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**Protocol for a systematic review of the physical health benefits of chair based exercise for older people**

Robinson K<sup>1</sup>, Gladman JRF<sup>1</sup>, Masud T<sup>2</sup>, Logan P<sup>1</sup> and Hood V<sup>3</sup>

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Address for correspondence:

Katie Robinson, B109 Division of Rehabilitation and Ageing, Medical School, University of Nottingham, Queens Medical Centre, NG7 2UH Email: [katie.robinson@nottingham.ac.uk](mailto:katie.robinson@nottingham.ac.uk)

Author Affiliations:

- 1 Division of Rehabilitation and Ageing, University of Nottingham
- 2 Health Care of Older People, Nottingham University Hospitals NHS Trust
- 3 Division of Physiotherapy, University of Nottingham

## Abstract

### Introduction

Chair based exercise (CBE) may provide a pragmatic and accessible form of exercise for some older people with compromised health and mobility. A previous systematic review identified little evidence or clarity over the nature of CBE, but there were methodological limitations with that review. The clinical consensus of what constitutes CBE has since been agreed, which allows for a more in depth and robust review of the evidence for the physical health benefits of CBE. This paper outlines a systematic review protocol.

### Methods

The PRISMA checklist for systematic reviews will provide the framework for the review.

Studies will be eligible for inclusion if: participants were aged 65 years and over; the intervention was considered to be CBE based on the consensus definition; and validated physical outcomes measures were reported. Medical and Allied Health Professional databases will be searched using a systematic search strategy.

Included papers will be reviewed against a standardised data extraction template which will include the intervention, adherence and outcomes. Quality appraisal will be conducted using the CASP tool and Cochrane Risk of Bias for randomised controlled trials. Meta-analysis will be performed if possible.

## Background

Chair based exercise (CBE) is used both for health promotion and in rehabilitation. It can be used by people who are not able to stand or walk, either with the aim of gaining the general health benefits of exercise, or as part of an effort to enable an immobile person to improve their mobility.

A systematic review on the benefits and harms of chair based exercise was published in 2013 with a specific focus on frail older people [1]. The review identified six papers [2-7] evaluating CBE in diverse settings and against a range of outcomes including mobility, function, cardio-respiratory fitness and mental health. The review concluded that the benefits of chair based exercise were uncertain. However, there were limitations in the search strategy such as the use of an incomplete list of search terms, which may partly have arisen due to an incomplete definition of chair based exercise. Since that review, a consensus study has established a definition and framework for chair based exercise programmes [8] which now enables a more robust review of the literature regarding the effectiveness of chair based exercise to be undertaken.

## Aims and Objectives of the Review

To ensure the quality and effectiveness of exercise provision, practice should be guided by the best available evidence, and robust evidence for the effectiveness of CBE has not been published for this specific population. Wide-spread adoption of chair based exercise should only be contemplated if it is shown to be both clinically and cost effective. The aim of this study is to collate what is already known about CBE programmes for older people in order to guide current practice, and identify areas for further development and research.

Objective: To systematically review the literature on the physical health benefits of chair based exercise for older people.

## Criteria for considering studies for this review

### Types of studies

Due to the small number of randomised controlled trials identified in the previously published review the following primary research study types will be eligible for inclusion in the review; randomised and other controlled studies; cross sectional studies, case-control studies, case-series studies; cohort studies; and qualitative study designs

As randomised controlled trials represent the highest level of primary research then if sufficient RCT are identified other study design designs will not be presented.

### **Types of participants**

Studies will be included where the focus is on older adults. This will be determined by the mean age reported in the study being 65 years and over. This age limit will be applied to exclude studies of CBE that are primarily applied to younger groups such as wheelchair athletes and spinal rehabilitation.

### **Types of exercise programmes**

Studies where the intervention is considered to be chair based will be included. Chair based exercise will be considered where the programme is implied to be primarily seated using the following consensus definition:

*a primarily seated, structured and progressive exercise programme that is part of a continuum of exercise for older people, which uses a chair to provide stability, and is delivered by instructors that are suitably skilled and trained to work with frail older people”.*

*Programmes that use a chair to promote stability in sitting and standing will be considered chair based exercise based on the consensus understanding [8].*

Programmes that include a significant component of walking or standing exercises will be excluded.

