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# Psychosocial and rehabilitation interventions and health gains in older persons in long-term care: A systematic review

António José Lista[a,f,*], Lara Guedes de Pinho[b,f], Tânia Correia[c,g,h], Catarina Afonso[d,i], Inês Cardoso[e,f], César Fonseca[a,f]

[a] São João de Deus School of Nursing, University of Évora, Évora, Portugal
[b] School of Health, Polytechnic Institute of Viana do Castelo, Viana do Castelo, Portugal
[c] School of Health of Viseu, Polytechnic Institute of Viseu, Viseu, Portugal
[d] School of Health of Santarém, Polytechnic Institute of Santarém, Santarém, Portugal
[e] Intermediate Care Unit II, Sant'Iago do Outão Orthopaedic Hospital, Arrábida Local Health Unit, Setúbal, Portugal
[f] Comprehensive Health Research Centre (CHRC), University of Évora, Évora, Portugal
[g] RISE-Health, Nursing School of Porto (ESEP), Porto, Portugal
[h] Health Sciences Research Unit: Nursing (UICISA: E), Nursing School of Coimbra (ESEnfC), Coimbra, Portugal
[i] RISE-Health, School of Health of Santarém, Polytechnic Institute of Santarém, Santarém, Portugal

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ABSTRACT

*Background:* Global aging and the rising global prevalence of multimorbidity contribute to increasingly complex and substantial long-term healthcare needs. Person-centred psychosocial and rehabilitation interventions targeting older adults are essential in addressing these challenges effectively.

*Objective:* To identify person-centred psychosocial and rehabilitation interventions targeting older adults in long-term care and the health gains associated with these interventions.

*Study design:* Systematic literature review of randomized controlled trials with narrative synthesis.

*Methods:* Included studies were: (1) those with older adults (65+) in long term care with multimorbidity; (2) studies comparing person-centred rehabilitation and/or psychosocial interventions with usual care; and (3) those reporting outcomes indicating a positive change or stabilization of health trajectories, including improved mental health, maintained or slowed decline in functioning, and enhanced well-being. The risk of bias was assessed using the Cochrane RoB 2 tool.

*Data sources:* Database searches (Pubmed, CINAHL ultimate, MedicLatina, SPORTDiscus, MedLine Ultimate, Psychology and Behavioral Sciences Collection, CENTRAL, LILACS, ClinicalTrials.gov and Google Scholar) and manual searches were conducted, with the final search performed in June 2025.

*Results:* Eighteen studies involving 9132 participants were included, identifying and normalizing 51 person-centred interventions using the International Classification for Nursing Practice taxonomy, categorized as psychosocial (15), rehabilitation (15), and complementary (21). Psychosocial interventions demonstrated consistent effectiveness across diverse long term care contexts, notably in improving symptom management in palliative care and health-related quality of life. Rehabilitation interventions, particularly when integrated with psychosocial components, showed robust improvements in health-related quality of life among participants with clear potential for functional stabilization or improvement. Significant heterogeneity was observed among the included interventions, populations, and care settings, limiting direct comparisons and quantitative synthesis. The strongest and most methodologically robust evidence was specifically observed in interventions implemented among frail and complex multimorbid older adults.

*Conclusions:* The identified person-centred interventions effectively address complex health needs in older adults with multimorbidity. Psychosocial approaches demonstrated broad effectiveness, while rehabilitation interventions were most beneficial for participants with clear potential for functional improvement. These findings highlight the importance of integrating these approaches within multidisciplinary long term care models. Key limitations include the inability to conduct a quantitative synthesis due to heterogeneity and a focus on high-

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* Corresponding author at: Universidade de Évora, Largo dos Colegiais, 2, 7004-516, Évora, Portugal.
*E-mail addresses:* antonio.lista@uevora.pt (A.J. Lista), l.pinho@ess.ipvc.pt (L.G. de Pinho), cfonseca@uevora.pt (C. Fonseca).

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income countries. Future research should assess the cost-effectiveness, sustainability, and applicability of these interventions across diverse settings to inform clinical practice and policy development in long term care.

*Registration:* PROSPERO, CRD42022363860, registered in October 2022.

*Social media abstract:* For older adults (65+) with multimorbidity in long-term care, person-centred psychosocial and rehabilitation interventions lead to significant health gains across multiple domains.

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## What is already known

- With global aging and increasing multimorbidity, older adults face complex health needs arising from the interplay between multiple chronic conditions and impaired functional ability, requiring comprehensive, person-centred care approaches.
- Rehabilitation interventions primarily target the improvement of functional domains, whereas psychosocial interventions address the emotional, social, and psychological dimensions of living with multimorbidity.
- Psychosocial and rehabilitation interventions have individually demonstrated effectiveness in older adults with multimorbidity; however, the identification, normalization, and structured categorization of these interventions, as well as the effectiveness of their application within person-centred approaches in LTC contexts, remain insufficiently explored in current literature.

## What this paper adds

- This review systematically identifies and normalizes 51 person-centred psychosocial, rehabilitation, and complementary interventions for older adults (≥65 years) with multimorbidity in LTC, using the ICNP taxonomy.
- Psychosocial interventions demonstrated robust effectiveness across LTC settings, while rehabilitation interventions specifically benefited individuals with potential for functional improvement.
- Findings support integrating structured, multidisciplinary, person-centred interventions to effectively address the increasing complexity of LTC demands, especially among frail older adults and those with complex chronic conditions.

