Relationship between Learning Flow and Academic Performance: A Systematic Evaluation and Meta-analysis

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ADMINISTRATIVE INFORMATION
Support - None.
Review Stage at time of this submission - The review has not yet started.
Conflicts of interest - None declared.
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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 June 2023 and was last updated on 27 June 2023.

INTRODUCTION
Review question / Objective The purpose of this meta-analysis is to explore whether learning flow affect academic performance-the positive or negative impact of learning flow on academic performance. Furthermore, it does clarify main causes and make effective measures.

Condition being studied different media learning methods, enterprise online training, game-based online learning, non-face-to-face learning environment, computer science courses.

METHODS
Participant or population Students, aged from 6 to over 60, coming from grade 1 of primary school to grade 4 of university.

Intervention Learning environment/courses/methods to enhance flow experience.

Comparator Traditional environment/courses/methods for regular learning.

Study designs to be included Clinical research/Empirical research.

Eligibility criteria (1) the method to enhance the learning flow is the experimental group; (2) the control group that only conducts routine learning for students; (3) clinical research or empirical research; (4) the outcome indicators include at least one of the following: achievement test scores, flow questionnaire or interviews.

Information sources Four electronic databases (Pubmed, EMBASE, Cochrane Central Register of Controlled Trials and Web of Science).

Main outcome(s) Achievement test scores, flow questionnaire or interviews.

Quality assessment / Risk of bias analysis The quality evaluation scale is adapted from the quality
index (Downs&Black, 1998), the research article evaluation list (Durant, 1994) and the evaluation tool (Genaidy et al., 2007), with the total score of 9 points. The score of $\leq 6$ points-low quality literature; $7 \leq$ the score $\leq 8$-medium quality literature; the score $\geq 9$-high-quality literature.

**Strategy of data synthesis** We test the heterogeneity through the correlation coefficient and its 95% confidence interval and choose the random effect model for statistical analysis. Then, we perform a publication bias test on the correlation coefficient and its 95% confidence interval and perform a sensitivity analysis of elimination one by one.

**Subgroup analysis** Data extraction tables were used to record the data in the study: first author, country, year of publication, sample size (number of totals, men and women), average age (mean and standard deviation), intervention details and NOS score.

**Sensitivity analysis** Sensitivity analysis is to eliminate studies one by one, combine the remaining studies and observe the changes in heterogeneity and effect size.

**Country(ies) involved** China.

**Keywords** Learning Flow; Academic Performance; Meta.

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