

the WHO guidelines on physical activity, sedentary behaviour and sleep in children under 5 years of age

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This publication forms part of the WHO guideline entitled WHO Global guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. It is being made publicly available as supplied by those responsible for its development for transparency purposes and information, as required by WHO (see the WHO handbook for guideline development, 2nd edition (2014).

## Acknowledgements

This report was prepared by Casey Gray of the Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario Research Institute, Canada, and Juana Willumsen of the Department for Prevention of Noncommunicable Diseases, WHO, on behalf of the Guideline Development Group for the WHO Global guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age.

Photo credit: WHO /Jim Holmes, 2006

# **Background**

The guidelines development group for the WHO Global guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age met in November 2017. At this meeting they requested that the recent, high-quality systematic reviews on physical activity (1), sedentary behaviours (2), sleep (3) and the integration of these behaviours in a 24-hour day (4) in children under 5 years of age, that had informed the development of guidelines in Canada and subsequently updated to inform guidelines in Australia (5), be updated. In particular they requested that searches be expanded to incorporate all 6 official languages and any high-quality studies published since the systematic review searches in March 2017. All new high-quality studies identified were included in the GRADE tables included in the WHO guidelines.

## **Research Question**

What are the relationships between movement behaviours (i.e., physical activity, sedentary behaviour, sleep, or combinations of movement behaviours) and "critical" health indicators in the early years (0-4 years)?

## **Methods**

## **Eligibility criteria (PICO)**

The *a priori* inclusion criteria were: population (apparently healthy, 1 month to 4.99 years), intervention/exposure and comparator (durations, patterns, and types of sedentary behaviour and physical activity; various sleep durations), outcome/health indicator (critical: adiposity, motor development, psychosocial health, cognitive development, fitness, risks/harm, emotional regulation [sleep only], and growth [sleep only]), and study designs (all study designs were eligible for inclusion; only longitudinal/cohort and experimental study designs were extracted).

## Information sources and search strategies

English, French, and Spanish searches were developed and updated by Margaret Sampson<sup>2</sup>. Searches for Chinese, Russian, and Arabic records were completed by Zhiguang Zhang<sup>3</sup> and Joao Rodrigues Pereira<sup>3</sup>. The original English search strategy was translated to Chinese and run in a Chinese Language database by Zhiguang Zhang.

## Physical activity search methods

Search updates from March 2017 were run between December 6 and December 21, 2017, with harms updated from early 2016. For databases with language limits available, searches were also run from database inception to present to identify material published in Spanish. The following databases were searched: MEDLINE including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) and EBM Reviews - Cochrane Central Register of Controlled Trial (CENTRAL, May 2016) on the Ovid platform, SportDiscus on the Ebscohost platform and LILACS on the Virtual Health Library platform. The MEDLINE search strategy was developed for the Early Years Guideline project by a librarian experienced in systematic review searching, and peer reviewed by another librarian, using the PRESS standard (6). The MEDLINE search was then adapted for the other databases. Journal articles published in English, French or Spanish were sought. The search strategies are presented in Appendix 1.

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## Sedentary behaviour search methods

Search updates from March 2017 were run between December 11 and December 21, 2017, with harms updated from early 2016. For databases with language limits available, searches were also run from database inception to present to identify material published in Spanish. The following databases were searched: MEDLINE including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R), Embase, PsycINFO and EBM Reviews - Cochrane Central Register of Controlled Trial on the Ovid platform, SportDiscus on the Ebscohost platform and LILACS on the Virtual Health Library platform. The MEDLINE search strategy was developed for the Early Years Guideline project by a librarian experienced in systematic review searching, and peer reviewed by another librarian, using the PRESS standard (6). The MEDLINE search was then adapted for the other databases. Journal articles published in English, French or Spanish were sought. The search strategies are presented in Appendix 2.

#### Sleep search methods

Search updates from March 2017 were run between December 18 and December 21, 2017, with harms updated from early 2016. For databases with language limits available, searches were also run from database inception to present to identify material published in Spanish. The following databases were searched: MEDLINE including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R), Embase, PsycINFO and EBM Reviews - Cochrane Central Register of Controlled Trial (CENTRAL) on the Ovid platform and LILACS on the Virtual Health Library platform. The MEDLINE search strategy was developed for the Early Years Guideline project by a librarian experienced in systematic review searching, and peer reviewed by another librarian, using the PRESS standard (6). The MEDLINE search was then adapted for the other databases. Journal articles published in English, French or Spanish were sought. The search strategies are presented in Appendix 3.

## Integrated search methods

Searches were run between December 20 and December 22, 2017 as updates from March 2017, with harms updated from early 2016. For databases with language limits available, searches were also run from database inception to present to identify material published in Spanish. The following databases were searched: MEDLINE including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) and EBM Reviews - Cochrane Central Register of Controlled Trial (CENTRAL, May 2016) on the Ovid platform, SportDiscus on the Ebscohost platform and LILACS on the Virtual Health Library platform. The MEDLINE search strategy was developed for the Early Years Guideline project by a librarian experienced in systematic review searching, and peer reviewed by another librarian, using the PRESS standard (6). The MEDLINE search was then adapted for the other database. Journal articles published in English, French or Spanish were sought. The search strategies are presented in Appendix 4.

## Screening, extraction, and abstraction (English, French, Spanish)

The following process was followed for each review. Initial deduplication of bibliographic records identified in MEDLINE and CENTRAL was completed online. Deduplicated records were manually combined with records identified from all other databases, extracted as text files, and imported into Reference Manager Software (Version 11; Thompson Reuters, San Francisco, CA, USA) for final manual deduplication. Deduplicated records were uploaded to DistillerSR (Evidence Partners,

Ottawa, ON, Canada) for screening. Screening, data extraction, and quality assessment followed the reported processes for the original reviews (Carson et al. 2017; Chaput et al. 2017; Kuzik et al. 2017; Poitras et al. 2017).

Screening and data extraction was conducted by members of the Healthy Active Living and Obesity Research Group at the Children's Hospital of Eastern Ontario Research Institute, Canada.

## **Results**

## **Search Records**

Table 1. Physical activity search results							
Database	English*	French*	Spanish*	Chinese initial hits	Russian initial hits	Arabic initial hits	
MEDLINE	460	0	129	27	109	0	
SPORTDiscus	395	0	22	925	106	1	
CENTRAL	214	0	0	N/A	N/A	N/A	
PsycINFO	N/A	N/A	N/A	403	697	10	
EMBASE	N/A	N/A	N/A	98	120	3	
LILACS	N/A	N/A	30	N/A	N/A	N/A	
CJAD	N/A	N/A	N/A	1572	N/A	N/A	
Records retrieved from database search	1069	0	181	3025	1032	14	
Included titles and abstracts	33	0	7	12	0	0	
Studies identified from other reviews (SB, sleep, integrated)	0	0	0	3	0	0	
Included full text studies [FINAL]	2 experimental; 3 longitudinal; 8 cross- sectional	1 cross-sectional  Note. study was not flagged as French by the search	1 1 experimental	5 case-control; 5 cross- sectional	0	0	

Table 2. Sedentary behaviour search results							
Database	English*	French*	Spanish*	Chinese initial hits	Russian initial hits	Arabic initial hits	
MEDLINE	48	0	62	17	24	0	
EMBASE	170	0	12	134	0	4	
SPORTDiscus	202	0	17	7	4	0	
PsycINFO	124	0	4	0	3	0	
CENTRAL	2	0	0	N/A	N/A	N/A	
LILACS	N/A	N/A	6	N/A	N/A	N/A	
Communication Source	N/A	N/A	N/A	0	0	0	
Gale Communications and Mass Media Collection	N/A	N/A	N/A	0	0	0	
CAJD	N/A	N/A	N/A	201	N/A	N/A	
Records retrieved from database search	546	0	101	359	31	4	
Included titles and abstracts	51	0	0	0	0	0	
Studies identified from other reviews (PA, sleep, integrated)	0	0	0	3	0	0	
Included full text studies [FINAL]	5 longitudinal; 8 cross- sectional  Note. 5 longitudinal studies includes Thurber et al., however modelling data were presented and Are not included in SoF or GRADE tables	0	2 2 cross- sectional	4 case-control 10 cross sectional	0	0	

Table 3. Sleep search results							
Database	English*	French*	Spanish*	Chinese	Russian	Arabic	
				initial hits	initial hits	initial hits	
MEDLINE	16	0	2	4	1	0	
EMBASE	33	0	4	5	0	1	
PsycINFO	25	0	1	7	1	0	
CENTRAL	8	0	0	N/A	N/A	N/A	
LILACS	N/A	N/A	0	N/A	N/A	N/A	
CAJD	N/A	N/A	N/A	392	N/A	N/A	
Final included	TBD	TBD	TBD	5	0	0	
studies							
Records retrieved	82	0	7	413	2	1	
Included titles and	25	0	0	2	0	0	
abstracts							
Studies identified	0	0	0	5	0	0	
from other							
reviews (SB, PA,							
integrated)							
Included full text	10	1	0	5	0	0	
studies [FINAL]							
	5 longitudinal; 5 cross-	1 cross- sectional		3 case-control; 2 cross			
	sectional;	sectional		sectional			
		Note. study					
		was not					
		flagged as French by the					
		search					

Table 4. Integrated	Table 4. Integrated movement behaviours (any combination of physical activity +/or sedentary						
behaviour +/or sleep) search results							
Database	English*	French*	Spanish*	Chinese**	Russian**	Arabic**	
MEDLINE	61	0	26	215	30	0	
EMBASE	75	0	9	9	0	0	
PsycINFO	32	0	0	1	0	0	
SPORTDiscus	78	0	7	0	0	0	
LILACS	N/A	N/A	6	N/A	N/A	N/A	
Records retrieved	246	0	48	225	30	0	
Included titles and abstracts	16	0	0	0	0	0	
Studies identified from other reviews (PA, SB, sleep)	1	0	0	0	0	0	
Included full text studies [FINAL]	2 experimental; 1 longtidudinal; 1 cross- sectional	0	0	0	0	0	

\*search results are de-duplicated CAJD is the Chinese Academic Journal Network Publishing Database LILACS is the Spanish database: Literature of Latin America and the Caribbean

## **Description of studies**

## **Physical activity**

Twenty-five new studies were identified in the present update of the physical activity review (14 cross-sectional, 5 case-control, 3 longitudinal, 2 non-randomized intervention, 1 cluster randomized controlled trial [RCT]). Studies were published in English (13), French (1), Spanish (1), and Chinese (10). No new Arabic or Russian language studies were eligible for inclusion.

