

# INPLASY PROTOCOL

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None declared.

## Digitally-delivered exercise interventions for fall and fracture prevention in older adults: A scoping review

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**Review question / Objective:** To systematically synthesize the key characteristics (the reach, implementation, efficacy, and safety) of digitally delivered fall and fracture prevention through exercise among community-residing older adults.

**Rationale:** Falls represent a significant cause of preventable injury, contributing to premature morbidity and mortality worldwide(1). Fall risk is multifactorial, and there are numerous strategies to prevent falls, being exercise programs strongly recommended. While there is strong evidence of the effectiveness of targeted exercise in reducing falls and fractures in older adults (2), these are normally delivered in-person by qualified instructors. With the COVID-19 pandemic, the use of technologies for medical care increased substantially(3). Also, services including exercise programs were shut down. The combination of continued reluctance among many older adults to return to in-person programs in addition to their comfort level to exercise from their homes are two main factors that justify the need for digitally delivered programs. To date, little is known about the reach, implementation, efficacy, and safety of exercise programs delivered digitally.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 24 August 2022 and was last updated on 24 August 2022 (registration number INPLASY202280097).

### INTRODUCTION

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**Condition being studied:** Our review will focus on exercise specific to physical function and fall/fracture prevention.

## METHODS

**Search strategy:** We will retrieve studies published in English, Portuguese or Spanish in the following electronic databases: Cochrane Center Register of Controlled Trials (CENTRAL), EMBASE, MEDLINE via PubMed, and the Physiotherapy Evidence Database (PEDro). Searches will be conducted since inception the database up to November 2022 . Our search strategy will contain a combination of terms reflecting our population of interest (older adults living in the community) AND intervention (composed of aerobic and/or strength and/or balance and/or agility and/or flexibility exercises) AND the mode of delivery (being delivered digitally/remotely). The terms used in the search strategy will be adapted according to each database.

**Participant or population:** Postmenopausal women and men > 50 years of any ethnicity, ambulatory without assistive device and living independently or semi-independently (e.g., residing in assisted living facility and dependent only for meals). Individuals should be apt to participate in exercise

interventions following the primary study author's criteria. Individuals with comorbidities (e.g., diabetes type II, hypertension) that are apt to exercise will be included. We will exclude studies in which individuals have been diagnosed as severely cognitively impaired and/or unable to follow instructions of an exercise leader.

**Intervention:** Interventions composed of aerobic, strength, balance, coordination, agility exercises focused on fall prevention. Interventions can contain specific postural control exercises, such as Tai Chi, Yoga, Pilates or other similar programs. We will include only interventions that were digitally delivered (e.g., through Zoom or another telecommunication platform) in real time by an instructor. We will include studies with qualified instructors (exercise professional, physical or occupational therapist, nurse or practitioner, another qualified professional). We will not include recorded interventions, such as YouTube videos. We will include interventions delivered for a minimum of six weeks, regardless of the number of sessions per week. We will include interventions delivered as group classes or individually.

**Comparator:** XPossible comparators will be: no control/comparator group (single-arm study), exercise interventions delivered in-person, any other comparator group, or wait list control.

**Study designs to be included:** We will include the interventional study designs: pilot studies (single arm), non-randomized, and randomized controlled trials.

**Eligibility criteria:** We will include studies that reflect the population, intervention, comparator and study designs of interest as described above.

**Information sources:** We will search the Cochrane Center Register of Controlled Trials (CENTRAL), EMBASE, MEDLINE via PubMed, and the Physiotherapy Evidence Database (PEDro) from inception.

**Main outcome(s):** - Measures of physical function and muscular strength: such as

validated measures of gait speed, chair sit-to-stand test, timed-up-and-go (TUG) test, grip strength, balance, and posture. - Adverse events: such as falls (during or outside exercise classes), injurious falls, fractures, as well as other exercise induced injuries, e.g., strains and sprains, resulting in medical intervention and missed days of exercise, when reported. - Quality of life: assessed using validated questionnaires, such as the Older People's QoL questionnaire (OPQOL) and the World Health Organization Quality of Life Questionnaire – version for older people WHOQOL-OLD).

**Additional outcome(s):** Secondary outcomes of interest are: - Measures of physical fitness : such as measures of cardiorespiratory fitness, flexibility and coordination. - Satisfaction: such as overall rating of satisfaction with the intervention being delivered and the mode of instruction (digitally), or any other measurement of satisfaction as reported by the primary study authors. - Safety: such as measurements of perceived safety during classes, or any other measure of safety as reported by the primary study authors. - Adherence to the intervention: such as attendance to exercise sessions or other measures of adherence as reported by primary study authors, such as frequency of exercise practice on non-instruction days.

**Data management:** References obtained from the electronic databases will be downloaded into a reference management software package and duplicates will be removed. The studies will be initially screened by title and abstract by two review authors, according to established criteria. We will obtain the full text of selected references and multiple publications of one particular study be pooled. Disagreements and inconsistencies will be resolved by discussion in consensus meetings and a third reviewer will assist in this process as needed. An electronic data extraction form will be created (in Microsoft Excel) and two independent authors will extract relevant data from the included studies. Disagreements on data

extraction between the two authors will be resolved in consensus meetings. We will summarize the characteristics of included studies descriptively in tables, including: a) Study identification (author, publication year) b) Sample characteristics (such as size, race/ethnicity, age, health conditions, any other specific characteristic) c) Description of the intervention (such as the number and frequency of exercise classes, duration) d) Length of follow up for the outcomes of interest e) Outcomes of interest assessed and magnitude of effects as described by the primary authors.

**Quality assessment / Risk of bias analysis:**

Two reviewers will assess randomized controlled trials using the Cochrane Collaboration's Risk of Bias 2 tool, and non-randomized studies will be assessed using the ROBINS-I tool.

**Strategy of data synthesis:** Because this is a scoping review aimed to systematically synthesize the evidence related to this theme, no pooled analysis will be conducted. Data will be summarized and presented as reported by the primary studies.

**Subgroup analysis:** We will not conduct subgroup analysis.

**Sensitivity analysis:** We will not conduct sensitivity analysis.

**Language restriction:** We will consider studies published in English, Portuguese, or Spanish.

**Country(ies) involved:** United States.

**Keywords:** older adults; resistance training; impact exercise; physical function; balance; falls; fall prevention; fractures.

**Dissemination plans:** The proposed review will be submitted for peer review publication. We will also disseminate results to our university colleagues through seminars to appropriate target audiences, such as individuals associated with the UC San Diego School of Medicine and the Hebert Wertheim School of Public Health.

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We intend to disseminate our findings to other groups, such as those from the field of Geriatrics & Gerontology, Exercise Science, and Dissemination and Implementation Science. We will share results with community agencies on aging and elder care and disseminate results to patient-centered local groups.

#### **Contributions of each author:**

**Author 1 - Maira Tristao Parra - Co-conceived this systematic review; supervised the search process and data extraction, and contributed to manuscript preparation and editing.**

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**Author 4 - Jeanne Nichols - Co-conceived this systematic review; contributed to data extraction and screening, and manuscript preparation and editing.**

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