### **Types of outcome measures**

Any physical health benefit will be considered as part of this review. This will include - but is not limited to - muscle strength, muscle endurance, functional abilities, activities of daily living, mobility and balance. Studies will only be included if the outcome is measured using a validated tool.

## **Search strategy for identification of studies**

The following databases will be searched: Medline, CINHAL, PsychINFO, Cochrane, DARE, Health Technology Assessment (HTA) reports, NHS Economic Evaluation Database, Physiotherapy Evidence Database (PEDro) and The Allied and Complementary Medicine Database (AMED).

Databases will be searched from the date of their inception to the present day. The databases have been chosen as subject specific databases relevant to therapeutic exercise and older people, in order to ensure a comprehensive review of available literature. Search terms related to the broad concepts of exercise, older people and seated exercise will be defined, searched separately and then combined. Limitations from the previous review identified the difficulties in searching for chair based exercise as a full phrase which was rarely cited in titles and abstracts [1]. Key words of chair, seated and sitting will therefore be selected to ensure a full search of the literature. Key words from the papers identified in the previous publish review also shaped the search strategy with the inclusion of key words such as rehabilitation. This search strategy was constructed to include all older people and used a wide range of terms to capture the breadth of studies.

Search terms: the following search will be used for Medline, CINAHL, AMED and PsychInfo:

1. Exercise/
2. Exercise.mp
3. Exercise therapy/
4. Exercise therapy.mp
5. Rehabilitation/
6. Rehabilitation.mp
7. Aged/
8. Frail Elderly/
9. Frail elderly.mp
10. Older adults.mp
11. Elderly.mp
12. Chair.mp
13. Seated.mp
14. Sitting.mp

15. 1 or 2 or 3 or 4 or 5 or 6
16. 7 or 8 or 9 or 10 or 11
17. 12 or 13 or 14
18. 15 and 16 and 17
19. Limit 18 to 65 years and over

*Hand searching:*

The reference list of included studies will be searched.

### **Study Selection**

The process of selecting studies will be carried out independently by two reviewers (KR and VH). Titles and abstracts will be screened by the two reviewers to identify articles to retrieve in full.

Full articles will be reviewed by the two reviewers against the inclusion criteria. Reasons for exclusion will be recorded. Disagreements will be resolved by the independent assessment of a third reviewer (TM).

### **Data Extraction**

Data will be extracted from the included studies independently by each the two reviewers. Data will be extracted using a standardised spreadsheet which will include details of the intervention, reported health benefits; compliance and long term follow up.

### **Data Synthesis**

Meta-analysis will be performed where it is possible to pool the data from comparable studies. It is however anticipated that meta-analysis may not be possible given the variety of outcomes identified in the previous review.

If meta-analysis is not possible a narrative synthesis of the data will be reported. The interventions will be described to examine the range and pattern of use of the components of chair based exercise programmes. Health benefits reported in the papers will be presented and the strength of the effect reported where possible (significance and effect size).