Experimental and longitudinal studies included data from 2327 unique participants from studies conducted in 4 countries: Australia (2), Spain (2), France (1), and Sweden (1). Baseline age ranged from "birth" to mean age 4.88 years. Follow-up was up to 3 years. Outcomes examined were adiposity (2 studies), motor development (1 study), cognitive development (3 studies), and fitness (1 study). Chinese language case-control (5 studies) and cross-sectional (5 studies) studies conducted in China included data from 16,567 participants. Outcomes examined were adiposity (8 studies), fitness (1 study), and cardiometabolic health (1 study).

One new longitudinal study conducted in Australia was included in the Australian update of the physical activity review. Data from 185 unique participants with a mean age of 19 months at baseline and 3.5 years at follow up were included in the review. The outcome examined was motor development.

## **Sedentary Behaviour**

Twenty-nine new studies were identified in the present update of the sedentary behaviour review (20 cross-sectional, 4 case-control, 5 longitudinal). Studies were published in English (13), Spanish (2), and Chinese (14). No new Arabic or Russian language studies were eligible for inclusion. Data across the 4 extracted longitudinal studies involved 2,222 unique participants from studies conducted in Sweden (1), France (1), Spain (1) and Australia (1). Approximate baseline age ranged from 2 years to 4.48 years. Follow-up was up to 3 years. Outcomes examined by longitudinal studies were adiposity (2 studies), cognitive development (1 study), psychosocial health (1 study) and fitness (1 study). Chinese language case-control (4) and cross-sectional (10) studies conducted in China included data from 2581 participants. Outcomes examined were adiposity (10), fitness (1), psychosocial health (2) and cognitive development (1).

Three new studies were included in the Australian update of the sedentary behaviour review (1 RCT, 2 longitudinal). Data from 2,592 unique participants were included. Approximate baseline ages were between 1 year and 5 years, and follow-up was up to 15 years. Studies were conducted in Australia (1), USA (1) and the UK (1). The outcomes examined were adiposity (2 studies) and psychosocial health (2 studies).

## Sleep

Sixteen new studies were identified in the present update of the sleep systematic review (8 cross-sectional; 3 case-control; 5 longitudinal). Studies were published in English (10), French (1), and Chinese (5). No new Arabic or Russian language studies were eligible for inclusion. This update included data from 9401 participants (1957 unique participants) from longitudinal studies conducted in 3 countries: Netherlands (2), England (1), USA (2). Baseline age of the new studies ranged from average age 2 months to mean age 24.43 months; follow-up was up to 6 years. Outcomes examined by longitudinal studies were adiposity (2 studies), emotional regulation (2 studies), and cognitive development (1 study). Chinese language case-control (3 studies) and cross-sectional (2 studies) studies conducted in China included data from 12019 participants. Outcomes examined were adiposity (3 studies) and cognitive development (1 study).

Two new studies were included in the Australian update of the sedentary behaviour review (1 RCT, 1 longitudinal). Data from 1252 participants were included. Baseline ages were 1 year and 2.5 years at baseline. Follow up was up to age 10 years. This update included data from studies conducted in Germany and Brazil. Outcomes examined were cognitive development (2 studies). *Note*: A third study was included in the Australian update, however it was a study protocol (i.e., not original research) and no data were reported; it is not known if participants included in the Australian update unique.

## **Multiple Movement Behaviours**

Four new studies were included in the present update of the multiple movement behaviours systematic review (1 cross-sectional; 1 longitudinal, 2 clustered-RCT). All studies were published in English. No new studies published in Arabic, Chinese, French, Russian or Spanish languages were eligible for inclusion. This update included longitudinal and experimental data from 568 participants (353 unique participants) from two unique samples from studies conducted in Canada (2) and Sweden (1). Mean baseline age of participants in the new studies ranged from 3.5 years to 4.48 years; follow up was up to 1 year. Outcomes examined by experimental and longitudinal studies were adiposity (2 studies) and motor development (1 study).

No new studies were identified for inclusion by the Australian update of the multiple movement behaviours systematic review.

#### **Acknowledgements**

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### References

- 1. Carson V, Lee EY, Hewitt L, Jennings C, Hunter S, Kuzik N, et al. Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). BMC Public Health. 2017;17:854.
- 2. Poitras VJ, Gray CE, Janssen X, Aubert S, Carson V, Faulkner G, et al. Systematic review of the relationships between sedentary behaviour and health indicators in the early years (0-4 years). BMC Public Health. 2017;17:868.
- 3. Chaput JP, Gray CE, Poitras VJ, Carson V, Gruber R, Birken CS, et al. Systematic review of the relationships between sleep duration and health indicators in the early years (0-4 years). BMC Public Health. 2017;17:855.
- 4. Kuzik N, Poitras VJ, Tremblay MS, Lee EY, Hunter S, Carson V. Systematic review of the relationships between combinations of movement behaviours and health indicators in the early years (0-4 years). BMC Public Health. 2017;17:849.
- 5. Okely AD, Ghersi D, Hesketh KD, Santos R, Loughran SP, Cliff DP, et al. A collaborative approach to adopting/adapting guidelines the australian 24-hour movement guidelines for the early years (birth to 5 years): An integration of physical activity, sedentary behavior, and sleep. BMC Public Health. 2017;17:869.
- 6. McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. Press peer review of electronic search strategies: 2015 guideline statement. J Clin Epidemiol. 2016;75:40-6.

# **Appendix 1. Physical Activity**

#### **Search Strategies**

#### **MEDLINE**

- 1 Physical Activity.mp. (95452)
- 2 exp Exercise/ (178858)
- 3 exp Exercise Movement Techniques/ (7301)
- 4 exp Exercise Therapy/ (45888)
- 5 Physical Exertion/ (61538)
- 6 exp "Physical Education and Training"/ (14612)
- 7 exp Sports/ (177180)
- 8 (sport\$ or bicycl\$ or swim\$ or walk\$ or run\$ or jog\$).tw,kf. (398980)
- 9 (physical\$ adj2 activ\$).tw,kf. (104419)
- 10 (aerobic adj2 (train\$ or active\$)).tw,kf. (4464)
- 11 "Play and Playthings"/ and (activ\* or outdoor\*).tw,kf. (1732)
- 12 ((activ\* or outdoor\*) adj3 play\*).tw,kf. (21201)
- 13 playground\*.tw,kf. (1542)
- active.ti. and (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle).mp. (15054)
- 15 (active adj3 (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle)).tw,kf. (21685)
- 16 prone position\*.mp. or floor time.tw,kf. (7423)
- 17 ((abdomen or stomach or tummy or belly) adj2 (time or play)).tw,kf. (235)
- 18 or/1-17 (749735)
- 19 exp obesity/ (202355)
- 20 obese.tw,kf. (118930)
- 21 exp overweight/ (207905)
- 22 (overweight or over-weight).tw,kf. (62179)
- 23 exp Body Fat Distribution/ (12968)
- 24 exp body composition/ (52292)
- 25 (adipos\* or fat).mp. (336871)
- 26 waist.mp. (39337)
- 27 Skinfold Thickness/ (6369)
- 28 (skin fold\* or skinfold\*).tw,kf. (11414)
- 29 (body composition\* or BMI or body mass index).tw,kf. (241436)
- 30 exp "body weights and measures"/ (595808)
- 31 (bio-impedance analysis or BIA).tw,kf. (2914)
- 32 Absorptiometry, Photon/ (23222)
- 33 (absorptiomet\* or densitometr\* or photodensitometr\* or DXA or DEXA).tw,kf. (45442)
- 34 Physical Fitness/ (28031)
- 35 (physical conditioning or fitness).tw,kf. (66870)
- 36 Range of Motion, Articular/ (47501)
- 37 Postural Balance/ (21392)
- 38 Metabolic Syndrome X/ (31773)
- 39 Insulin Resistance/ (55530)
- 40 ((metabolic adj2 syndrome) or syndrome x).tw,kf. and Risk Factors/ (13053)
- 41 exp blood glucose/ or exp diabetes mellitus, type 2/ (261926)
- 42 exp glucose intolerance/ or glucose tolerance test/ (41661)
- 43 Hemoglobin A, Glycosylated/ (35008)
- 44 HbA1c.tw,kf. (28838)

- 45 Bone Density/ (54355)
- 46 (bone adj2 (density or mass)).tw,kf. (62853)
- 47 (bone mineral content or bone strength).tw,kf. (11769)
- 48 Bone development/ (14055)
- 49 Osteogen\*.mp. (58737)
- 50 exp Vitamin D Deficiency/ (27113)
- 51 exp Cardiovascular Diseases/ (2376418)
- 52 ((cardiovascular or heart or vascular) adj2 risk\$).tw,kf. (106733)
- 53 exp Hypertension/ (258910)
- 54 (hypertens\* or high blood pressure).tw,kf. (433325)
- 55 exp blood pressure determination/ (38817)
- 56 blood pressure/ (284017)
- 57 Hypercholesterolemia/ (26601)
- 58 exp Hyperlipidemias/ (67705)
- 59 (cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,kf. (292259)
- 60 exp Plagiocephaly/ (381)
- 61 Plagioceph\*.tw,kf. (923)
- 62 Torticollis/ (3685)
- 63 exp Psychomotor Performance/ (114408)
- 64 motor development.tw,kf. (3516)
- 65 Motor Activity/ (101303)
- 66 Gross motor skill\*.tw,kf. (527)
- 67 (fine motor skill\* or locomotor control or object control).tw,kf. (1408)
- 68 exp "Wounds and Injuries"/ (890576)
- 69 exp Child Development Disorders/ (19638)
- 70 Child Development/ (44626)
- 71 Developmental milestone\*.mp. (1367)
- 72 gd.fs. (548477)
- 73 Child Behavior Disorders/ (21844)
- 74 Child Behavior/ (17461)
- 75 exp Adaptation, Psychological/ (127162)
- 76 (pro-social behav\* or prosocial behav\* or social behav\*).tw,kf. (15831)
- 77 exp \*Social Behavior/ (126016)
- 78 ((behavio?ral adj (conduct or disorder\*)) or conduct disorder\*).tw,kf. (9803)
- 79 exp Aggression/ (37021)
- 80 Interpersonal Relations/ (69575)
- 81 Attention/ (78115)
- 82 Attention Deficit Disorder with Hyperactivity/ (28336)
- 83 concentrat\*.tw,kf. (1936857)
- 84 Cognitive develop\*.tw,kf. (6055)
- 85 Achievement/ (15933)
- 86 (academic achievement or educational achievement).tw,kf. (5530)
- 87 Educational Achievement/ (50768)
- 88 School Admission Criteria/ (4896)
- 89 (grade-point average or grade point average or GPA).tw,kf. (9852)
- 90 Educational measurement/ (35482)
- 91 Educational status/ (50768)
- 92 Language Development Disorders/ (6357)
- 93 Language Development/ (10141)
- 94 Communication/ (79403)
- 95 Speech Perception/ (23133)

