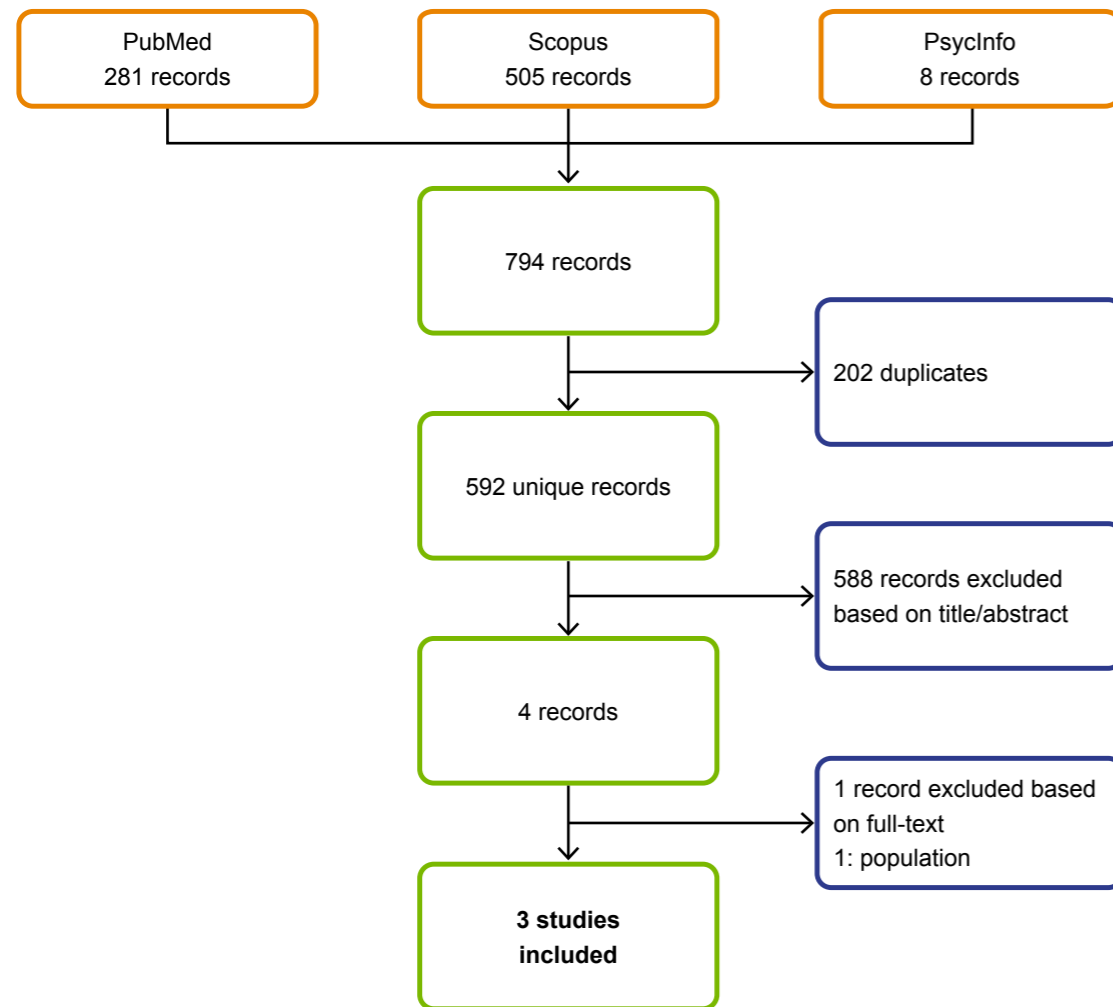
C2 Literature search reviews

Outcome physical activity/sedentary behaviour at a later age