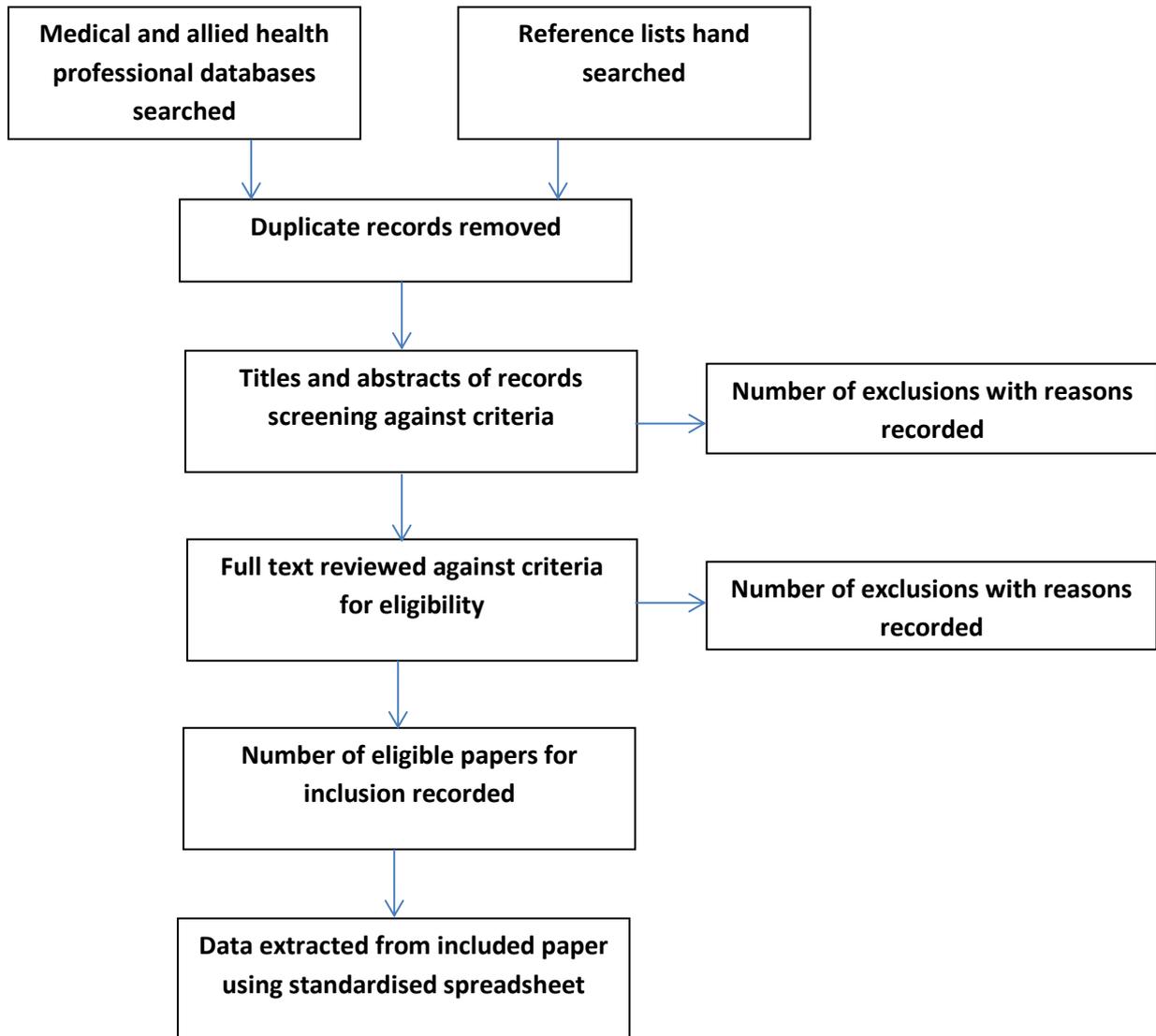
## Quality Appraisal

For randomised controlled trials the CASP tool [9] and Cochrane risk of bias summaries will be conducted independently by each of the reviewers. For non-randomised trial designs the McMasters Checklist will be conducted independently by each of the reviewers [10].

## Summary of Methods

Figure 1 provides a summary of the methods to be used in the review.

Figure 1: Summary of methods



## Discussion

This protocol presents the methods for a systematic review on the physical health benefits of chair based exercise for older people. The methods of the review adhere to a pre-defined structure using the PRISMA statement [11] which ensures a systematic process is followed. This means that the results of the review are likely to be robust.

In addition the methods of this review build upon the lessons learned from a previously published review [1]. A broad approach and search strategy has been developed to

ensure all relevant literature is screened. The definition of chair based exercise has been refined through the consensus development processing offering a more reliable way of identifying chair based exercise interventions in the published literature.

It is acknowledged that a potential weakness of the review is that there may not be any more literature identified than already examined in the earlier review. In this case this review will add very little to the current knowledge base that isn't already known. It is however anticipated that rehabilitation research in this sector is growing and therefore more literature will be available for review.

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Table 1: PRISMA Checklist for Methodology

Section/topic	#	Checklist item	Reported on page #
<b>TITLE</b>			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1 Title
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2 Abstract
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3 Background
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3 Aims and Objectives
<b>METHODS</b>			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	1 Title
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3-4 Criteria for considering studies in this review

Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4-5 Search Strategy
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	6. Study selection
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6. Data Extraction
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6. Data Extraction
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6. Quality Appraisal
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	6. Data Synthesis
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$ ) for each meta-analysis.	6. Data Synthesis
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6. Data Synthesis
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Not Applicable



EMRAN: Chair based exercise review protocol

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