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96 Verbal Behavior/ (18278)
97
    Vocabulary/ (10409)
98 exp Self Concept/ (105763)
99 (self-esteem or self esteem).tw,kf. (19135)
100 Self Efficacy/ (18156)
101 Self-Control/ (1180)
102 (self regulation or self control).tw,kf. (11977)
      Executive function/ (11566)
103
104 exp Memory/ (131854)
105 Depression/ (108713)
106
      exp Mood Disorders/ (119404)
107
      exp Anxiety Disorders/ (78930)
108 Affective Symptoms/ (12972)
109
     Stress, Psychological/ (115040)
110
     "Quality of Life"/ (178121)
111
     Temperament/ (5630)
112
      (depression or depressive).tw,kf. (354092)
113
     or/19-112 (8258199)
114
     18 and 113 (395254)
115 limit 114 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)") (13258)
116
      114 and (pre-school* or preschool* or early childhood).tw,kf. (2016)
117
     115 or 116 (13711)
118 limit 117 to (spanish and journal article) (138)
119
     remove duplicates from 118 (131)
120 68 and 113 (890576)
     limit 120 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)") (70420)
121
122 121 and (pre-school* or preschool* or early childhood).tw,kf. (924)
123 122 and (english or french).lg. (794)
     123 and (2016* not (201601* or 201602*)).dc. (27)
124
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## Spanish supplement

126 124 or 125 (32)