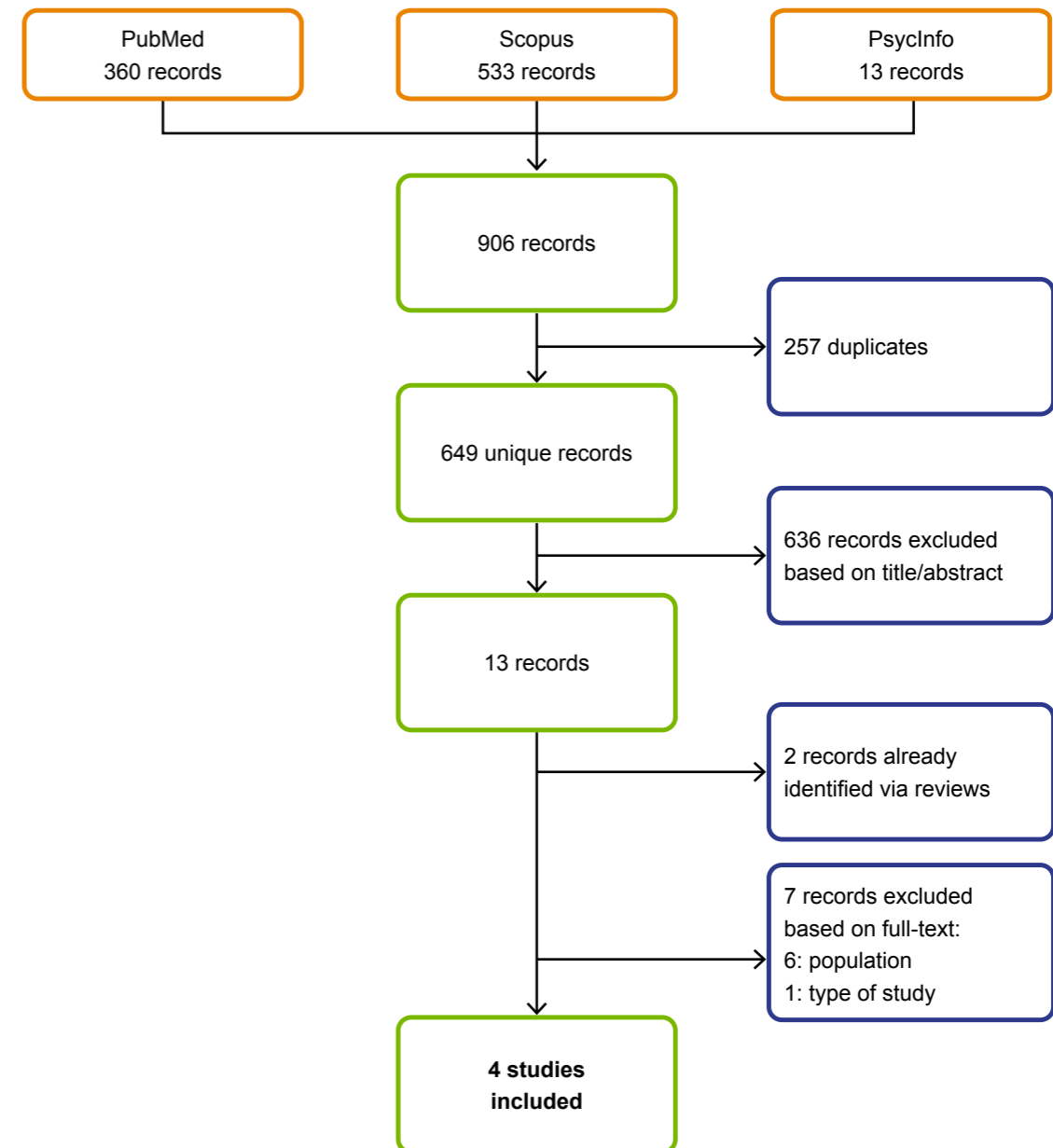
C3 Literature search individual studies

Outcome: bone health

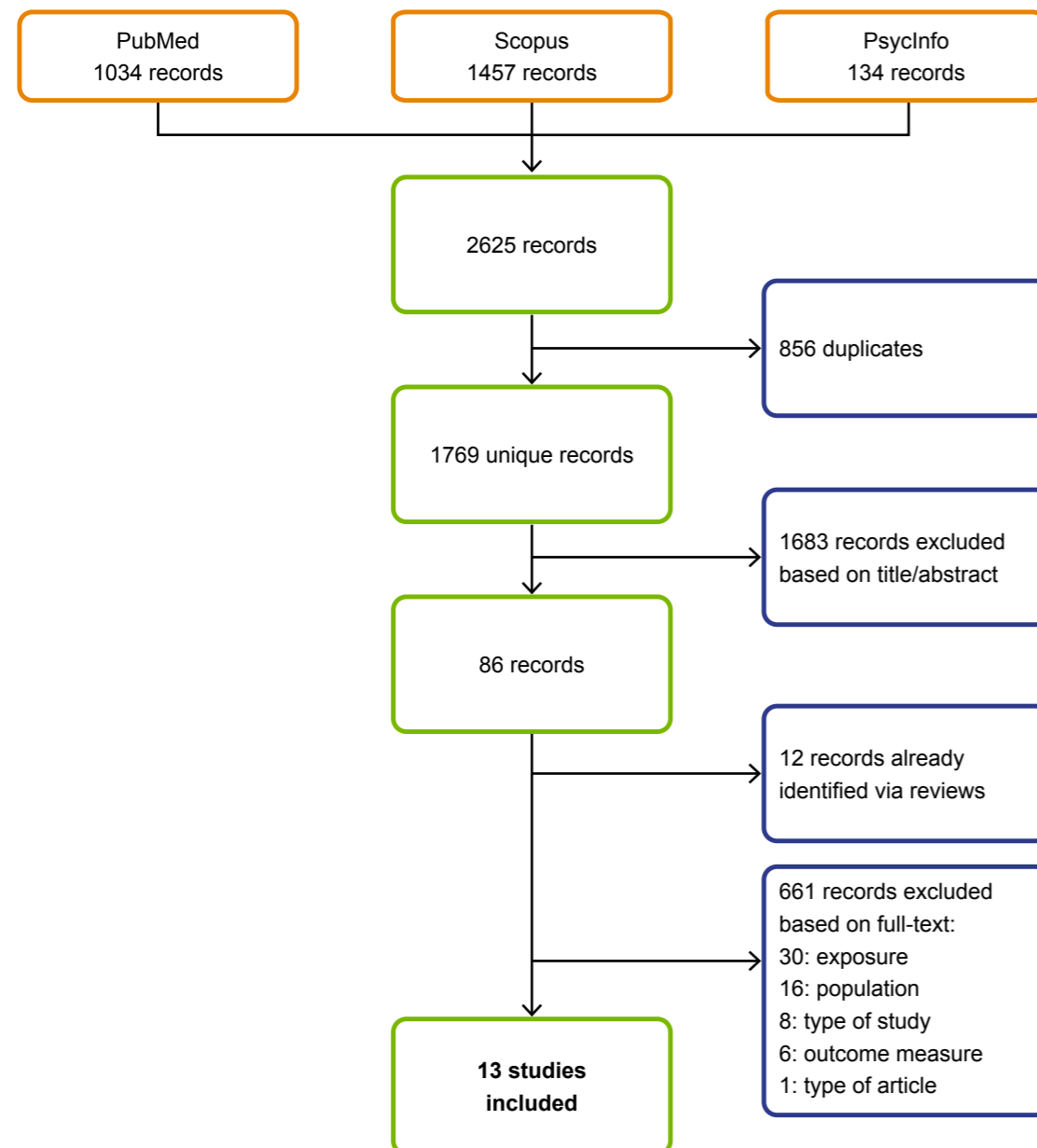


