INPLASY PROTOCOL

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Support: **Universidad de Tolima.**

Review Stage at time of this submission: **Formal screening of search results against eligibility criteria.**

Conflicts of interest:
None declared.

Rehabilitation programs based on computational systems: effects in the executive functions in young and middle adulthood: A scoping review

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Review question / Objective: **To identify empirical studies that measured the feasibility and effect of computer-based executive function stimulation and rehabilitation programs in the young and middle adult population.**
Background: **Reviews that evaluate the effectiveness of computerized cognitive training programs on executive functions in different population groups have shown contradictory results, to a certain extent associated with the methodological characteristics of said studies (Gates et al., 2019; 2020); most of them These reviews have focused on older adults (Ten Brinke et al., 2020; Yoo et al., 2015) with stroke sequelae, and adults with cognitive impairment. These studies have found improvements in general cognitive function in older adults (Ten Brinke et al., 2020); however, the effect on executive functions have not been studied. Only one review was carried out on the average adult (Gates et al., 2019); the authors restricted the search to interventions with more than 12 weeks and only found one article with eligibility criteria. Their work concluded that computerized cognitive training in midlife demonstrated lasting effects on general cognitive function after 12 weeks of training and on memory after 24 weeks of training.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 October 2022 and was last updated on 13 October 2022 (registration number INPLASY2022100052).

INTRODUCTION

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different population groups have shown contradictory results, to a certain extent associated with the methodological characteristics of said studies (Gates et al., 2019; 2020); most of them These reviews have focused on older adults (Ten Brinke et al., 2020; Yoo et al., 2015) with stroke sequelae, and adults with cognitive impairment. These studies have found improvements in general cognitive function in older adults (Ten Brinke et al., 2020); however, the effect on executive functions have not been studied. Only one review was carried out on the average adult (Gates et al., 2019); the authors restricted the search to interventions with more than 12 weeks and only found one article with eligibility criteria. Their work concluded that computerized cognitive training in midlife demonstrated lasting effects on general cognitive function after 12 weeks of training and on memory after 24 weeks of training.

Rationale: The impairments of Executive Functions are characteristics common to a large number of health disorders in young and middle adults, such as some early-onset neurodegenerative disorders, neurodevelopmental disorders, mood disorders, psychoactive substance use disorders, impulse control, as well as some diseases such as cancer or HIV, among others.

Among the rehabilitation programs or cognitive stimulation of executive functions, programs based on computer systems have gained great popularity and have given rise to multiple platforms and commercial applications. Although these programs have shown to be effective in different age groups, especially in children, adolescents, and older adults, there is little evidence that compiles the effects of these interventions in the young and middle adult populations.

Based on this background and in the absence of reviews on the topic of interest, a scoping review is proposed to provide a general description of the evidence collected so far on cognitive stimulation and rehabilitation programs for executive functions based on computational systems applied in young and middle adulthood.

METHODS

Strategy of data synthesis: The following databases were selected: Science Direct, Scopus, Springer Link, PubMed, and Taylor & Francis. The research team designed and tested the search strategies and reviewed by a specialized professional. In the review protocol, the authors established the central concepts for the construction of the search chain of the studies: 1) Executive functions, 2) Rehabilitation and cognitive stimulation, 3) Computer systems, and 4) young and middle adulthood. These categories were translated into English and reviewed in the ERIC thesauri (recognized terms in the education and health of the Educational Resources Information Center). Based on these central concepts identified and the review carried out in said thesauri, a search chain was built that included logical operators, which was executed in April 2021 in the databases selected for the search of the articles. The final search strategy for each database can be found in the supplementary material; below is the search strategy for the SCOPUS database: TITLE-ABS-KEY (("executive function" OR "executive function" OR "executive functioning") AND ("cognitive training" OR "cognitive stimulation" OR rehabilitation) AND (computerized OR computer-based) AND (adult)) AND PUBYEAR > 2004 AND PUBYEAR 2004 AND PUBYEAR < 2022 AND (LIMIT-TO (DOCTYPE , "ar")).

Eligibility criteria: Inclusion criteria: research articles published between 2015 and 2021, experimental studies (controlled clinical trials, open clinical trials, and quasi-experimental studies), articles that study computerized programs for the stimulation or rehabilitation of executive functions, which involved population between 18 and 60 years, written in English, that included one or two measures of executive functions.

Exclusion criteria: short articles, abstracts or protocols, reviews and meta-analyses, articles that do not assess executive functions, interventions that are not based on the use of computer systems.

Source of evidence screening and selection: The first author searched the different databases, implemented automatic filters, and eliminated duplicate articles. Next, the first and second authors screened the title and abstract of each article based on the established inclusion and exclusion criteria. The third author performed a second review of the articles that had passed the first filters. Subsequently, the full text of each article was reviewed independently by the three authors to verify whether or not the eligibility criteria were met; the articles in doubt were reviewed collectively to reach an agreement between the authors, and in exceptional cases, it was sent for arbitration to an outside advisor.

Data management: Based on previous reviews, the authors adapted a documentary analysis matrix in which the data extracted from each article was recorded: identification data, place of publication, year of publication, sample size, the average age of the participants, clinical conditions of the participants, methodological design, study objectives, characteristics of the training and type of activities, characteristics of the computer system implemented, executive functions studied, measurement instruments, primary results, secondary results, and conclusions.

Language restriction: English.

Country(ies) involved: Colombia.

Keywords: Cognitive rehabilitation, executive functions, computational systems, systematic review, clinical trials, adulthood.

Dissemination plans: An article with the research results is expected to be published in a high-impact journal.

Contributions of each author:
Author 1 - Carolina Robledo Castro - Formulation of search strategy, literature review (review of titles and abstracts of all retrieved articles), exhaustive reading of each article, first filter in data extraction, qualitative analysis.

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Author 2 - Piedad Rocio Lerma-Castaño - Formulation of search strategy, exhaustive reading of each article, second filter in data extraction, qualitative analysis.
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Author 3 - Luis Gerardo Pachón-Ospina - Formulation of search strategy, literature review (review of titles and abstracts of all retrieved articles), exhaustive reading of each article, second filter in data extraction, qualitative analysis.
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