125

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[as above, lines 1-113]
```

- 114 18 and 113 (395254)
- 115 limit 114 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)") (13258)
- 116 114 and (pre-school\* or preschool\* or early childhood).tw,kf. (2016)

123 and (201701\* or 201701\* or 201702\* or 201703\*).dc. (5)

- 117 115 or 116 (13711)
- 118 limit 117 to (spanish and journal article) (138)
- 119 remove duplicates from 118 (131)

## Pubmed

((sedentary OR inactive OR inactivity) and (Infant or child\* or preschool or pre-school) and (pubstatusaheadofprint or publisher[sb] or pubmednotmedline[sb]))

#### **CENTRAL**

1. (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.

- 2. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 3. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 4. sitting.tw,kw.
- 5. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*).tw,kw.
- 6. (Smartphone\* or ipad or apps or app or mobile applications).tw,kw.
- 7. screen based entertainment.tw,kw.
- 8. media.tw,kw.
- 9. or/1-8
- 10. obese.tw,kw.
- 11. (overweight or over-weight).tw,kw.
- 12. (adipos\* or fat).mp.
- 13. waist.mp.
- 14. (skin folds or skinfold or skin-fold\*).tw,kw.
- 15. (body composition\* or BMI or body mass index).tw,kw.
- 16. (bio-impedance analysis or BIA).tw,kw.
- 17. (absorptiometery or densitometry or photodensitometry or DXA or DEXA).tw,kw.
- 18. (physical conditioning or fitness).tw,kw.
- 19. (((metabolic adj2 syndrome) or syndrome x) and risk).tw,kw.
- 20. (diabetes or blood glucose or glucose intolerance or glucose intolerance).tw,kw.
- 21. HbA1c.tw,kw.
- 22. (bone adj2 (density or mass)).tw,kw.
- 23. (bone mineral content or bone strength).tw,kw.
- 24. Osteogen\*.mp.
- 25. vitamin d defic\*.tw,kw.
- 26. ((cardiovascular or heart or vascular) adj2 (risk\$ or disease)).tw,kw.
- 27. (hypertens\* or high blood pressure).tw,kw.
- 28. (cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,kw.
- 29. Plagioceph\*.tw,kw.
- 30. torticollis.tw,kw.
- 31. motor development.tw,kw.
- 32. Gross motor skill\*.tw,kw.
- 33. (fine motor skill\* or locomotor control or object control).tw,kw.
- 34. (flexibility or (range adj2 motion)).tw,kw.
- 35. balance.tw,kw.
- 36. Injur\*.tw,kw.
- 37. Developmental milestone\*.mp.
- 38. (social or pro-social or prosocial).tw,kw.
- 39. (behavio?ral conduct or behavio?ral conduct or behavio?r\* disorder\* or conduct disorder\*?).tw,kw.
- 40. concentrat\*.tw,kw.
- 41. attention.tw,kw.
- 42. Cognitive develop\*.tw,kw.
- 43. achievement.tw,kw.
- 44. (grade-point average or grade point average or GPA).tw,kw.
- 45. (language or communication or verbal or vocabulary).tw,kw.
- 46. (self-esteem or self esteem).tw,kw.
- 47. (self regulation or self control).tw,kw.
- 48. (depression or depressive).tw,kw.

- 49. (anxiety or anxious).tw,kw.
- 50. (quality adj2 life).tw,kw.
- 51. (memory or executive function).tw,kw.
- 52. psychosocial.tw,kw.
- 53. 9 and (or/10-17,29-52)
- 54. 53 and (infant\* or child\* or preschool\* or pre-school\*).tw,kw.
- 55. limit 54 to medline records
- 56. limit 54 to embase records
- 57. 54 not (55 or 56)
- 58. Limit 57 to abstract
- 59.57 not 58
- 60. limit 59 to yr="2017"
- 61. 36 and 59
- 62. limit 59 to yr="2016-2017"
- 63. 58 or 60

### SportDiscus

#### Query

- s13 with Limiters Language: English, French, Spanish; Publication Type: Academic Journal
- S13 S11 and S12
- S12 Infan\* or child\* or pre-school or preschool
- S1 or S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10
- S10 (Smartphone\* or ipad or apps or app or mobile applications) or screen based entertainment
- S9 (television N3 time or screentime or screen N3 time or computer N3 time or (watch\* N2 dvd or watch N2 video\* or view\* N2 dvd\* or view N2 video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*
- S8 chair N3 time or stroller N3 time or car N3 time or automobile\* N3 time or auto N3 time or motor vehicle\* N3 time or bus N3 time or indoor\* N3 time or in-door N3 time or computer N3 time
- S7 sitting
- S6 ((sedentary or inactiv\* or (lack N2 activity)))
- S5 ((low N3 energy expend\*) or physical\* inactiv\*)
- S4 DE "MASS media"
- DE "INTERNET" OR DE "ELECTRONIC games" OR DE "INTERNET games" OR DE "MULTIPLAYER games" OR DE "VIDEO games")
- S2 DE "SEDENTARY behavior in children"
- S1 DE "SEDENTARY behavior in children"

just add date limit

## PsycInfo

Early years sedentary bx pychinfo

- 1. sedentar\*.tw,id.
- 2. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,id.
- 3. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,id.
- 4. sitting.tw,id.
- 5. ((television adj watch\*) or tv watch\* or cartoon\*).tw,id.
- 6. television viewing/

- 7. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\* or gaming).tw,id.
- 8. screen based entertainment.tw,id.
- 9. exp Social Media/
- 10. exp Mobile Devices/
- 11. (smartphone\* or smart phone\* or cell phone\* or mobile phone\* or small screen\*).tw,id.
- 12. (texting or text messag\* or app or apps or mobile applications).tw,id.
- 13. (iphone\* or ipad\* or ipod\* or tablet\* or laptop\*).tw,id.
- 14. bed rest.tw,id.
- 15. or/1-14
- 16. exp overweight/ or body weight/ or weight gain/ or weight loss/ or body fat/ or body mass index/ or weight control/ or body size/
- 17. (obes\* or overweight or over-weight or adipos\* or fat or waist or skinfold\* or skin fold\* or body composition or bmi or body mass index).tw,id.
- 18. (bio-impedance analysis or BIA or absorptiomet\* or densitometr\* or photodensitometr\* or DXA or DEXA).tw,id.
- 19. physical fitness/ or physical endurance/ or physical strength/ or "range of motion"/
- 20. (physical conditioning or fitness).tw,id.
- 21. metabolic syndrome/ or insulin/ or blood suger/ or type 2 diabetes/ or glucose metabolism/ or glucose/
- 22. ((metabolic adj2 syndrome) or syndrome x).tw,id. and Risk Factors/
- 23. (glycosylated hemoglobin A or HbA1c).tw,id.
- 24. (bone adj2 (density or mass or development)).tw,id.
- 25. (bone mineral content or bone strength or osteogen\*).tw,id.
- 26. bones/
- 27. exp vitamin deficiency disorders/
- 28. exp Cardiovascular Disorders/ or exp hypertension/ or cholesterol/ or lipids/
- 29. ((cardiovascular or heart or vascular) adj2 risk\*).tw,id.
- 30. (hypertens\* or high blood pressure or cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,id.
- 31. torticollis/
- 32. plagioceph\*.tw,id.
- 33. exp motor development/ or exp motor processes/
- 34. (motor development or motor skill\* or locomotor control or object control).tw,id.
- 35. injuries/ or exp head injuries/ or exp spinal cord injuries/ or exp wounds/
- 36. developmental disabilities/ or exp delayed development/ or exp intellectual development disorder/
- 37. developmental milestone\*.tw,id.
- 38. behavior disorders/ or exp aggressive behavior/ or exp antisocial behavior/ or exp behavior problems/
- 39. exp social behavior/
- 40. interpersonal relationships/ or exp interpersonal interaction/
- 41. ((behavio?ral adj (conduct or disorder\*)) or conduct disorder\* or prosocial behav\* or social behav\*).tw,id.
- 42. exp attention/ or exp attention deficit disorder/ or concentration/ or distraction/ or concentrat\*.tw,id.
- 43. exp cognitive development/
- 44. exp academic achievement/ or academic achievement prediction/ or academic aptitude/ or academic failure/ or educational attainment level/ or achievement/ or student admission criteria/ or educational measurement/

- 45. (cognitive develop\* or academic achievement or educational achievement or grade-point average or grade point average or GPA).tw,id.
- 46. exp Language Development/ or exp Language Disorders/ or exp communication/ or speech perception/ or vocabulary/
- 47. self-perception/ or exp self-concept/ or self-efficacy/ or self-esteem/ or self-control/ or anger control/ or exp emotional control/ or emotional regulation/ or exp impulse control disorders/ or self-regulation/
- 48. (self esteem or self regulation or self control).tw,id.
- 49. exp executive function/ or exp cognitive ability/ or exp memory/ or exp affective disorders/ or exp anxiety disorders/ or psychological stress/ or "quality of life"/ or exp Life Satisfaction/ or exp Well Being/ or personality/
- 50. (depression or depressive).tw,id.
- 51. or/16-50
- 52. 15 and 51
- 53. limit 15 to (2330 motor processes or 2340 cognitive processes or 2343 learning & memory or 2346 attention or 2800 developmental psychology or 2820 cognitive & perceptual development or 2840 psychosocial & personality development or 2900 social processes & social issues or 3020 group & interpersonal processes or 3040 social perception & cognition or 3211 affective disorders or 3230 behavior disorders & antisocial behavior or 3250 developmental disorders & autism or 3295 cardiovascular disorders)
- 54. 52 or 53
- 55. limit 54 to (140 infancy <2 to 23 mo> or 160 preschool age )
- 56. 54 and (pre-school\* or preschool\* or early childhood).mp.
- 57. 55 or 56
- 58. limit 57 to (english or french)
- 59. limit 58 to "0100 journal"
- 60. remove duplicates from 59
- 51. or/16-19,31-50
- 58. limit 57 to (english or french or spanish)
- 60. 61 and (2017\* not (201701\* or 201702\*)).up.
- 61. 60 and 35
- 62. limit 61 to yr="2016-2017"
- 63. 60 or 62

#### **LILACS**

tw:(sedentar\*) AND (instance:"regional") AND ( mh:("Sedentary Lifestyle") AND db:("LILACS") AND limit:("child") AND la:("es"))

# **Appendix 2. Sedentary Behaviour**

### **Search Strategies**

#### **MEDLINE**

- 1. Sedentary Lifestyle/
- 2. (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.
- 3. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 4. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 5. sitting.tw,kw.
- 6. Television/ or Video Games/ or Software/ or Videodisc Recording/ or Cartoons as Topic/ or Motion Pictures as Topic/
- 7. exp Internet/ or exp Computers, handheld/
- 8. Communications Media/ or Mass Media/
- 9. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*).tw,kw.
- 10. (Smartphone\* or ipad or apps or app or mobile applications).tw,kw.
- 11. screen based entertainment.tw,kw.
- 12. or/1-11
- 13. limit 12 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)")
- 14. 12 and (pre-school or preschool).tw,kw.
- 15. 13 or 14
- 16. exp obesity/
- 17. obese.tw,kw.
- 18. exp overweight/
- 19. (overweight or over-weight).tw,kw.
- 20. exp Body Fat Distribution/
- 21. exp body composition/
- 22. (adipos\* or fat).mp.
- 23. waist.mp.
- 24. Skinfold Thickness/
- 25. (skin folds or skinfold or skin-fold\*).tw,kw.
- 26. (body composition\* or BMI or body mass index).tw,kw.
- 27. exp "body weights and measures"/
