Effectiveness of community-based rehabilitation (CBR) centres for improving physical fitness for community-dwelling older adults: a systematic review protocol

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ABSTRACT:

Introduction The increasing ageing population has become a substantial challenge for both healthcare and social services in many Asian countries. There is a high incidence of chronic diseases and comorbidities in older populations, leading to impairments and functional disability. Functional disability may result in loss of independence, reduced quality of life and increased care needs. Community-based rehabilitation (CBR) provides rehabilitation to improve physical, mental and social outcomes. However, there is limited evidence regarding the effectiveness of CBR for improving older adults’ physical fitness. The aim of this systematic review is to synthesise the evidence for the effectiveness of interventions delivered by CBR centres on physical fitness of community-dwelling older adults in Asian countries.

Methods and analysis A search on four English databases (CINAHL, Medline, Scopus and Proquest) and two Chinese databases (China National Knowledge Internet and Wanfang Database) will be conducted from inception to 15 November 2021. Both English and Chinese publications will be included. Studies conducted in Asian countries using either experimental or quasi-experimental designs, with any type of control group, will be included. The primary outcomes are physical fitness (capacity to perform activities and tasks). Secondary outcomes are performance of activities of daily living and health-related quality of life. The quality of all included studies will be assessed using the Joanna Briggs Institute standardised critical appraisal tools. Two reviewers will independently complete study screening, selection, quality appraisal and data extraction. Quantitative data where possible will be pooled in statistical meta-analysis. All statistical analyses will be performed using Review Manager (Rev Man) V.5.3 software.

Ethics and dissemination Ethical approval is not required for this review. Findings of the review will be disseminated electronically through a peer-reviewed publication and conference presentations. This review will provide high-quality evidence for CBR in Asian countries with growing ageing populations. Clinical and research recommendations will provide guidance for policy makers and clinical programmes in Asian healthcare systems. Findings will also inform healthcare systems in other countries that use CBR.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Findings and evidence in this review will be summarised and graded using the Grading of Recommendations, Assessment, Development and Evaluation Pro approach.
⇒ A comprehensive literature search using both English and Chinese language databases will be conducted.
⇒ Studies included in the review may measure different outcomes, which may limit pooling in meta-analysis.
⇒ Differences in populations and interventions delivered in the included studies may result in high levels of heterogeneity, leading to less certainty about the recommendations from the review.

BACKGROUND

Population ageing has become a major public health challenge worldwide, although this is occurring at varying speeds in different countries.1 According to the United Nations, a country with a proportion of older adults (aged 60 years or older) comprising more than 10% of the total population, is identified as an ageing country.2 Asia is the largest earth continent, with 60% of the world population.3 Most Asian countries are facing unprecedented growth of the ageing population and have stepped into an ageing society.4 In China, the older adult population was over 264 million in 2016, accounting for more than 18% of the total population. It is estimated that older adults in China will account for 30% of the total population (over 400 million) by 2050.5 This significant demographic change will have considerable impacts on social services, health, economic and social care, presenting both challenges and opportunities.6

The prevalence of chronic diseases, such as hypertension and diabetes, among older adult populations is increasing worldwide due to both non-modifiable risk factors (such
as ageing processes and genetics) and modifiable risk factors (such as smoking, dietary and exercise patterns). These chronic diseases contribute to increases in the incidence of cardiovascular, neurodegenerative and metabolic diseases, thereby leading to increased functional disability in the ageing population. Functional disability is predictive of reduced walking, talking and bathing abilities, and higher incidence of falls, social isolation and dependency, resulting in increased long-term care needs, reduced ability to participate in the community and reduced independence in activities of daily living (ADL).

The World Health Organisation (WHO) defines functional ability as ‘having the capabilities that enable all people to be and do what they have reason to value’, including abilities to meet their basic needs, learn, grow and make decisions, be mobile, build and maintain relationships, and contribute to society. This includes performance of basic activities of self-care, such as dressing or walking, which are referred to as ADL. Physical fitness is a core component of functional ability and is defined as the ability to carry out daily tasks and perform physical activities in a highly functional state, often as a result of physical conditioning. Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure.

There is strong evidence that a range of rehabilitation interventions are effective in improving physical fitness and ADL for community-dwelling ageing populations. Systematic reviews demonstrate significant reduction in fall rates and improvements in balance, functional performance and quality of life in older adults who received exercise programmes, Tai-Chi or dancing compared with controls. Reviews have also found that ADL are improved by strength, endurance, balance and functional training. However, rehabilitation interventions are not yet widely available in Chinese communities, as there is limited ability for community centres to provide rehabilitation treatment, health professional support and resources. A Chinese study published in 2021 reported that while 11.1% of older adults required rehabilitation services, less than 1% of older adults actually received various rehabilitation services in their community. These findings highlight the limited availability of community rehabilitation services for older adults in China and the need to address this service gap to reduce the growing health burden due to functional disability.

