

Overview of effects of motor learning strategies in neurological and geriatric populations: a systematic mapping review

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Jie, LJ¹; Kleynen, M²; Rothuizen, GW³; Kal, E⁴; Rothgangel, A⁵; Braun, S⁶.**ADMINISTRATIVE INFORMATION****Support** - Regieorgaan SIA.**Review Stage at time of this submission** - Data analysis.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202430056**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 March 2024 and was last updated on 14 March 2024.**INTRODUCTION**

Review question / Objective The aim is to undertake a systematic mapping review of Randomised Controlled Trials (RCT's) that provides a broad overview of the current state of research regarding the effects of the seven motor learning strategies (based on the framework of Kleynen et al., 2018) to improve functional tasks within elderly neurological and geriatric populations.

Rationale Motor learning is of key importance in neurological and geriatric rehabilitation. While there are a variety of motor learning strategies available, understanding their working mechanisms and effectiveness can be challenging due to the scattered information available. Although guidelines emphasize motor learning principles, practical application details are often lacking. To address this, a framework of seven common motor learning strategies has been developed. The framework, however, does not provide an overview of the current state of research and the

effectiveness of the different learning strategies. Furthermore, current research tends to focus on single strategies in isolated populations, which doesn't fully reflect clinical complexity. To bridge this gap, a systematic review aims to map the evidence on the effects of these strategies in elderly neurological and geriatric populations to enhance functional tasks.

Condition being studied Elderly neurological and geriatric populations.

METHODS

Search strategy Ageing (older adults) OR neurological diseases (stroke OR parkinson OR dementia) AND motor learning strategies (analogy learning OR errorless learning OR trial and error OR discovery learning OR dual-task learning OR action observation OR mental practice) AND Activities of Daily Living (functional tasks). The detailed search strategy per database is available from the corresponding author on a reasonable request.

Participant or population Elderly neurological and geriatric populations.

Intervention Errorless learning, analogy learning, observational learning, trial and error learning, dual task learning, discovery learning, and mental imagery.

Comparator The control group is not further specified.

Study designs to be included Randomised Controlled Trials (RCT).

Eligibility criteria Articles are eligible for inclusion if the participants have a mean age of ≥ 60 years, if the training session is ≥ 1 , if the outcome is a performance measure of motor task both immediate after the intervention (acquisition) or delayed (retention/transfer), and if the article is written in English, German or Dutch.

Information sources PubMed, CINAHL and Embase. Additionally, reference tracking will be performed to identify additional studies.

Main outcome(s) Number of publications per learning strategy over time, populations, the quality of the available studies (RoB2 and Sample size justification), and described effects (between-group differences).

Data management All data will be kept on a secured research drive, only accessible for researchers conducting this study.

Quality assessment / Risk of bias analysis The papers will be assessed on risk of bias using the Cochrane risk of bias 2 tool. Furthermore, sample size justification will be evaluated.

Strategy of data synthesis The data analysis will be divided into a numeric and thematic analysis. As part of the numeric analysis a flowchart will be presented to visualize the search and selection procedure. Furthermore, the included studies per learning strategy over time and the included populations per learning strategy will be visualized in figures (mapped). Data will be grouped and reported per learning strategy, risk of bias, power, population, intervention, task trained, amount of supervised practice, difference between groups (significance) and, if significant, the number of physical outcome measures. As part of the thematic analysis additional data will be further analyzed based on more detail on the population (type, group sizes, gender, age), intervention (motor learning strategy(ies), control intervention(s)

intervention), duration and frequency, task trained, measurement instruments, moments and outcome(s). Results will be summarized (table) and described per learning strategy. Finally, to help clinicians draw conclusions, the observed effects will be mapped in light of the potential risk of bias and obtained sample size justifications.

Subgroup analysis N/A.

Sensitivity analysis N/A.

Language restriction Only papers written in English, German, or Dutch will be included.

Country(ies) involved The Netherlands.

Keywords Systematic mapping review; errorless learning; analogy learning; observational learning; trial and error learning; dual task learning; discovery learning; mental imagery.

Dissemination plans Next to a scientific publication, we aim to present findings on (inter)national conference(s) targeted at health care professionals and to make findings accessible via our national website on the application of motor learning (in Dutch).

Contributions of each author

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