- 28. (bio-impedance analysis or BIA).tw,kw.
- 29. Absorptiometry, Photon/
- 30. (absorptiometery or densitometry or photodensitometry or DXA or DEXA).tw,kw.
- 31. Physical Fitness/
- 32. (physical conditioning or fitness).tw,kw.
- 33. Range of Motion, Articular/
- 34. Postural Balance/
- 35. Metabolic Syndrome X/
- 36. Insulin Resistance/
- 37. ((metabolic adj2 syndrome) or syndrome x).tw,kw. and Risk Factors/
- 38. exp blood glucose/ or exp diabetes mellitus, type 2/
- 39. exp glucose intolerance/ or glucose tolerance test/
- 40. Hemoglobin A, Glycosylated/
- 41. HbA1c.tw,kw.

- 42. Bone Density/
- 43. (bone adj2 (density or mass)).tw,kw.
- 44. (bone mineral content or bone strength).tw,kw.
- 45. Bone development/
- 46. Osteogen\*.mp.
- 47. exp Vitamin D Deficiency/
- 48. exp Cardiovascular Diseases/
- 49. ((cardiovascular or heart or vascular) adj2 risk\$).tw,kw.
- 50. exp Hypertension/
- 51. (hypertens\* or high blood pressure).tw,kw.
- 52. exp blood pressure determination/
- 53. blood pressure/
- 54. Hypercholesterolemia/
- 55. exp Hyperlipidemias/
- 56. (cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,kw.
- 57. exp Plagiocephaly/
- 58. Plagioceph\*.tw,kw.
- 59. Torticollis/
- 60. exp Psychomotor Performance/
- 61. motor development.tw,kw.
- 62. Motor Activity/
- 63. Gross motor skill\*.tw,kw.
- 64. (fine motor skill\* or locomotor control or object control).tw,kw.
- 65. exp "Wounds and Injuries"/
- 66. exp Child Development Disorders/
- 67. Child Development/
- 68. Developmental milestone\*.mp.
- 69. gd.fs.
- 70. Child Behavior Disorders/
- 71. Child Behavior/
- 72. exp Adaptation, Psychological/
- 73. (pro-social behav\* or prosocial behav\* or pro social behav\*).tw,kw.
- 74. exp \*Social Behavior/
- 75. (behavio?ral conduct or behavio?ral conduct or behavio?r\* disorder\* or conduct disorder\*?).tw,kw.
- 76. exp Aggression/
- 77. Interpersonal Relations/
- 78. Attention/
- 79. Attention Deficit Disorder with Hyperactivity/
- 80. concentrat\*.tw,kw.
- 81. Cognitive develop\*.tw,kw.
- 82. Achievement/
- 83. (academic achievement or educational achievement).tw,kw.
- 84. Educational Achievement/
- 85. School Admission Criteria/
- 86. (grade-point average or grade point average or GPA).tw,kw.
- 87. Educational measurement/
- 88. Educational status/
- 89. Language Development Disorders/
- 90. Language Development/
- 91. Communication/

- 92. Speech Perception/
- 93. Verbal Behavior/
- 94. Vocabulary/
- 95. exp Self Concept/
- 96. (self-esteem or self esteem).tw,kw.
- 97. Self Efficacy/
- 98. Self-Control/
- 99. Self regulation.mp. or self control.tw,kw. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
- 100. Executive function/
- 101. exp Memory/
- 102. Depression/
- 103. exp Mood Disorders/
- 104. exp Anxiety Disorders/
- 105. Affective Symptoms/
- 106. Stress, Psychological/
- 107. "Quality of Life"/
- 108. Temperament/
- 109. Depression/
- 110. (depression or depressive).tw,kw.
- 111. or/16-109
- 112. 15 and 111
- 113. limit 112 to (english or french)
- 114. remove duplicates from 113

#### **Pubmed**

((sedentary OR inactive OR inactivity) and (Infant or child\* or preschool or pre-school) and (pubstatusaheadofprint or publisher[sb] or pubmednotmedline[sb]))

## **CENTRAL**

- 1. (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.
- 2. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 3. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 4. sitting.tw,kw.
- 5. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*).tw,kw.
- 6. (Smartphone\* or ipad or apps or app or mobile applications).tw,kw.
- 7. screen based entertainment.tw,kw.
- 8. media.tw,kw.
- 9. or/1-8
- 10. obese.tw,kw.
- 11. (overweight or over-weight).tw,kw.
- 12. (adipos\* or fat).mp.
- 13. waist.mp.
- 14. (skin folds or skinfold or skin-fold\*).tw,kw.
- 15. (body composition\* or BMI or body mass index).tw,kw.

- 16. (bio-impedance analysis or BIA).tw,kw.
- 17. (absorptiometery or densitometry or photodensitometry or DXA or DEXA).tw,kw.
- 18. (physical conditioning or fitness).tw,kw.
- 19. (((metabolic adj2 syndrome) or syndrome x) and risk).tw,kw.
- 20. (diabetes or blood glucose or glucose intolerance or glucose intolerance).tw,kw.
- 21. HbA1c.tw,kw.
- 22. (bone adj2 (density or mass)).tw,kw.
- 23. (bone mineral content or bone strength).tw,kw.
- 24. Osteogen\*.mp.
- 25. vitamin d defic\*.tw,kw.
- 26. ((cardiovascular or heart or vascular) adj2 (risk\$ or disease)).tw,kw.
- 27. (hypertens\* or high blood pressure).tw,kw.
- 28. (cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,kw.
- 29. Plagioceph\*.tw,kw.
- 30. torticollis.tw,kw.
- 31. motor development.tw,kw.
- 32. Gross motor skill\*.tw,kw.
- 33. (fine motor skill\* or locomotor control or object control).tw,kw.
- 34. (flexibility or (range adj2 motion)).tw,kw.
- 35. balance.tw,kw.
- 36. Injur\*.tw,kw.
- 37. Developmental milestone\*.mp.
- 38. (social or pro-social or prosocial).tw,kw.
- 39. (behavio?ral conduct or behavio?ral conduct or behavio?r\* disorder\* or conduct disorder\*?).tw,kw.
- 40. concentrat\*.tw,kw.
- 41. attention.tw,kw.
- 42. Cognitive develop\*.tw,kw.
- 43. achievement.tw,kw.
- 44. (grade-point average or grade point average or GPA).tw,kw.
- 45. (language or communication or verbal or vocabulary).tw,kw.
- 46. (self-esteem or self esteem).tw,kw.
- 47. (self regulation or self control).tw,kw.
- 48. (depression or depressive).tw,kw.
- 49. (anxiety or anxious).tw,kw.
- 50. (quality adj2 life).tw,kw.
- 51. (memory or executive function).tw,kw.
- 52. psychosocial.tw,kw.
- 53. 9 and (or/10-17,29-52)
- 54. 53 and (infant\* or child\* or preschool\* or pre-school\*).tw,kw.
- 55. limit 54 to medline records
- 56. limit 54 to embase records
- 57. 54 not (55 or 56)
- 58. Limit 57 to abstract
- 59. 57 not 58
- 60. limit 59 to yr="2017"
- 61. 36 and 59
- 62. limit 59 to yr="2016-2017"
- 63.58 or 60

#### SportDiscus

Query

- s13 with Limiters Language: English, French, Spanish; Publication Type: Academic Journal
- S13 S11 and S12
- S12 Infan\* or child\* or pre-school or preschool
- S11 S1 or S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10
- S10 (Smartphone\* or ipad or apps or app or mobile applications) or screen based entertainment
- S9 (television N3 time or screentime or screen N3 time or computer N3 time or (watch\* N2 dvd or watch N2 video\* or view\* N2 dvd\* or view N2 video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*
- S8 chair N3 time or stroller N3 time or car N3 time or automobile\* N3 time or auto N3 time or motor vehicle\* N3 time or bus N3 time or indoor\* N3 time or in-door N3 time or computer N3 time
- S7 sitting
- S6 ((sedentary or inactiv\* or (lack N2 activity)))
- S5 ((low N3 energy expend\*) or physical\* inactiv\*)
- S4 DE "MASS media"
- DE "INTERNET" OR DE "ELECTRONIC games" OR DE "INTERNET games" OR DE "MULTIPLAYER games" OR DE "VIDEO games")
- S2 DE "SEDENTARY behavior in children"
- S1 DE "SEDENTARY behavior in children"
  Add date limit

## PsycInfo

- 1. sedentar\*.tw,id.
- 2. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,id.
- 3. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,id.
- 4. sitting.tw,id.
- 5. ((television adj watch\*) or tv watch\* or cartoon\*).tw,id.
- 6. television viewing/
- 7. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\* or gaming).tw,id.
- 8. screen based entertainment.tw,id.
- 9. exp Social Media/
- 10. exp Mobile Devices/
- 11. (smartphone\* or smart phone\* or cell phone\* or mobile phone\* or small screen\*).tw,id.
- 12. (texting or text messag\* or app or apps or mobile applications).tw,id.
- 13. (iphone\* or ipad\* or ipod\* or tablet\* or laptop\*).tw,id.
- 14. bed rest.tw,id.
- 15. or/1-14
- 16. exp overweight/ or body weight/ or weight gain/ or weight loss/ or body fat/ or body mass index/ or weight control/ or body size/
- 17. (obes\* or overweight or over-weight or adipos\* or fat or waist or skinfold\* or skin fold\* or body composition or bmi or body mass index).tw,id.
- 18. (bio-impedance analysis or BIA or absorptiomet\* or densitometr\* or photodensitometr\* or DXA or DEXA).tw,id.
- 19. physical fitness/ or physical endurance/ or physical strength/ or "range of motion"/
- 20. (physical conditioning or fitness).tw,id.

- 21. metabolic syndrome/ or insulin/ or blood suger/ or type 2 diabetes/ or glucose metabolism/ or glucose/
- 22. ((metabolic adj2 syndrome) or syndrome x).tw,id. and Risk Factors/
- 23. (glycosylated hemoglobin A or HbA1c).tw,id.
- 24. (bone adj2 (density or mass or development)).tw,id.
- 25. (bone mineral content or bone strength or osteogen\*).tw,id.
- 26. bones/
- 27. exp vitamin deficiency disorders/
- 28. exp Cardiovascular Disorders/ or exp hypertension/ or cholesterol/ or lipids/
- 29. ((cardiovascular or heart or vascular) adj2 risk\*).tw,id.
- 30. (hypertens\* or high blood pressure or cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,id.
- 31. torticollis/
- 32. plagioceph\*.tw,id.
- 33. exp motor development/ or exp motor processes/
- 34. (motor development or motor skill\* or locomotor control or object control).tw,id.
- 35. injuries/ or exp head injuries/ or exp spinal cord injuries/ or exp wounds/
- 36. developmental disabilities/ or exp delayed development/ or exp intellectual development disorder/
- 37. developmental milestone\*.tw,id.
- 38. behavior disorders/ or exp aggressive behavior/ or exp antisocial behavior/ or exp behavior problems/
- 39. exp social behavior/
- 40. interpersonal relationships/ or exp interpersonal interaction/
- 41. ((behavio?ral adj (conduct or disorder\*)) or conduct disorder\* or prosocial behav\* or social behav\*).tw,id.
- 42. exp attention/ or exp attention deficit disorder/ or concentration/ or distraction/ or concentrat\*.tw,id.
- 43. exp cognitive development/
- 44. exp academic achievement/ or academic achievement prediction/ or academic aptitude/ or academic failure/ or educational attainment level/ or achievement/ or student admission criteria/ or educational measurement/
- 45. (cognitive develop\* or academic achievement or educational achievement or grade-point average or grade point average or GPA).tw,id.
- 46. exp Language Development/ or exp Language Disorders/ or exp communication/ or speech perception/ or vocabulary/
- 47. self-perception/ or exp self-concept/ or self-efficacy/ or self-esteem/ or self-control/ or anger control/ or exp emotional control/ or emotional regulation/ or exp impulse control disorders/ or self-regulation/
- 48. (self esteem or self regulation or self control).tw,id.