Community-based rehabilitation (CBR) is promoted by the WHO as a key strategy that aims to meet the rehabilitation needs and social inclusion of people living with disabilities in the general community. CBR delivers a broad range of health services including rehabilitation and physical exercise training within the community, supervised by health professionals but using predominantly local resources. Compared with existing healthcare systems, the CBR system has the potential to provide healthcare services for the community in a timely and efficient manner without cumbersome and compartmentalised local administration. This promotes strong and convenient links between older adults living with disabilities and their local healthcare system. A study conducted in Nepal that investigated the cost-effectiveness of CBR programmes reported that the programmes averted 1065 disability-adjusted life-years from 2013 to 2015.

However, there is limited evidence about the effectiveness of CBR for improving physical fitness or functional ability of older adults. CBR has been found to have some limitations, which have been summarised as not being customised to the local settings, absence of guidelines or frameworks for commencement and implementation, shortages of resources, lack of professional healthcare workers and multidisciplinary teams to deliver rehabilitation services. Previous systematic reviews have provided limited evidence for the effectiveness of CBR for improving health outcomes for community-dwelling older adults. A systematic review that included 15 studies found that CBR is effective in improving physical functional disabilities (such as performance of ADL and walking ability), mental functional disability and quality of life for people with living with disabilities (including people with stroke, arthritis, chronic obstructive pulmonary diseases and mental disabilities) living in low-income and middle-income countries. However, this review did not include outcomes that related to physical fitness or ADL and only included studies conducted in Thailand.

A preliminary literature search conducted through Google Scholar, PubMed and CINAHL found no systematic reviews that are undergoing or have been published evaluating the effectiveness of interventions delivered in the CBR centres on physical fitness or ADL for community-dwelling older adults in Asian countries. There is a gap in evidence about whether CBR delivered interventions can improve older adults’ performance of ADL or physical fitness as well as other important health outcomes, such as health-related quality of life, specifically in Asian countries. This systematic review will summarise the best available evidence for CBR interventions that aim to improve ADL or physical fitness for older adults, living in Asian countries. The focus on countries with similar cultures and histories will assist in providing high-quality evidence for Asian health systems as well as health systems in other countries that use CBR. The sharp increase in the ageing population worldwide and the resource constraints of health systems mean it is important to synthesise the best evidence for whether CBR interventions are effective in improving older adults’ physical fitness and performance of ADL.
Review objective
The objective of the review is to synthesise the best available evidence for the effectiveness of interventions performed in CBR centres on (1) physical fitness (2) ADL and health-related quality of life; for older adults aged over 60 living in Asian countries.

METHODS
The review protocol has been registered on Prospero (ID: CRD42021292088). The results of the review will be reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 Guidelines.33

Inclusion criteria
Types of participants
This review will consider studies that include community-dwelling adults aged 60 years or over living in Asian countries. The MeSH term ‘Asia’ has five parts, including Central, Northern, South-Eastern, Western and Far East. China is included in the East Asia region. There are 48 countries and regions in Asia. Studies that enrol participants less than 60 years old but where the mean age of the group is over 60 years old will also be considered for inclusion in this review. Studies that enrol older adults receiving palliative care will be excluded.

Types of settings
Studies that are conducted by centres that provide CBR will be eligible for inclusion. CBR centres provide services that include physiotherapy, exercise training, exercise, education and medical services. Services provided by hospitals, including outpatient services, individual community medical practitioners and home visiting nurses, will be excluded.

Types of intervention(s)/phenomena of interest
Primary research evaluating the effectiveness of interventions delivered by CBR centres, either single or multiple component interventions, will be considered for inclusion in this review. Studies evaluating interventions conducted by CBR centres that will be eligible for inclusion will include, but are not limited to, those that deliver multi-disciplinary interventions, physiotherapy, occupational therapy (including one-one or group interventions), exercise training (including aerobic, strength, dance or Tai Chi training), functional training or health education (including one-one/group/written/materials). These interventions must be provided by CBR centres. Studies that evaluate interventions provided in the home will be included if the participants are assessed through the CBR centre and the programme is conducted as an outreach of the CBR centre.

Comparator(s)/control
This review will only include primary studies that clearly state that the only difference between groups is the use of an intervention delivered by the CBR centre. Comparators can be usual care or another treatment, such as a home programme or health intervention, health education or medications.