C4 Literature search individual studies

Outcome: cardiometabolic health



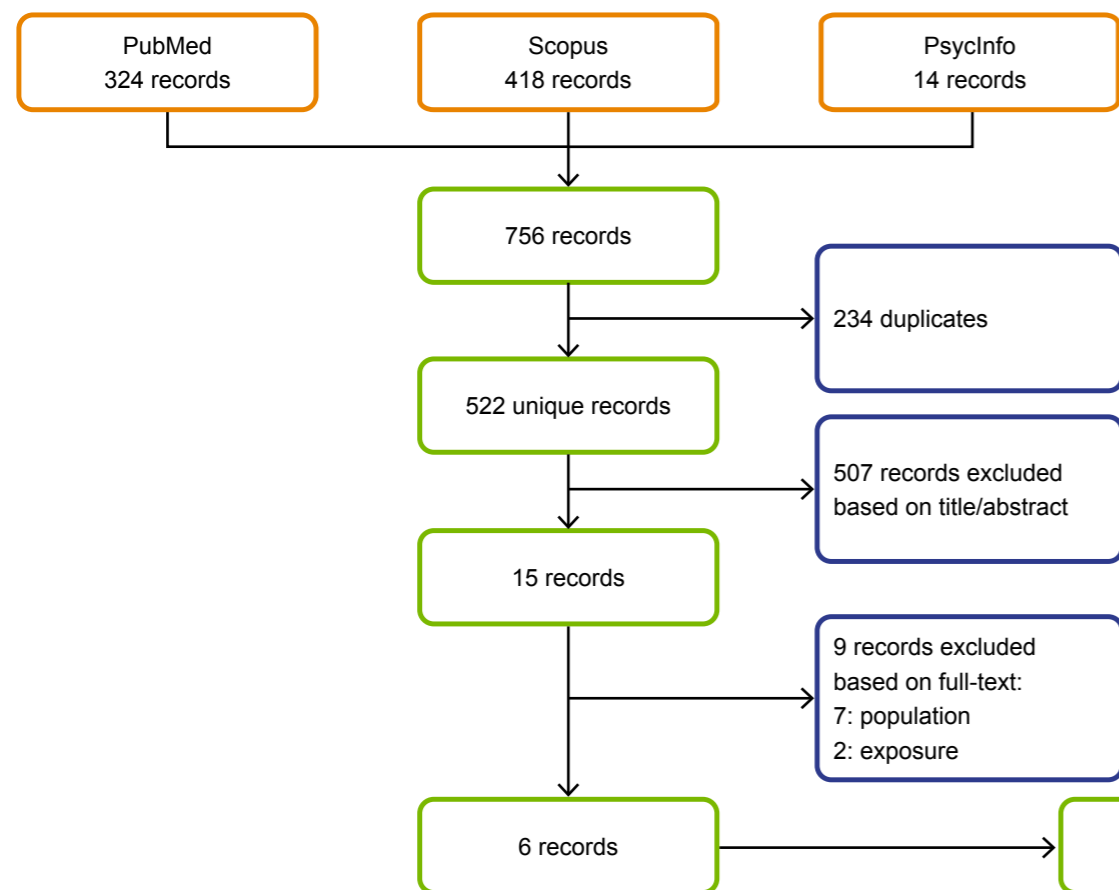
C5 Individual studies