- 49. exp executive function/ or exp cognitive ability/ or exp memory/ or exp affective disorders/ or exp anxiety disorders/ or psychological stress/ or "quality of life"/ or exp Life Satisfaction/ or exp Well Being/ or personality/
- 50. (depression or depressive).tw,id.
- 51. or/16-50
- 52. 15 and 51
- 53. limit 15 to (2330 motor processes or 2340 cognitive processes or 2343 learning & memory or 2346 attention or 2800 developmental psychology or 2820 cognitive & perceptual development or 2840 psychosocial & personality development or 2900 social processes & social issues or 3020 group & interpersonal processes or 3040 social perception & cognition or 3211 affective disorders or 3230

behavior disorders & antisocial behavior or 3250 developmental disorders & autism or 3295 cardiovascular disorders)

- 54. 52 or 53
- 55. limit 54 to (140 infancy <2 to 23 mo> or 160 preschool age )
- 56. 54 and (pre-school\* or preschool\* or early childhood).mp.
- 57. 55 or 56
- 58. limit 57 to (english or french)
- 59. limit 58 to "0100 journal"
- 60. remove duplicates from 59
- 51. or/16-19,31-50
- 58. limit 57 to (english or french or spanish)
- 60. 61 and (2017\* not (201701\* or 201702\*)).up.
- 61. 60 and 35
- 62. limit 61 to yr="2016-2017"
- 63. 60 or 62

#### **Embase**

Early years sedentary bx Embase

- 1. sedentary lifestyle/
- 2. (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.
- 3. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 4. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 5. sitting.tw,kw.
- 6. bed rest.mp.
- 7. television viewing/ or television/ or exp computer/
- 8. internet/
- 9. Social Media/ or Mobile Application/ or Mobile Phone/
- 10. (screen based entertainment or screen time).tw.
- 11. (texting or text messag\* or app or apps or mobile applications).tw.
- 12. (smartphone\* or smart phone\* or cell phone\* or mobile phone\* or small screen\*).tw.
- 13. (iphone\* or ipad\* or ipod\* or tablet\* or laptop\*).tw.
- 14. (social media or Facebook or Youtube or Twitter or Snapchat or Instagram or Pinterest or Skype or Vine).tw.
- 15. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*).tw,kw.
- 16. ((television adj watch\*) or tv watch\*).tw.
- 17. or/1-16
- 18. exp obesity/ or exp adipose tissue/ or body composition/ or body fat/ or body fat distribution/ or skinfold thickness/ or exp body weight/ or body mass/
- 19. (obes\* or overweight or over-weight or adipos\* or fat or waist or skin fold\* or skinfold\* or body composition\* or bmi or body mass index).tw,kw.
- 20. dual energy x ray absorptiometry/ or photon absorptiometry/
- 21. (bio-impediance analysis or bia or absorptiomet\* or densitometr\* or photodensitometr\* or DXA or DEXA).tw,kw.
- 22. fitness/ or "range of motion"/ or body equilibrium/
- 23. (physical conditioning or fitness).tw,kw.

- 24. metabolic syndrome X/ or insulin resistance/ or non insulin dependent diabetes mellitus/ or glucose blood level/ or glucose intolerance/ or exp glucose tolerance test/ or hemoglobin A1c/
- 25. ((metabolic adj2 syndrome) or syndrome x).tw,kw. and Risk Factor/
- 26. HbA1c.tw,kw.
- 27. bone density/ or bone development/ or (bone adj2 (density or mass)).tw,kw. or (bone mineral content or bone strength).tw,kw. or osteogen\*.mp.
- 28. vitamin d deficiency/ or exp cardiovascular disease/ or ((cardiovascular or heart or vascular) adj2 risk\*).tw,kw.
- 29. exp hypertension/ or exp blood pressure measurement/ or exp blood pressure/ or hyperlipidemia/ or exp hypertriglyceridemia/
- 30. (hypertens\* or high blood pressure or cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,kw.
- 31. Plagiocephaly/ or plagiocephal\*.tw,kw.
- 32. torticollis/
- 33. exp psychomotor performance/
- 34. exp motor activity/
- 35. (motor development or gross motor skill\* or fine motor skill\* or locomotor control or object control).tw,kw.
- 36. exp wound/
- 37. exp child development/ or developmental milestone.tw,kw.
- 38. exp behavior disorder/ or child behavior/ or adaptive behavior/ or exp aggression/ or exp \*social behavior/ or human relation/
- 39. (prosocial behav\* or social behav\* or ((behavio?ral adj (conduct or disorder\*)) or conduct disorder\*)).tw,kw.
- 40. attention deficit disorder/ or exp attention/ or cognitive development/ or achievement/ or exp academic achievement/ or educational status/
- 41. (concentrat\* or academic achievement or educational achievement or grade-point average or grade point average or GPA).tw,kw.
- 42. exp developmental language disorder/
- 43. language development/
- 44. exp interpersonal communication/
- 45. speech perception/
- 46. exp verbal behavior/
- 47. exp developmental language disorder/ or language development/ or exp interpersonal communication/ or speech perception/ or exp verbal behavior/
- 48. exp self concept/
- 49. (self esteem or self confidence or self regulation or self control).tw,kw.
- 50. executive function/ or exp memory/ or exp mood disorder/ or exp anxiety disorder/ or emotional disorder/ or mental stress/ or exp "quality of life"/ or exp temperament/
- 51. (depression or depressive or anxious\* or anxiet\*).tw,kw.
- 52. or/18-51
- 53. 17 and 52
- 54. limit 53 to (infant or preschool child <1 to 6 years>)
- 55. 53 and (pre-school\* or preschool\* or early childhood).tw,kw.
- 56. 54 or 55
- 57. limit 56 to (english or french)
- 58. limit 57 to embase
- 59. remove duplicates from 58

LILACS

tw:(sedentar\*) AND (instance:"regional") AND ( mh:("Sedentary Lifestyle") AND db:("LILACS") AND limit:("child") AND la:("es"))

# Appendix 3. Sleep

### **Search Strategies**

#### **MEDLINE**

- 1. Sleep/
- 2. (sleep adj3 duration).tw.
- 3. exp \*Sleep Apnea Syndromes/ and (apnea or apnoea).ti.
- 4. (1 or 2) not 3
- 5. Polysomnography/
- 6. Accelerometer/ or Accelerometry/
- 7. Actigraphy/
- 8. (polysomnogr\* or actigr\* or accelerom\*).tw.
- 9. ((objectiv\* adj3 measur\*) or (direct\* adj3 measure\*)).tw.
- 10. (Sleep\* adj3 (report or questionnaire\* or index or eval\* or diary or diaries or log\* or journal\*)).tw.
- 11. (self report\* or proxy report\*).tw.
- 12. or/5-11
- 13. 4 and 12
- 14. limit 13 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)")
- 15. 13 and (pre-school\* or preschool\* or early childhood).tw,kf.
- 16. 14 or 15
- 17. limit 16 to journal article
- 18. limit 17 to (english or french)
- 19. Sedentary Lifestyle/
- 20. (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.
- 21. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 22. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 23. sitting.tw,kw.
- 24. Television/ or Video Games/ or Software/ or Videodisc Recording/ or Cartoons as Topic/ or Motion Pictures as Topic/
- 25. exp Internet/ or exp Computers, handheld/
- 26. Communications Media/ or Mass Media/
- 27. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*).tw,kw.
- 28. (Smartphone\* or ipad or apps or app or mobile applications).tw,kw.
- 29. screen based entertainment.tw,kw.
- 30. Physical Activity.mp.
- 31. exp Exercise/
- 32. exp Exercise Movement Techniques/
- 33. exp Exercise Therapy/
- 34. Physical Exertion/
- 35. exp "Physical Education and Training"/
- 36. exp Sports/
- 37. (sport\$ or bicycl\$ or swim\$ or walk\$ or run\$ or jog\$).tw,kf.
- 38. (physical\$ adj2 activ\$).tw,kf.
- 39. (aerobic adj2 (train\$ or active\$)).tw,kf.
- 40. "Play and Playthings"/ and (activ\* or outdoor\*).tw,kf.

- 41. ((activ\* or outdoor\*) adj3 play\*).tw,kf.
- 42. playground\*.tw,kf.
- 43. active.ti. and (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle).mp.
- 44. (active adj3 (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle)).tw,kf.
- 45. prone position\*.mp. or floor time.tw,kf.
- 46. ((abdomen or stomach or tummy or belly) adj2 (time or play)).tw,kf.
- 47. exp obesity/
- 48. obes\*.tw,kf.
- 49. exp overweight/
- 50. (overweight or over-weight).tw,kf.
- 51. exp Body Fat Distribution/
- 52. exp body composition/
- 53. (adipos\* or fat).mp.
- 54. waist.mp.
- 55. Skinfold Thickness/
- 56. (skin fold\* or skinfold\*).tw,kf.
- 57. (body composition\* or BMI or body mass index).tw,kf.
- 58. exp "body weights and measures"/
- 59. (bio-impedance analysis or BIA).tw,kf.
- 60. Absorptiometry, Photon/
- 61. (absorptiomet\* or densitometr\* or photodensitometr\* or DXA or DEXA).tw,kf.
- 62. Physical Fitness/
- 63. (physical conditioning or fitness).tw,kf.
- 64. Range of Motion, Articular/
- 65. Postural Balance/
- 66. Metabolic Syndrome X/
- 67. Insulin Resistance/
- 68. ((metabolic adj2 syndrome) or syndrome x).tw,kf. and Risk Factors/
- 69. exp blood glucose/ or exp diabetes mellitus, type 2/
- 70. Hemoglobin A, Glycosylated/
- 71. HbA1c.tw,kf.
- 72. exp Cardiovascular Diseases/
- 73. ((cardiovascular or heart or vascular) adj2 risk\$).tw,kf.
- 74. exp Hypertension/
- 75. (hypertens\* or high blood pressure).tw,kf.
- 76. exp blood pressure determination/
- 77. blood pressure/
- 78. Hypercholesterolemia/
- 79. exp Hyperlipidemias/
- 80. ((cardiovascular or heart or vascular) adj2 risk\$).tw,kf.
- 81. exp Hypertension/
- 82. (hypertens\* or high blood pressure).tw,kf.
- 83. exp blood pressure determination/
- 84. blood pressure/
- 85. Hypercholesterolemia/
- 86. exp Hyperlipidemias/
- 87. (cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,kf.
- 88. exp Psychomotor Performance/
- 89. motor development.tw,kf.

- 90. Motor Activity/
- 91. Gross motor skill\*.tw,kf.
- 92. (fine motor skill\* or locomotor control or object control).tw,kf.
- 93. exp "Wounds and Injuries"/
- 94. exp Child Development Disorders/
- 95. Child Development/
- 96. Developmental milestone\*.mp.
- 97. gd.fs.
- 98. Child Behavior Disorders/
- 99. Child Behavior/
- 100. exp Adaptation, Psychological/
- 101. (pro-social behav\* or prosocial behav\* or social behav\*).tw,kf.
- 102. exp \*Social Behavior/
- 103. ((behavio?ral adj (conduct or disorder\*)) or conduct disorder\*).tw,kf.
- 104. exp Aggression/
- 105. Interpersonal Relations/
- 106. Attention/
- 107. Attention Deficit Disorder with Hyperactivity/
- 108. concentrat\*.tw,kf.
- 109. Cognitive develop\*.tw,kf.
- 110. Language Development Disorders/
- 111. Language Development/
- 112. Communication/
- 113. Speech Perception/
- 114. Verbal Behavior/
- 115. Vocabulary/
- 116. exp Self Concept/
- 117. (self-esteem or self esteem).tw,kf.
- 118. Self Efficacy/
- 119. Self-Control/
- 120. (self regulation or self control).tw,kf.
- 121. Executive function/
- 122. exp Memory/
- 123. Depression/
- 124. exp Mood Disorders/
- 125. exp Anxiety Disorders/
- 126. Affective Symptoms/
- 127. Stress, Psychological/
- 128. "Quality of Life"/
- 129. Temperament/
- 130. (depression or depressive).tw,kf.