Types of outcomes
The primary outcomes will be physical fitness (capacity to perform activities and tasks), measured by tools assessing physical function, including, but not limited to, balance, strength, functional mobility, walking, physical activity and endurance. Measurement tools may include, but are not limited to, BERG balance scale.34 Timed up and go test,35 gait speed or the 6 min walk test.36 Only studies that measure physical outcomes with validated assessment tools will be included. If a study reports multiple physical fitness outcomes, we will extract all data for each outcome, synthesise and, if possible, conduct a meta-analysis for each outcome separately, depending on the consistency of measurement tools used. Cognitive, emotional and social functional outcomes will be excluded. Studies that measure blood markers such as cholesterol or blood glucose levels will be excluded unless they also include data on outcomes measuring functional performance that can be extracted. Secondary outcomes are performance of ADL measured by tools including but not limited to the Katz tool,37 the Lawton instrumental ADL scale38 and health-related quality of life measured by tools including, but not limited to, the EuroQol-5 Dimension 5 levels version (EQ-5D-5L).39 If a study reports multiple secondary outcomes, we will extract all data for each outcome, synthesise and, if possible, conduct a meta-analysis for each outcome separately, depending on the consistency of measurement tools used.

Types of studies
Experimental and quasi-experimental study designs, including randomised controlled trials (RCTs), or quasi-experimental studies will all be considered for inclusion in this review. Trials that use any type of control group will be included. Case control studies, observational cohort studies or qualitative studies will be excluded. Mixed-methods studies will be considered if they contain an experimental phase and report quantitative data that measure an intervention of interest with a comparator.

Types of languages
Both English and Chinese publications will be included in this systematic review.

Search strategy
This review search strategy aims to ensure the literature search is as wide and thorough as possible so that all relevant published studies can be found and synthesised in the analysis. The search will follow the three-step strategy described by the Joanna Briggs Institute manual, including both electronic and manual searches.40 Initially, a preliminary web search, including Google Scholar and PubMed, will be conducted to find existing, similar systematic reviews, assessing the volume of potentially relevant studies, and identifying index terms and
keywords. Preliminary keywords will be identified and discussed with a senior health librarian at Curtin University. Second, all identified keywords and index terms will be searched across the following databases for relevant studies to complete a comprehensive, systematic literature search. Four English electronic databases will be searched: CINAHL, Medline, Scopus and Proquest. Two Chinese electronic databases will be searched: China National Knowledge Internet and Wanfang Database. Grey literature will be searched in OpenGrey. All searches will be reported in the results, as recommended in the PRISMA guidelines. An example of a search strategy is presented in Table 1. Third, the reference list of all identified publications will be handsearched for additional studies not previously identified during the first or second step of the search. Titles and abstracts of all studies will be screened by two independent reviewers who will examine the studies to determine if they meet the inclusion criteria. Any disagreements between the two reviewers will be resolved by consulting a third independent reviewer until a consensus is reached.

### Assessment of methodological quality
All eligible studies will be assessed for methodological quality, including risk of bias of individual studies, by two independent reviewers (two for Chinese and two for English articles) before inclusion in the review using the Joanna Briggs Institute standardised critical appraisal tools (JBI https://jbi.global/critical-appraisal-tools) for RCTs and quasi-experimental trials. Any disagreements between the two reviewers will be discussed with a third reviewer to reach consensus. Study selection and inclusion will be presented in a PRISMA flow chart (online supplemental appendix). Studies excluded after full text review will be recorded and reasons for exclusion provided.

### Data extraction
Quantitative data will be extracted from all included studies by two reviewers (two for Chinese and two for English articles) using the standardised data extraction tool from the JBI reviewers’ manual. Detailed information of the included studies extracted will include publication date, authors’ names, types of interventions, populations, study methods and data measuring outcomes relevant to the review. Missing data from any of the included studies will be sought from the authors. If sufficient data are not obtained from authors studies will be narratively reported and implications of any missing data will be discussed.

### Data synthesis
Quantitative data from two or more studies will be pooled, if possible, in statistical meta-analysis using Review Manager V.5. All results will be subject to double data entry. Effect sizes will be expressed either as weighted (or standardised) mean differences (for continuous data) or ORs (for categorical data), with 95% CIs calculated for analysis, depending on the outcome measures used in the studies. Standard $\chi^2$ and I² tests will be used to assess heterogeneity. For multiple primary or secondary outcomes, we will, if possible, pool study results to conduct a separate meta-analysis for each outcome. The choice of statistical model (random or fixed effects) for meta-analysis will be based on the criteria outlined by JBI guidelines. Data that cannot be pooled will be reported by using narrative synthesis. Grading of Recommendations, Assessment, Development and Evaluation Pro (GRADEPro) will be used to create the GRADE approach for grading the certainty of evidence and a summary of findings. The GRADE approach also rates the risk of bias at the outcome level.

