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ADMINISTRATIVE INFORMATION**Support** - N/A.**Review Stage at time of this submission** - Preliminary searches.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202510099

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 January 2025 and was last updated on 23 January 2025.

INTRODUCTION

Review question / Objective The purpose of this review will be to investigate the current state of the literature regarding the use of serious gaming or virtual-interactive tools to assess and treat executive dysfunction in individuals with traumatic brain injury (TBI). Specifically, the authors seek to identify in individuals with Traumatic Brain Injury (TBI) how effective are serious gaming or virtual-interactive tools in the assessment or treatment of executive dysfunction as evidenced by existing studies in the literature?

Background One of the most common diagnoses following traumatic brain injury is executive dysfunction, which is a blanket diagnosis describing a host of cognitive deficits such as those in memory, attention, language, learning, and pragmatic skills. Due to the nature of TBI, the most commonly impacted cortical regions are the in the frontal and temporal lobes, which are the areas believed to house several of the most important

cognitive functions. Because of this, it is very common for individuals, post TBI, to struggle with cognitive functioning, specifically the executive functions; hence the birth of the term executive dysfunction. These deficits typically present as difficulties with planning and organizing information, monitoring or repairing behaviors, structuring goals or initiative goal-directed behaviors, a lack of cognitive flexibility, inhibition, and inappropriate social behaviors.

Rationale Serious games, which are described as computerized tasks with goal-directed frameworks that are not used for recreation, are becoming increasingly popular modalities for rehabilitation in clinical populations. These tasks can offer seemingly idyllic conditions, such as replicability, ease of administration, task control, and a safe testing environment, to test a myriad of skills such as motor movements, language, and cognition abilities. Despite the promise that such tasks hold, there is little evidence-base to serve as a foundation for the creation of such tasks in addition to their use in clinical environments for

assessment, diagnosis, or treatment. Therefore, the purpose of this review is to investigate the current state of the literature regarding the use of serious gaming or virtual-interactive tools to assess and treat executive dysfunction in individuals with traumatic brain injury (TBI).

METHODS

Strategy of data synthesis The search strategy was developed by an experienced librarian and was adapted to use the controlled vocabulary of each database. An example of the search conducted in PubMed is as follows: (serious game OR video game OR computer game OR virtual reality OR ("Video Games"[Mesh])) AND (executive function* or executive dysfunction or executive abilit* or immediate memory deficit or delayed memory deficit or ("Executive Function"[Mesh]) OR ("Memory Disorders"[Mesh]) OR ("Memory"[Mesh])) AND (traumatic brain injury or tbi or acquired brain injury or abi or ("Brain Injuries, Traumatic"[Mesh]) OR ("Brain Injuries"[Mesh])) AND (assess* or evaluat* or screen* or rehabilitation). The search was not limited by publication date or language.

Eligibility criteria The population of focus in this review are individuals with traumatic brain injury who present with cognitive and/or executive dysfunction. There is no exclusionary criterion for comorbid deficits such as a motor speech disorder, emotional dysregulation, or additional acquired brain injury. While this review is investigating studies for both assessment and rehabilitation, those focused on rehabilitation or therapy, would be designed to support improvements in any of the following areas: attention, memory, inhibition, cognitive flexibility, planning/organization, and/or monitoring and repair of behaviors. These studies may be comparing the computerized intervention with a more traditional, in-person delivery model, or, if the study is a pilot study of a new technological intervention, there may be no comparison treatment explored.

Source of evidence screening and selection A comprehensive literature search was conducted in the following databases: CINAHL, MEDLINE, PsycArticles, PsycInfo, PubMed, and Scopus.

Data management Authors plan to use Covidence.org to facilitate article screening and selection.

Reporting results / Analysis of the evidence Outcomes include: a summary of modalities of gaming types and software used for tasks, types of

functions targeted through assessment or rehabilitation, effectiveness of tools in performing as designed, duration/timing of interventions, effectiveness in treating individuals with different severities of TBI, feasibility of replication, and barriers to replication or usability in clinical settings. Secondary outcomes will include understanding how behaviors are being measured (this can differ greatly across studies), participant feedback/administrator feedback on computerized tasks, and timing effects of treatments (short, long-term generalizability).

Presentation of the results The authors will prepare a manuscript following the PRISMA Statement for Scoping Reviews (PRISMA-ScR).

Language restriction English Language Restriction.

Country(ies) involved United States.

Keywords Serious Gaming; Traumatic Brain Injury; Cognitive rehabilitation; Executive Dysfunction.

Contributions of each author

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