- 131. "Growth and Development"/
- 132. exp Growth/
- 133. exp Child Development/
- 134. growth.tw,kf.
- 135. exp Wounds/ and Injuries/
- 136. Accidents/
- 137. exp Accidental Falls/
- 138. Accidents, Home/
- 139. exp Drowning/
- 140. exp Emotions/

- 141. emotional regulation.mp.
- 142. well-being.mp.
- 143. or/47-65,88-141
- 144. 18 and 143
- 145. 144 and (2017\* not (201701\* or 201702\* or 201703\*)).dc.
- 146. limit 144 to ("in data review" or in process or "pubmed not medline")
- 147. 18 and (or/ 135-139)
- 148. 147 and (20161\* or 2017\* ).dc.
- 149. limit 148 to ("in data review" or in process or "pubmed not medline")
- 150. 145 or 146 or 147 or 148

run also in spanish, from inception

Early years sleep - Embase

- 1. Sleep/
- 2. Sleep Time/
- 3. (sleep adj3 duration).tw.
- 4. exp Sleep Disordered Breathing/ and (apnea or apnoea).ti.
- 5. (or/1-3) not 4
- 6. Polysomnography/
- 7. Accelerometer/ or Accelerometry/
- 8. Actigraphy/
- 9. (polysomnogr\* or actigr\* or accelerom\*).tw.
- 10. (Sleep\* adj3 (report or questionnaire\* or index or eval\* or diary or diaries or log\* or journal\*)).tw.
- 11. (self report\* or proxy report\*).tw.
- 12. ((objectiv\* adj3 measur\*) or (direct\* adj3 measure\*)).tw.
- 13. or/6-12
- 14. 5 and 13
- 15. limit 14 to (infant or preschool child <1 to 6 years>)
- 16. 14 and (pre-school\* or preschool\* or early childhood).tw,kw.
- 17. 15 or 16
- 18. limit 17 to (english or french)
- 19. limit 18 to embase
- 20. remove duplicates from 19
- 21. sedentary lifestyle/
- 22. (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.
- 23. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 24. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 25. sitting.tw,kw.
- 26. bed rest.mp.
- 27. television viewing/ or television/ or exp computer/
- 28. internet/
- 29. Social Media/ or Mobile Application/ or Mobile Phone/
- 30. (screen based entertainment or screen time).tw.
- 31. (texting or text messag\* or app or apps or mobile applications).tw.
- 32. (smartphone\* or smart phone\* or cell phone\* or mobile phone\* or small screen\*).tw.
- 33. (iphone\* or ipad\* or ipod\* or tablet\* or laptop\*).tw.

- 34. (social media or Facebook or Youtube or Twitter or Snapchat or Instagram or Pinterest or Skype or Vine).tw.
- 35. exp physical activity/ or exp exercise/ or exp kinesiotherapy/ or physical education/ or exp sport/
- 36. (sport\* or bicycl\* or swim\* or walk\* or run\* or jog\*).tw,kw.
- 37. (aerobic adj2 (train\* or active\*)).tw,kw.
- 38. Play/ and (activ\* or outdoor\*).tw,kw.
- 39. (((activ\* or outdoor\*) adj3 play\*) or playground\*).tw,kw.
- 40. active.ti. and (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle).mp.
- 41. (active adj3 (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle)).tw,kw.
- 42. (prone position\* or floor time).tw,kw.
- 43. ((abdomen or stomach or tummy or belly) adj2 (time or play)).tw,kw.
- 44. exp obesity/ or exp adipose tissue/ or body composition/ or body fat/ or body fat distribution/ or skinfold thickness/ or exp body weight/ or body mass/
- 45. (obes\* or overweight or over-weight or adipos\* or fat or waist or skin fold\* or skinfold\* or body composition\* or bmi or body mass index).tw,kw.
- 46. dual energy x ray absorptiometry/ or photon absorptiometry/
- 47. (bio-impediance analysis or bia or absorptiomet\* or densitometr\* or photodensitometr\* or DXA or DEXA).tw,kw.
- 48. (physical conditioning or fitness).tw,kw.
- 49. metabolic syndrome X/ or insulin resistance/ or non insulin dependent diabetes mellitus/ or glucose blood level/ or glucose intolerance/ or exp glucose tolerance test/ or hemoglobin A1c/
- 50. ((metabolic adj2 syndrome) or syndrome x).tw,kw. and Risk Factor/
- 51. HbA1c.tw,kw.
- 52. exp cardiovascular disease/ or ((cardiovascular or heart or vascular) adj2 risk\*).tw,kw.
- 53. exp hypertension/ or exp blood pressure measurement/ or exp blood pressure/ or hyperlipidemia/ or exp hypertriglyceridemia/
- 54. (hypertens\* or high blood pressure or cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,kw.
- 55. exp psychomotor performance/
- 56. exp motor activity/
- 57. (motor development or gross motor skill\* or fine motor skill\* or locomotor control or object control).tw,kw.
- 58. exp developmental disorder/ or exp child development/ or developmental milestone.tw,kw.
- 59. exp behavior disorder/ or child behavior/ or adaptive behavior/ or exp aggression/ or exp \*social behavior/ or human relation/
- 60. (prosocial behav\* or social behav\* or ((behavio?ral adj (conduct or disorder\*)) or conduct disorder\*)).tw,kw.
- 61. attention deficit disorder/ or exp attention/ or cognitive development/ or achievement/ or exp academic achievement/ or educational status/
- 62. (concentrat\* or academic achievement or educational achievement or grade-point average or grade point average or GPA).tw,kw.
- 63. exp developmental language disorder/
- 64. language development/
- 65. exp interpersonal communication/
- 66. speech perception/
- 67. exp verbal behavior/
- 68. exp developmental language disorder/ or language development/ or exp interpersonal communication/ or speech perception/ or exp verbal behavior/
- 69. exp self concept/

- 70. (self esteem or self esteem or self regulation or self control).tw,kw.
- 71. executive function/ or exp memory/ or exp mood disorder/ or exp anxiety disorder/ or emotional disorder/ or mental stress/ or exp "quality of life"/ or exp temperament/
- 72. (depression or depressive).tw,kw.
- 73. "growth, development and aging"/
- 74. growth/ or body growth/
- 75. Child Development/
- 76. Growth.tw,kw.
- 77. exp injury/
- 78. "accidents and accident related phenomena"/ or accident/ or accident proneness/
- 79. emotionality/
- 80. emotional regulation.mp.
- 81. wellbeing/
- 82. or/44-80
- 83. 19 and 82
- 84. limit 83 to yr="2017"
- 85. 19 and (77 or 78)
- 86. limit 85 to yr="2016"

#### psycinfo

- 1. Sleep/ or Sleep Deprivation/
- 2. (sleep adj3 duration).tw.
- 3. \*Sleep Apnea/ and (apnea or apnoea).ti.
- 4. (1 or 2) not 3
- 5. Polysomnography/
- 6. Monitoring/
- 7. (activPAL\* or ActiGraph\* or acceleromet\* or heartrate monit\* or heart rate monit\* or pedomet\* or armband\* or arm band\* or inclinomet\*).tw.
- 8. (activity monitor\* or activity tracker\* or fitness tracker\* or portable monitor\* or wearable monitor\* or Fitbit\* or Vivofit\* or Fuelband\*).tw.
- 9. ((objectiv\* adj3 measur\*) or (direct\* adj3 measure\*)).tw.
- 10. Self report/ or Questionnaires/ or Reproducibility of Results/
- 11. Self Monitoring/
- 12. Journal Writing/
- 13. (report\* or self-report\* or questionnaire\* or diary or diaries or scale\* or interview\* or journal\*).tw.
- 14. or/5-13
- 15. 4 and 14
- 16. sedentar\*.tw,id.
- 17. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,id.
- 18. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,id.
- 19. sitting.tw,id.
- 20. ((television adj watch\*) or tv watch\* or cartoon\*).tw,id.
- 21. television viewing/
- 22. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\* or gaming).tw,id.
- 23. screen based entertainment.tw,id.
- 24. exp Social Media/
- 25. exp Mobile Devices/

- 26. (smartphone\* or smart phone\* or cell phone\* or mobile phone\* or small screen\*).tw,id.
- 27. (texting or text messag\* or app or apps or mobile applications).tw,id.
- 28. (iphone\* or ipad\* or ipod\* or tablet\* or laptop\*).tw,id.
- 29. bed rest.tw,id.
- 30. physical activity/ or exp exercise/ or activity level/ or movement therapy/ or dance therapy/ or mind body therapy/ or energy expenditure/ or physical education/ or exp sports/
- 31. (sport\* or bicycl\* or swim\* or walk\* or run\* or jog\*).tw,id.
- 32. (physical\* adj2 activ\*).tw,id.
- 33. (aerobic adj2 (train\* or active\*)).tw,id.
- 34. (childhood play behavior/ or childhood play development/ or games/ or recreation/) and (activ\* or outdoor\*).tw,id.
- 35. ((activ\* or outdoor\*) adj3 play\*).tw,id.
- 36. playgrounds/ or playground\*.tw,id.
- 37. active.ti. and (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle).tw,id.
- 38. (active adj3 (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle)).tw,id.
- 39. (prone position\* or floor time).tw,id.
- 40. ((abdomen or stomach or tummy or belly) adj2 (time or play)).tw,id.
- 41. exp overweight/ or body weight/ or weight gain/ or weight loss/ or body fat/ or body mass index/ or weight control/ or body size/
- 42. (obes\* or overweight or over-weight or adipos\* or fat or waist or skinfold\* or skin fold\* or body composition or bmi or body mass index).tw,id.
- 43. (bio-impedance analysis or BIA or absorptiomet\* or densitometr\* or photodensitometr\* or DXA or DEXA).tw,id.
- 44. physical fitness/ or physical endurance/ or physical strength/ or "range of motion"/
- 45. (physical conditioning or fitness).tw,id.
- 46. metabolic syndrome/ or insulin/ or blood suger/ or type 2 diabetes/ or glucose metabolism/ or glucose/
- 47. ((metabolic adj2 syndrome) or syndrome x).tw,id. and Risk Factors/
- 48. (glycosylated hemoglobin A or HbA1c).tw,id.
- 49. exp Cardiovascular Disorders/ or exp hypertension/ or cholesterol/ or lipids/
- 50. ((cardiovascular or heart or vascular) adj2 risk\*).tw,id.
- 51. (hypertens\* or high blood pressure or cholesterol or hypercholester\* or hyperlipid\* or dyslipid\*).tw,id.
- 52. exp motor development/ or exp motor processes/
- 53. (motor development or motor skill\* or locomotor control or object control).tw,id.
- 54. injuries/ or exp head injuries/ or exp spinal cord injuries/ or exp wounds/
- 55. developmental disabilities/ or exp delayed development/ or exp intellectual development disorder/
- 56. developmental milestone\*.tw,id.
- 57. behavior disorders/ or exp aggressive behavior/ or exp antisocial behavior/ or exp behavior problems/
- 58. exp social behavior/
- 59. interpersonal relationships/ or exp interpersonal interaction/
- 60. ((behavio?ral adj (conduct or disorder\*)) or conduct disorder\* or prosocial behav\* or social behav\*).tw,id.
- 61. exp attention/ or exp attention deficit disorder/ or concentration/ or distraction/ or concentrat\*.tw,id.
- 62. exp cognitive development/

- 63. exp academic achievement/ or academic achievement prediction/ or academic aptitude/ or academic failure/ or educational attainment level/ or achievement/ or student admission criteria/ or educational measurement/
- 64. (cognitive develop\* or academic achievement or educational achievement or grade-point average or grade point average or GPA).tw,id.
- 65. exp Language Development/ or exp Language Disorders/ or exp communication/ or speech perception/ or vocabulary/