Outcome: body composition

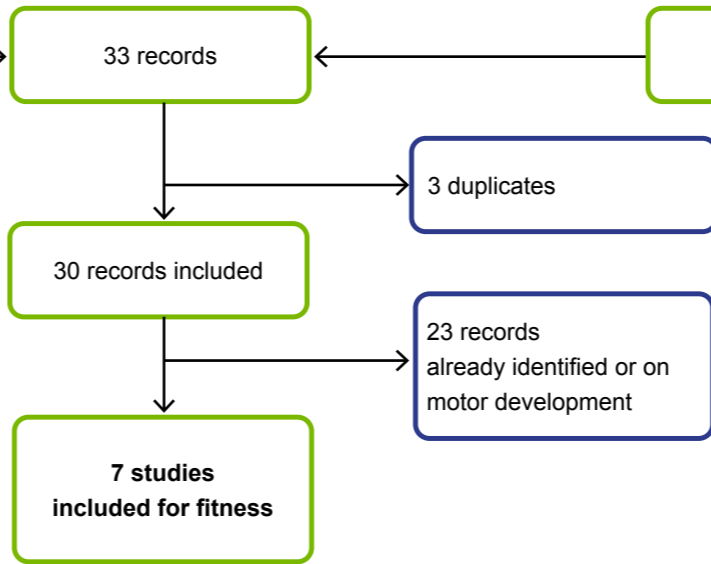
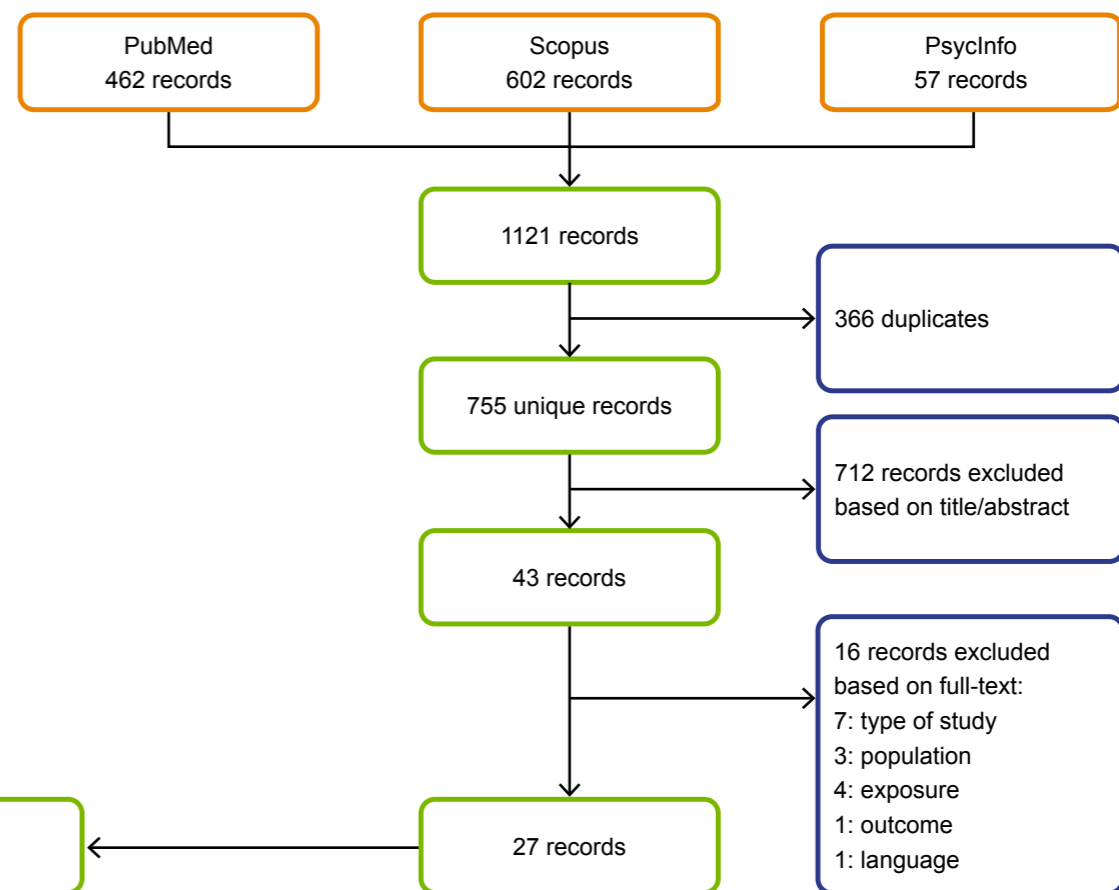
C6 Individual studies

Outcome: fitness and motor development

Fitness



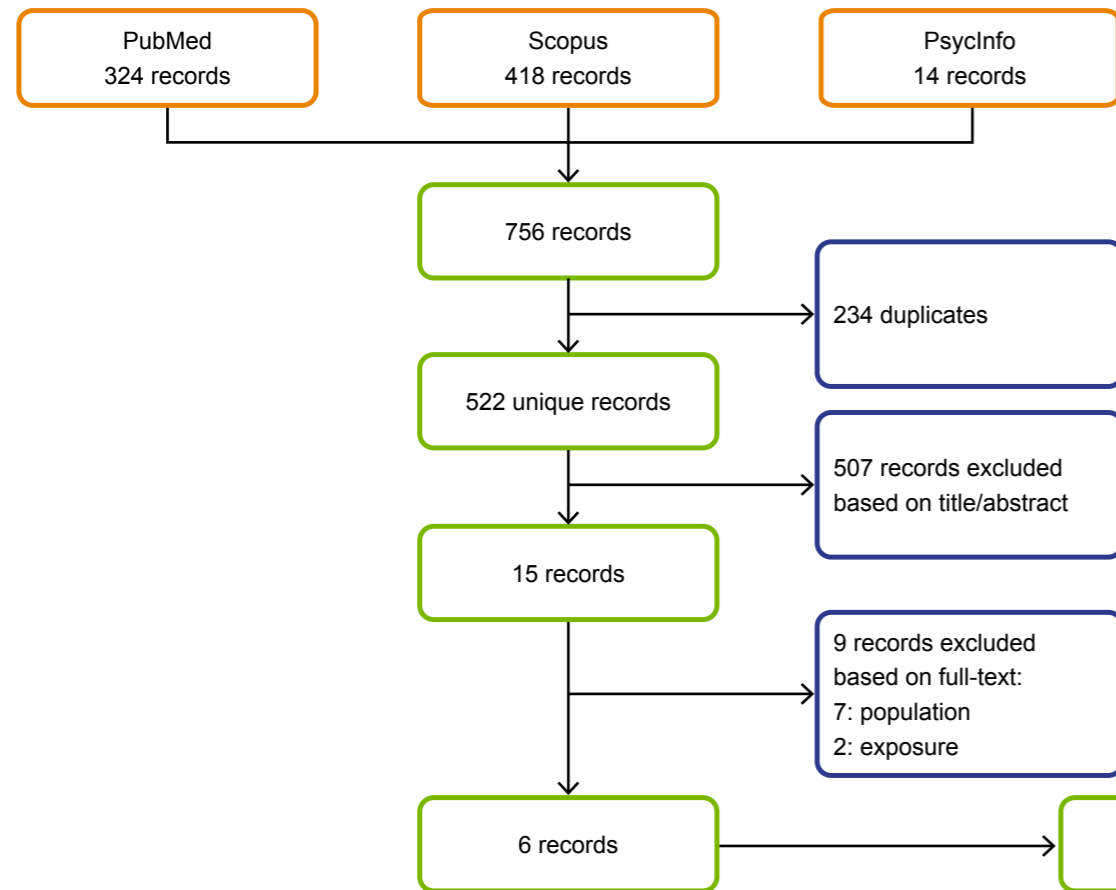
Motor development



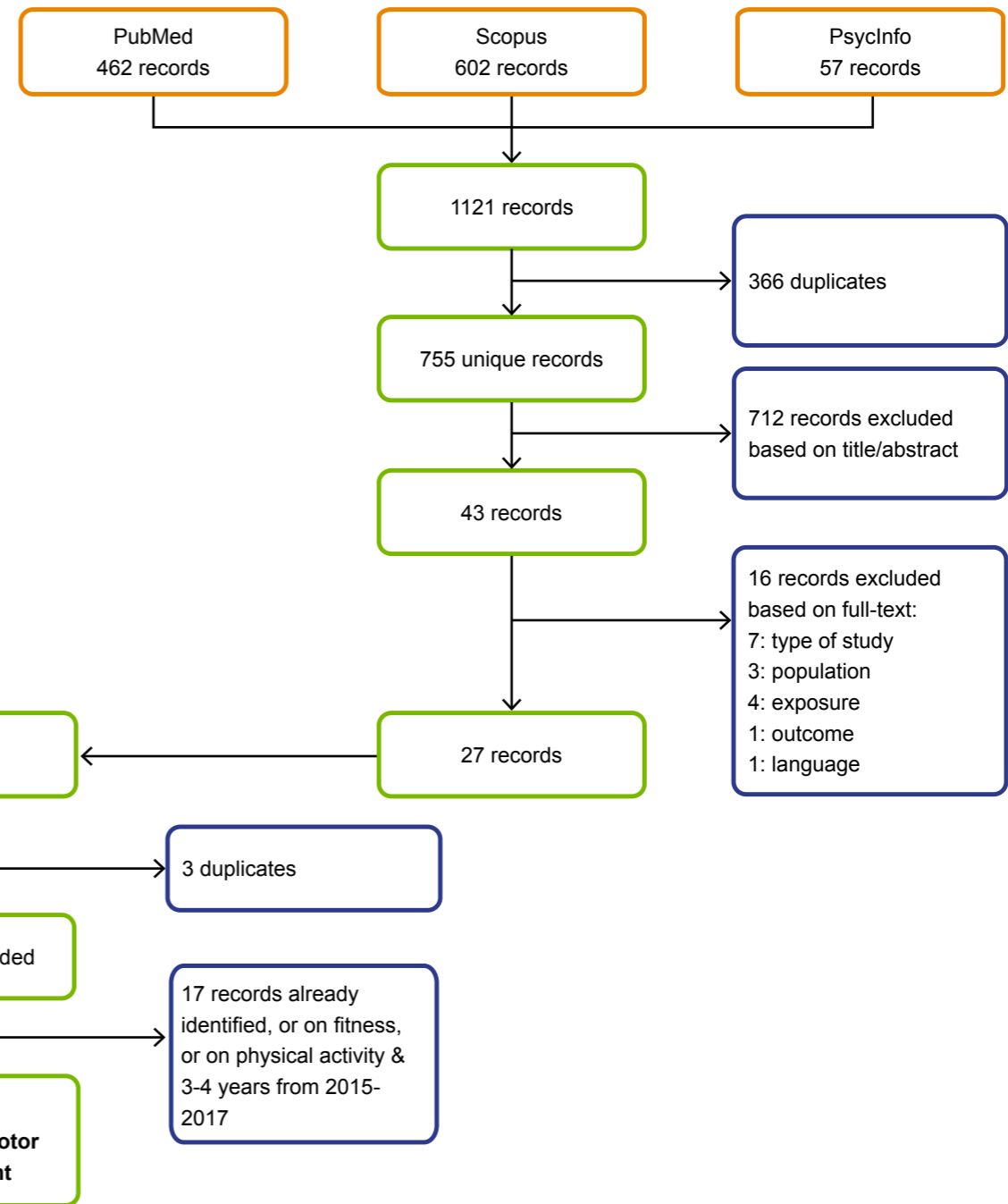
C7 Individual studies

Outcome: motor development and fitness

Fitness

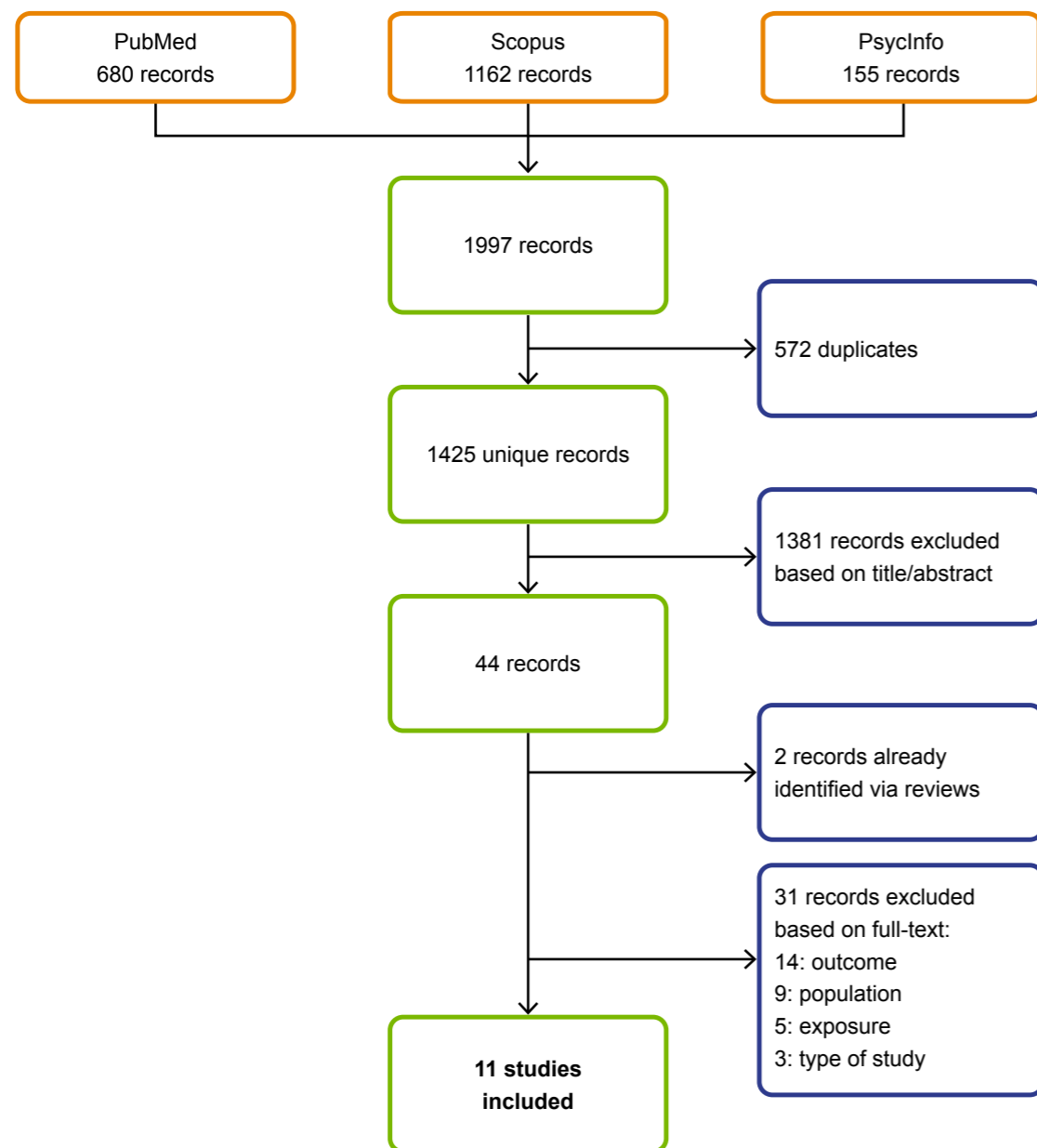


Motor development



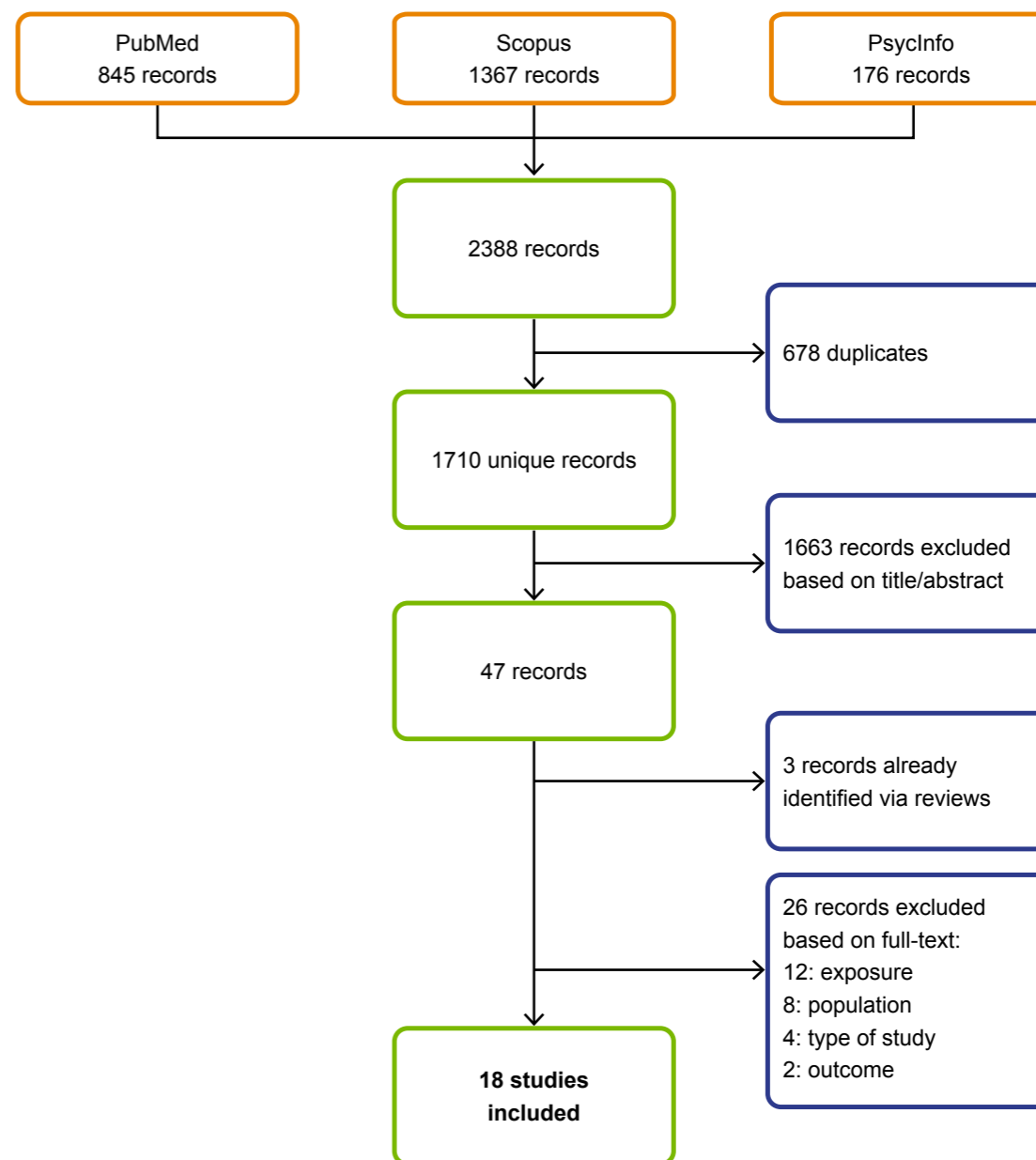
C8 Literature search individual studies

Outcome: cognitive development