### Patient and public involvement
Individual patients or public agencies will not be involved in the design, conduct, reporting or dissemination of this systematic review due to the nature of this review.

### Table 1: Literature search strategy for CINAHL

| S1 | MH “Aged+” OR (elder or aged of “old” adults” or geriatric) |
| S2 | MH “Asia+” OR (china or indonesi or pakistan or bangladesh or japan or philippines or vietnam or turkey or iran or thailand or myanmar or korea or iraq or afghanistan or “saudi arabia” oruzbekistan or malaysi or yemen or nepal or “sri lanka” or kazakhstan or syria or cambodia or jordan or azerbaijan or “united arab emirates” or tajikistan or israel or laos or lebanon or kyrgyzstan or turkmenistan or singapore or oman or palestine or kuwait or georgia or mongolia or armenia or qatar or bahrain or “timor-leste” or cyprus or bhutan or maldives or brunei or taiwan or “hong kong” or macao or macau) |
| S3 | (Communit* N8 (rehab* or therap* or physio*) OR MH “Rehabilitation, Community-Based”) |
| S4 | TI communit* OR AB communit* |
| S5 | MH “Rehabilitation” or “Activities of Daily Living+” or “Recreational Therapy” or “Occupational Therapy” or “Physical Therapy+” or “Dance Therapy” or “Rehabilitation, Cardiac” or “Rehabilitation, Pulmonary” or “Chest Physical Therapy” or “Rehabilitation, Geriatric” or “Sensory Motor Integration” or “Early Ambulation” or “Rehabilitation Centers” |
| S6 | S4 AND S5 |
| S7 | TI (rehab* or therap* or physio*) OR AB (rehab* or therap* or physio*) |
| S8 | “Community Health Services” or “Community Health Centers” or “Senior Centers” or “Health Services for the Aged” |
| S9 | S7 AND S8 |
| S10 | S3 OR S6 OR S9 |
| S11 | S1 AND S2 AND S10 |
DISCUSSION
Limited studies have shown that CBR centres in other countries are an effective means for older adults with chronic diseases and geriatric syndromes to receive fall prevention strategies, individualised rehabilitation programmes and other healthy-ageing services in the community to promote and improving their health and independence.21 24 However, few studies have investigated the effectiveness of CBR in Asian countries, hence there is limited evidence to guide healthcare providers and policy makers in these countries. This systematic review will focus on the effectiveness of CBR on physical fitness of older adults living in Asian Countries. High-quality evidence for CBR is required for these countries as they have reached a critical stage of population change. The United Nations Economic and Social Commission for Asia and the Pacific estimates that the proportion of the older adult population living in Asian countries will double from 12.4% in 2018 to reach more than 25% (1.3 billion) by 2050.25 It is estimated that, in the following one and half decades, healthcare costs for older adults will account for about 65% of the Chinese government health burden and 44% of the Indian government health burden.26 Results of this systematic review will therefore provide guidance to governments and healthcare systems in Asian countries on how to address this growing health-care challenge. Guidance on establishing CBR centres and providing evidence for clinicians in CBR centres on the use of interventions for improving functional outcomes of older adults will assist centres to provide more effective CBR services for older adults. Further clinical research will be designed based on this systematic review.

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Contributors WX was primarily responsible for drafting the systematic review protocol with support from A-MH and DX. WX, A-MH, DX and ZD were responsible for study design. AJ contributed to the design and the statistical analysis plan, JJ contributes to search strategy design, data extraction and critical appraisal. All authors critically reviewed the systematic review protocol for its content and approved the final version of the systematic review protocol for submission.

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REFERENCES
2 Desa U. United nations, department of economic and social Affairs, population division. World population prospects, 2019.
4 World Health Organisation. Ageing, 2020
20 Choo YT, Jiang Y, Hong J, et al. Effectiveness of tai chi on quality of life, depressive symptoms and physical function among community-


27 Organization WH. Global action plan on physical activity 2018–2030: more active people for a healthier world: World Health organization, 2019


46 GradePro GDT, GRADEpro Guideline development tool software. 435. McMaster University, 2015.
Appendix I

Records identified through database searching (PubMed (n=), Scopus (n=), CINAHL (n=), CNKI (n=), WanFang (n=)) Total articles (n=)

Duplicates removed (n=)

Records excluded by title (n=)

Records screened by abstract (n=)

Records excluded by abstract (n=)

Full-text articles assessed for eligibility (n=)

Full-text articles excluded, with reasons (n=)

Exclusion criteria:
- Not delivered in CBR:
- Age<60 years:
- Not in Asian countries:
- No control groups:
- No exercise activities:
- No physical fitness:
- The difference is not CBR: