INPLASY PROTOCOL

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Conflicts of interest: None.

Effects of classroom active breaks interventions on cognitive function and academic achievement of children and adolescents：a systematic review and meta-analysis

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Review question / Objective: The aim of this meta-analysis is to evaluate the effects of classroom active breaks on cognitive function and academic achievement in children and adolescents.

Condition being studied: Physical activity can bring multiple physical and mental health benefits, while over 50% of children around the world are not meeting WHO recommendations(60 min per day of moderate-to-vigorous physical activity). Schools are considered ideal settings for the promotion of children's physical activity. However, with limited time available during these discrete periods, additional opportunities may be required in order for children to achieve the recommended levels of physical activity. Classroom active breaks provides another way for students to be active at school. This involves classroom teachers incorporating physical activity into class time through adding short bursts of physical activity, either with curriculum content (curriculum focused active breaks) or without (active breaks). There is increasing interest from researchers and education professionals about the potential for classroom active breaks to positively impact academic-related outcomes, including cognitive function and academic achievement. However, there is less studies of systematic review and meta-analyses have explored the impact of classroom active breaks interventions on cognitive function and academic achievement outcomes. Existing literature on classroom active breaks shows high levels of heterogeneity for samples, intervention characteristics and investigated outcomes.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 06 August 2020 and was last updated on 06 August 2020 (registration number INPLASY202080020).

INTRODUCTION

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METHODS

Search strategy: We will search, with no time restrictions, the following databases for relevant English language literature: PubMed, Web of Science and EBSCO. The search string will be built as follows: (active breaks OR physical activity breaks) AND (students OR children OR adolescents) AND (cognitive function OR academic achievement) AND. The electronic database search will be supplemented by a manual search of the reference lists of included articles.

Participant or population: Inclusion: the population sample consisted of apparently healthy children or adolescents (4-19 years) Exclusion: studies targeting special populations (e.g. children with mental or cognition disorders, nervous system diseases or brain injuries, overweight children).

Intervention: Physical active breaks in classroom: physical activity carried out during regular class time, and is distinct from school recess/lunch break times.

Comparator: Treatment as usual with no additional physical activity during regular class time.

Study designs to be included: Randomized controlled trials (RCT), cluster-RCTs (cRCT), quasi-experimental or longitudinal observational study designs with a control or comparison g.

Eligibility criteria: 1.Randomized controlled trials (RCT), cluster-RCTs (cRCT), quasi-experimental or longitudinal observational study designs with a control or comparison group; 2.Active breaks interventions carried out inside the classroom, and investigated the effects of active breaks on executive functions, attention and/or academic achievement; 3.Study population included general school-aged children and adolescents between the age of 4–19 years; 4.Presented original data; 5.Articles written in English.

Information sources: Studies were identified through a systematic search of three electronic databases (PubMed, Web of Science and EBSCO), with no time restriction and up to 01 July 2020. Search strategies (strings adapted to the different databases) used the following keywords and terms: " (active breaks OR physical activity breaks) AND (students OR children OR adolescents) AND (cognitive function OR academic achievement) ". Search strategy for PubMed is shown in Table 1, and similar strategies will be built and applied for other databases. "Grey" literature, including the reference lists from studies meeting inclusion criteria as well as recent reviews in the field were hand-searched.

Main outcome(s): Mean change in cognitive function or academic achievement from baseline to the last available follow-up,

measures of effects is standardised mean difference, SMD.

Additional outcome(s): None.

Data management: Two authors will independently extract data. Any disagreement will be resolved by discussion until consensus is reached or by consulting a third authors. The following data will be extracted: author, year of publication, country of study, study design, participant characteristics, intervention characteristics, cognitive function and academic achievement outcome measures.

Quality assessment / Risk of bias analysis: Two authors will independently assesses the quality if the selected studies according to the Effective Public Health Practice Project (EPHPP) tool. The quality will be assessed on selection bias, study design, confounders, blinding, data collection methods and withdrawals and drop outs. Weak, moderate or strong scores were awarded in each category according to the tool's accompanying instructions, with an overall methodological quality score was given: strong (no weak component ratings); moderate (one weak component rating); or weak (more than one weak component rating). Where disagreements existed, deliberation occurred until a consensus was reached. Other biases results from these questions will be graphed and assessed using Review Manager 5.3.

Strategy of data synthesis: Standardized mean difference(SMD) for both fixed and random effects models (weighting by inverse of variance) will be used. Between-study heterogeneity will be assessed using the Q and I2 statistics. According to the Cochrane handbook, I2 statistic ≥50 was considered as a threshold for substantial heterogeneity. Results will be assessed using forest plots and presented as SMD for the main outcome ans secondary outcomes. An influence analysis will be performed to ascertain the results of the meta-analysis by excluding each of the individual studies. Publication bias will be assessed by a funnel plot for meta-analysis.

Subgroup analysis: A subgroup analysis was conducted for several subdomains. Four subdomains of cognitive functions were distinguished: executive function, working memory, and attention. Three subdomains of academic performance were distinguished: mathematics, spelling and reading.

Sensibility analysis: Individual studies were excluded one by one by using Review Manager 5.3.

Language: English.

Country(ies) involved: China.

Keywords: Systematic review; meta-analysis; physical activity; active breaks; cognitive function; academic achievement.

Contributions of each author:
Author 1 - Huimin Lyu - conceived and designed the study; drafted the initial manuscript; read and approved the final manuscript.
Author 2 - Cuixiang Dong - conceived and designed the study; performed the meta-analyses; read and approved the final manuscript.
Author 3 - Chunyan Zha - conducted the database searches, screened titles, abstracts and full texts for eligibility criteria, performed methodological quality assessments and data extraction; performed the meta-analyses; read and approved the final manuscript.
Author 4 - Qiuying Yang - conducted the database searches, screened titles, abstracts and full texts for eligibility criteria, performed methodological quality assessments and data extraction; read and approved the final manuscript.