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ADMINISTRATIVE INFORMATION**Support** - None.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2023110115**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 29 November 2023 and was last updated on 29 November 2023.**INTRODUCTION**

Review question / Objective This study will review the empirical research literature on the application of virtual reality (VR) to social emotional learning (SEL) in children and adolescents over the past 10 years (2013–2023) and systematically analyze the applied research trends in terms of research design, technical features, in-structional design, and teaching effects. This review seeks to describe the features of VR more comprehensively, summarize the specific types of SEL promoted by VR, and answer the following research questions.

1. Which groups were primarily targeted when using VR to promote SEL?
2. What are the technical features of VR that support SEL for children and adolescents?
3. What types of social and emotional skills for children and adolescents were taught in VR?
4. What are the overall effects and possible moderating factors of VR-supported SEL interventions?

Condition being studied Condition being studied is social emotional learning skill development of children and adolescents.

METHODS

Search strategy A literature search will be conducted according to the standard systematic literature review process. Articles will be retrieved from the core collection of the Web of Science online database to ensure the quality of the article. Articles will be limited to those written in English and published between January 2013 and May 2023. The following search terms will be used: (a) “virtual reality” or “VR” or “virtual” or “Immersive Virtual Environment” or “Immersive Technolog*” or “3D Environment” or “cave” (because cave environments are not clearly classified by level of immersion, some articles use the term “cave” in their titles instead of “VR”); (b) “social emotional learning” or “social emotional competence” or

“social emotional development” or “social emotional skill*” or “social skill*”; and (c) “child*” or “youth” or “young people” or “teenager” or “adolescent”. Using these search criteria, a total of 503 articles will be retrieved.

Participant or population Children and adolescents younger than 18 year old.

Intervention Virtual reality (VR) based intervention programs.

Comparator Traditional intervention programs or no program at all.

Study designs to be included Empirical studies such as experiment, observational studies, cross-sectional studies, case studies, and survey studies will be included.

Eligibility criteria Inclusion criteria: Between January 2013 and May 2023, empirical studies were published in English examining the use of VR technology for learning purposes among children and adolescents. These studies focused on one or more aspects of social emotional learning skills.

Information sources Web of Science Core Collecton Database: SSCI, SCIE, ESCI, and ACHI databases.

Main outcome(s) Change in social emotional learning assessment score from baseline to the last available follow-up. Overall effect of VR interventions and moderating factors. Levels of social emotional learning measured by self-reported rating or observed behaviors.

Quality assessment / Risk of bias analysis We will assess and report on the potential for publication bias, which arises from the selective publication of studies with positive results. Use methods like funnel plots and statistical tests (e.g., Egger’s test) to evaluate publication bias.

Strategy of data synthesis After deciding on the coding protocol dimension, two researchers will code five articles and discussed any uncertainties during the coding process in detail to ensure a common understanding between the two coders. The two researchers will then code separately, with the first round of coding being completed within 2 weeks. During the coding process, the two coders will remain in constant communication and jointly resolve any coding uncertainties when they arise. During the coding process, any areas that are difficult for both coders to determine will be recorded and then subsequently discussed with an

expert. Following expert guidance, both coders will undertake secondary coding. This primarily will involve addressing any gaps in the coding table and ensuring the accuracy of the previous coding. The entire coding process is expected to complete within one month.

Subgroup analysis Not applicable.

Sensitivity analysis Variation of inclusion/exclusion criteria and employment of different statistical methods/effect sizes. If these two measures do not substantially affect the results, the findings can be considered relatively stable. However, if the results are highly sensitive to these variations, further exploration and explanation of these discrepancies will be conducted.

Country(ies) involved China.

Keywords social and emotional learning; virtual reality; children; systematic literature review; meta-analysis.

Contributions of each author

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