- 66. self-perception/ or exp self-concept/ or self-efficacy/ or self-esteem/ or self-control/ or anger control/ or exp emotional control/ or emotional regulation/ or exp impulse control disorders/ or self-regulation/
- 67. (self-esteem or self esteem or self regulation or self control).tw,id.
- 68. exp executive function/ or exp cognitive ability/ or exp memory/ or exp affective disorders/ or exp anxiety disorders/ or psychological stress/ or "quality of life"/ or exp Life Satisfaction/ or exp Well Being/ or personality/
- 69. (depression or depressive).tw,id.
- 70. Development/
- 71. exp Childhood Development/
- 72. Growth.tw,id.
- 73. exp Accidents/ or exp Accident Proneness/ or exp Injuries/
- 74. Emotional Regulation/
- 75. exp Emotional Control/
- 76. Well Being/
- 77. or/42-45,52-75
- 78. 15 and 77
- 79. limit 78 to (140 infancy <2 to 23 mo> or 160 preschool age)
- 80. 78 and (pre-school\* or preschool\* or early childhood).mp.
- 81. 79 or 80
- 82. limit 81 to (english or french)
- 83. limit 82 to ("erratum/correction" or journal article)
- 84. 83 or (82 and retraction.ti.)
- 85. 84 and 2017.up.
- 86. 84 and 73 and 20161\*.up.
- 87.84 or 85

#### Early years sleep - CENTRAL

- 1. sleep.tw,kw.
- 2. 1 and (infant\* or child\* or preschool\* or pre-school\*).tw,kw.
- 3. limit 2 to medline records
- 4. limit 2 to embase records
- 5. 2 not (3 or 4)
- 6. remove duplicates from 5
- 7. 6 not (apnea or apnoea).ti.
- 8. 7 and 2017\*.up.

## LILACS

1. sleep.tw,kw.

tw:(sleep) AND (instance: "regional") AND (db:("LILACS") AND limit:("child, preschool") AND la:("es"))

# **Appendix 4. Integrated / Multiple Behaviours**

#### **MEDLINE**

- 1 Physical Activity.mp.
- 2 exp Exercise/
- 3 exp Exercise Movement Techniques/
- 4 exp Exercise Therapy/
- 5 Physical Exertion/
- 6 exp "Physical Education and Training"/
- 7 exp Sports/
- 8 (sport\$ or bicycl\$ or swim\$ or walk\$ or run\$ or jog\$).tw,kf.
- 9 (physical\$ adj2 activ\$).tw,kf.
- 10 (aerobic adj2 (train\$ or active\$)).tw,kf.
- "Play and Playthings"/ and (activ\* or outdoor\*).tw,kf.
- 12 ((activ\* or outdoor\*) adj3 play\*).tw,kf.
- 13 playground\*.tw,kf.
- active.ti. and (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle).mp.
- 15 (active adj3 (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle)).tw,kf.
- 16 prone position\*.mp. or floor time.tw,kf.
- 17 ((abdomen or stomach or tummy or belly) adj2 (time or play)).tw,kf.
- 18 or/1-17
- 19 Sedentary Lifestyle/
- 20 (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.
- 21 ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 22 ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 23 sitting.tw,kw.
- 24 Television/ or Video Games/ or Software/ or Videodisc Recording/ or Cartoons as Topic/ or Motion Pictures as Topic/
- 25 exp Internet/ or exp Computers, handheld/
- 26 Communications Media/ or Mass Media/
- 27 (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*).tw,kw.
- 28 (Smartphone\* or ipad or apps or app or mobile applications).tw,kw.
- 29 screen based entertainment.tw,kw.
- 30 or/19-29
- 31 Sleep/
- 32 (sleep adj3 duration).tw.
- 33 exp \*Sleep Apnea Syndromes/ and (apnea or apnoea).ti.
- 34 (31 or 32) not 33
- 35 (18 and 30) or (18 and 34) or (30 and 34)
- 36 limit 35 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)")
- 37 35 and (pre-school\* or preschool\* or early childhood).tw,kf.
- 38 36 or 37
- 39 limit 38 to (english or french)
- 40 limit 39 to (journal article or published erratum or "retraction of publication")
- 41 40 and (2017\* not (201701\* or 201702\* or 201703\*)).dc.

- 42 remove duplicates from 41
- 43 limit 38 to spanish
- 44 limit 43 to (journal article or published erratum or "retraction of publication")
- 45 remove duplicates from 44

#### **EMBASE**

## Early years combination - Embase

- 1. exp physical activity/ or exp exercise/ or exp kinesiotherapy/ or physical education/ or exp sport/
- 2. (sport\* or bicycl\* or swim\* or walk\* or run\* or jog\*).tw,kw.
- 3. (aerobic adj2 (train\$ or active\$)).tw,kw.
- 4. Play/ and (activ\* or outdoor\*).tw,kw.
- 5. (((activ\* or outdoor\*) adj3 play\*) or playground\*).tw,kw.
- 6. active.ti. and (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle).mp.
- 7. (active adj3 (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle)).tw,kw.
- 8. (prone position\* or floor time).tw,kw.
- 9. ((abdomen or stomach or tummy or belly) adj2 (time or play)).tw,kw.
- 10. or/1-9
- 11. sedentary lifestyle/
- 12. (sedentary or inactiv\* or (lack adj2 activity)).tw,kw.
- 13. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,kw.
- 14. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,kw.
- 15. sitting.tw,kw.
- 16. bed rest.mp.
- 17. television viewing/ or television/ or exp computer/
- 18. internet/
- 19. Social Media/ or Mobile Application/ or Mobile Phone/
- 20. (screen based entertainment or screen time).tw.
- 21. (texting or text messag\* or app or apps or mobile applications).tw.
- 22. (smartphone\* or smart phone\* or cell phone\* or mobile phone\* or small screen\*).tw.
- 23. (iphone\* or ipad\* or ipod\* or tablet\* or laptop\*).tw.
- 24. (social media or Facebook or Youtube or Twitter or Snapchat or Instagram or Pinterest or Skype or Vine).tw.
- 25. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\*).tw,kw.
- 26. ((television adj watch\*) or tv watch\*).tw.
- 27. or/11-26
- 28. Sleep/
- 29. Sleep Time/
- 30. (sleep adj3 duration).tw.
- 31. exp Sleep Disordered Breathing/ and (apnea or apnoea).ti.
- 32. (or/28-30) not 31
- 33. (10 and 27) or (10 and 32) or (27 and 32)
- 34. limit 33 to (infant or preschool child <1 to 6 years>)
- 35. 33 and (pre-school\* or preschool\* or early childhood).tw,kw.
- 36. 34 or 35
- 37. limit 36 to conference abstract

- 38. 36 not 37
- 39. limit 38 to (english or french)
- 40. limit 39 to embase
- 41. limit 40 to yr="2017"

#### **PsycINFO**

- 1. physical activity/ or exp exercise/ or activity level/ or movement therapy/ or dance therapy/ or mind body therapy/ or energy expenditure/ or physical education/ or exp sports/
- 2. (sport\* or bicycl\* or swim\* or walk\* or run\* or jog\*).tw,id.
- 3. (physical\* adj2 activ\*).tw,id.
- 4. (aerobic adj2 (train\* or active\*)).tw,id.
- 5. (childhood play behavior/ or childhood play development/ or games/ or recreation/) and (activ\* or outdoor\*).tw,id.
- 6. ((activ\* or outdoor\*) adj3 play\*).tw,id.
- 7. playgrounds/ or playground\*.tw,id.
- 8. active.ti. and (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle).tw,id.
- 9. (active adj3 (space\* or behavio?r\* or transport\* or commut\* or neighbo?rhood\* or park\* or game\* or gaming or lifestyle)).tw,id.
- 10. (prone position\* or floor time).tw,id.
- 11. ((abdomen or stomach or tummy or belly) adj2 (time or play)).tw,id.
- 12. or/1-11
- 13. sedentar\*.tw,id.
- 14. ((low adj3 energy expend\*) or physical\* inactiv\*).tw,id.
- 15. ((chair or stroller or car or automobile\* or auto or motor vehicle\* or bus or indoor\* or in-door or computer) adj3 time).tw,id.
- 16. sitting.tw,id.
- 17. ((television adj watch\*) or tv watch\* or cartoon\*).tw,id.
- 18. television viewing/
- 19. (television or screentime or ((screen or computer) adj3 time) or ((watch\* or view\*) adj2 (dvd\* or video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\* or gaming).tw,id.
- 20. screen based entertainment.tw,id.
- 21. exp Social Media/
- 22. exp Mobile Devices/
- 23. (smartphone\* or smart phone\* or cell phone\* or mobile phone\* or small screen\*).tw,id.
- 24. (texting or text messag\* or app or apps or mobile applications).tw,id.
- 25. (iphone\* or ipad\* or ipod\* or tablet\* or laptop\*).tw,id.
- 26. bed rest.tw,id.
- 27. or/13-26
- 28. Sleep/ or Sleep Deprivation/
- 29. (sleep adj3 duration).tw.
- 30. \*Sleep Apnea/ and (apnea or apnoea).ti.
- 31. (28 or 29) not 30
- 32. (12 and 31) or (12 and 27) or (27 and 31)
- 33. 32 and (pre-school\* or preschool\* or early childhood).mp.
- 34. limit 32 to (140 infancy <2 to 23 mo> or 160 preschool age )
- 35. 33 or 34
- 36. limit 35 to (english or french)
- 37. limit 36 to ("erratum/correction" or journal article)

38. 37 or (36 and retraction.ti.) 39. limit 38 to yr="2017"

#### **SportDiscus**

- 1. TI (exercise or (physical\* n2 activ\*) OR aerobic N2 train\* or aerobic N2 active\* OR sport\* or outdoor\* OR playground or play or playing OR "rough and tumble" or "active recreation\*" OR run\* OR walk\* OR jog\* OR bicycl\* or biking or cycling or tricylc\* or "tummy time" or "floor time" or prone position or crawl\* OR swim\* or soccer or gymnastic\* ) OR SU (exercise or (physical\* n2 activ\*) OR aerobic N2 train\* or aerobic N2 active\* OR sport\* or outdoor\* OR playground or play or playing OR "rough and tumble" or "active recreation\*" OR run\* OR walk\* OR jog\* OR bicycl\* or biking or cycling or tricylc\* or "tummy time" or "floor time" or prone position or crawl\* OR swim\* or soccer or gymnastic\* )
- 2. Sleep
- 3. DE "MASS media" or DE "INTERNET" OR DE "ELECTRONIC games" OR DE "INTERNET games" OR DE "MULTIPLAYER games" OR DE "VIDEO games") or DE "SEDENTARY behavior" or DE "SEDENTARY behavior in children" or (Smartphone\* or ipad or apps or app or mobile applications) or screen based entertainment or (television N3 time or screentime or screen N3 time or computer N3 time or (watch\* N2 dvd or watch N2 video\* or view\* N2 dvd\* or view N2 video\*)) or screen media or social media or video gam\* or videogam\* or computer gam\* or electronic gam\* OR chair N3 time or stroller N3 time or car N3 time or automobile\* N3 time or auto N3 time or motor vehicle\* N3 time or bus N3 time or indoor\* N3 time or in-door N3 time or computer N3 time OR sitting or ((sedentary or inactiv\* or (lack N2 activity))) or ((low N3 energy expend\*) or physical\* inactiv\*)
- 4. (S1 and S2) or (S1 and S3) or (S2 and S3)
- 5. S4 and (Infan\* or pre-school\* or preschool\* or early childhood or SU child\*) Limiters - Language: English, French; Publication Type: Academic Journal; Document Type: Article Date 2017

#### **LILACS**

(tw:(tw:(sleep) AND tw:(sedentar\*))) OR (tw:(tw:(sleep) AND tw:(actividad física OR exercise OR physical\* activ\* OR sport\* OR bicycl\* OR swim\* OR walk\* OR run\* OR jog\* OR aerobic active\* OR tummy time))) OR (tw:(tw:(sedentar\*) AND tw:(actividad física OR exercise OR physical\* activ\* OR sport\* OR bicycl\* OR swim\* OR walk\* OR run\* OR jog\* OR aerobic active\* OR tummy time))) AND (instance:"regional") AND ( db:("LILACS") AND limit:("child") AND la:("es"))