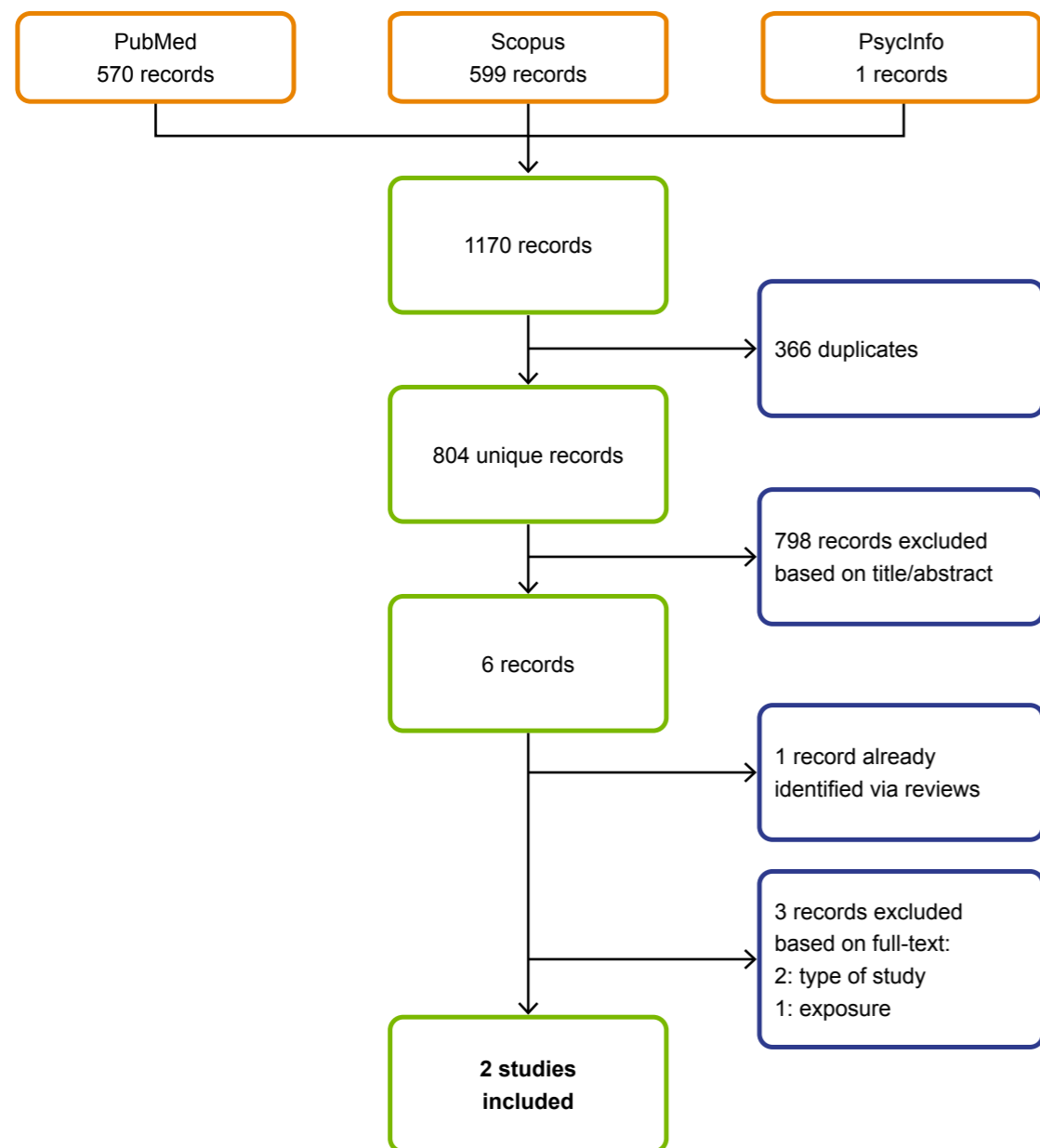
C9 Literature search individual studies

Outcome: psychosocial development



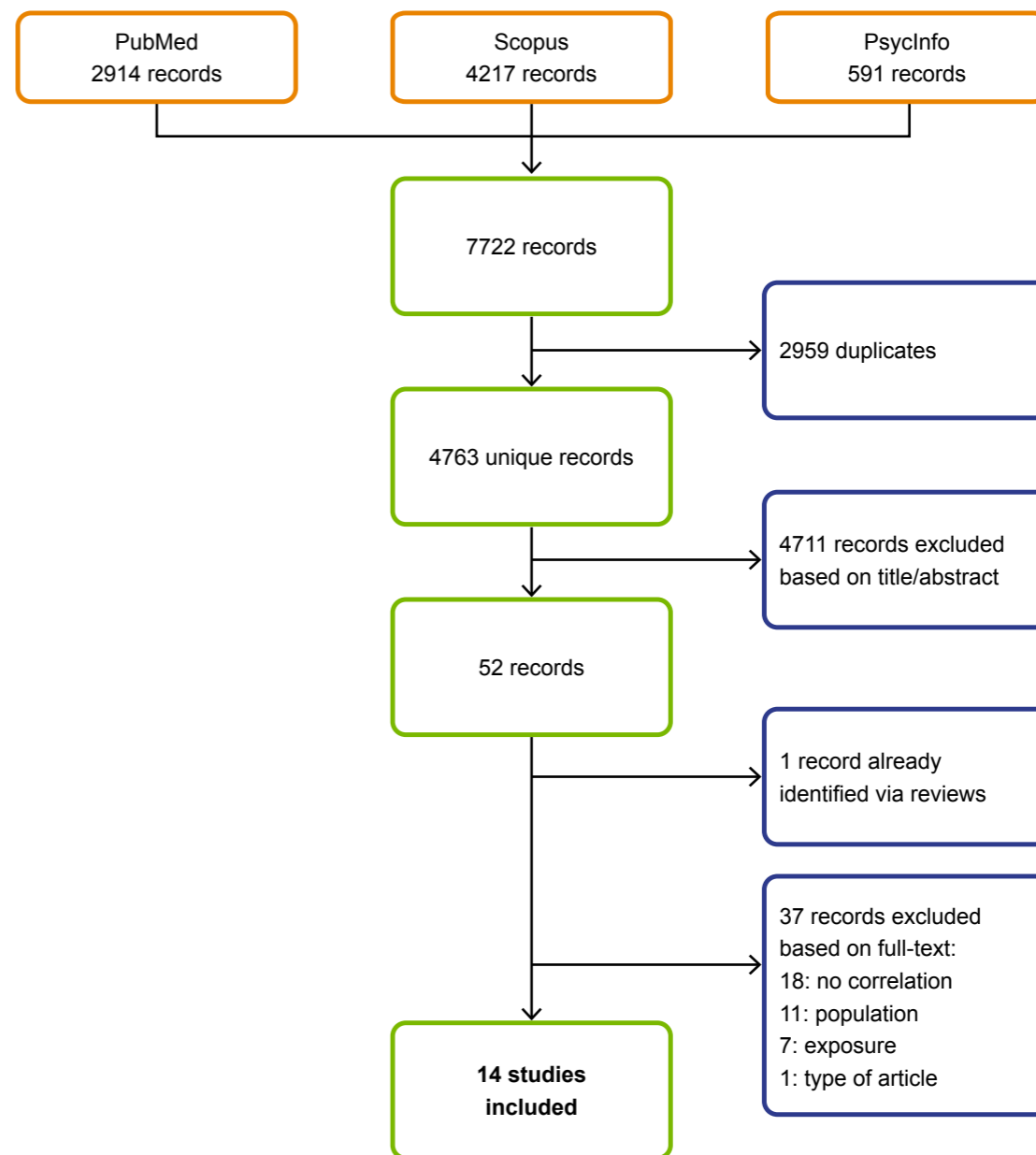
C10 Literature search individual studies

Outcome: risks



C11 Literature search individual studies

Outcome: physical activity/sedentary behaviour at a later age



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