## 1. Background

The world is undergoing profound sociodemographic transformations. Driven by human advancements, scientific progress, and effective government policies, global life expectancy has surpassed 60 years (Adja et al., 2020; United Nations, 2022; World Health Organization, 2023a). However, increased longevity is not always accompanied by positive health indicators, posing significant challenges to the sustainability of health systems and economies (Kyu et al., 2018; OECD, 2023).

Longer lives are often associated with greater vulnerability to disease, complex clinical profiles, and higher demand for healthcare services, particularly long-term care (LTC) (Kyu et al., 2018; Harling et al., 2020; Prathapan et al., 2020; Skou et al., 2022; Khan et al., 2024). In this scenario, two variables should be highlighted: multimorbidity and functional ability. On the one hand, multimorbidity — defined as the co-occurrence of two or more chronic conditions (Fortin et al., 2005; Valderas et al., 2009) — has become highly prevalent in older populations (Marengoni et al., 2011; Skou et al., 2022). A recent global study involving approximately 15.4 million individuals estimated an overall prevalence of 37.2 %, with 51 % of older adults affected (Chowdhury et al., 2023). Over the past two decades, this pattern has intensified, and is now a major predictor of functional decline, particularly among individuals with a higher number and severity of conditions (Ryan et al., 2015; Chowdhury et al., 2023). Multimorbidity is also linked to increased healthcare costs (Soley-Bori et al., 2021), higher mortality (Soley-Bori et al., 2021), reduced quality of life (Makovski et al., 2019), cognitive impairment (Vargas-González et al., 2022), greater hospitalization risk and higher readmission rates among older adults (Rodrigues et al., 2022). On the other hand, functional ability — shaped by the interaction between an individual's intrinsic capacity (physical and mental functions) and the surrounding environment — is negatively impacted by aging and chronic conditions, contributing to disability (World Health Organization, 2021b). In this regard, evidence indicates a bidirectional relationship between these two dimensions: functional limitations increase the risk of developing multimorbidity, while the presence of multiple chronic conditions raises the probability of disability, especially as disease burden increases (Qiao et al., 2021; Pengpid et al., 2022). As disability and multimorbidity converge, healthcare needs become more complex, driving growing demand for LTC services (Navickas et al., 2016; Qiao et al., 2021; Pengpid et al., 2022; Balqis-Ali et al., 2024).

Unlike conventional healthcare, LTC encompasses a wide range of personal, social, and medical services aimed at maintaining functional ability, supporting intrinsic capacity, and safeguarding the dignity, rights, and well-being of older individuals (Colombo et al., 2011; World Health Organization, 2021a, 2021b; Gao et al., 2022). These services are typically provided in nursing homes, day centres, assisted living facilities, or at home, by professionals or informal caregivers (de Biase and Dougherty, 2023; World Health Organization, 2023a). To reduce pressure on acute healthcare, investment in LTC has favored a shift toward institutional or community-based solutions, improving cost-effectiveness and care adequacy (World Health Organization, 2023b). Additionally, older adults often express a strong preference to remain in their usual environment for as long as possible (Lewis and Buffel, 2020).

In this context, the World Health Organization (WHO) and other global actors have called for the development of person-centred, integrated LTC systems as part of the United Nations Decade of Healthy Ageing (WHO, 2021b). Additionally, PCC is defined as "care approaches and practices that see the person as a whole with many levels of needs and goals, with these needs coming from their own personal social determinants of health" (WHO, 2015, p. 48). In this framework, psychosocial and rehabilitation interventions show significant potential. On one hand, rehabilitation aims to optimize functional ability and reduce disability, thereby promoting maximum autonomy (WHO, 2020). On the other hand, psychosocial interventions involve activities, techniques, or interpersonal and informational strategies to improve health, functioning, and well-being by addressing biological, behavioral, cognitive, emotional, interpersonal, social, or environmental factors (IOM (Institute of Medicine), 2015; WHO, 2024). Recent studies have demonstrated the cost-effectiveness of both rehabilitation (Candio et al., 2022; Barker et al., 2023; Shields et al., 2023; Shepard et al., 2024) and psychosocial approaches (Lee et al., 2020; Gillespie et al., 2022).

Within this framework, the use of psychosocial and rehabilitation interventions through person-centred approaches may enable more humanized and effective healthcare (Ekman and Swedberg, 2022), as well as improved outcomes in physical and mental health and enhanced well-being (OECD, 2025).

Despite growing evidence on interventions in LTC, most studies focus on isolated domains such as physical rehabilitation (Forster et al., 2010; Cao et al., 2018) or psychosocial health (Nordhausen et al., 2019), lacking integration across dimensions. Reviews of care models highlight the importance of personalized approaches but often lack empirical intervention evaluation (Bayly et al., 2021). Some studies classified LTC interventions (Sims-Gould et al., 2017; Arias-Casais et al., 2022), but remain primarily descriptive and limited regarding effectiveness or integration. A recent scoping review mapped systematic reviews relating LTC interventions to healthcare utilization (Balqis-Ali et al., 2024), without evaluating intervention effectiveness specifically in multimorbid populations or integrating multiple health domains.

Thus, to our best knowledge, no review has examined psychosocial and rehabilitation interventions in an integrated, person-centred approach for older adults with multimorbidity in LTC settings. Addressing this gap, we conducted a systematic review to identify person-centred psychosocial and rehabilitation interventions targeting older adults (≥ 65 years) with multimorbidity in LTC, and associated health gains. This study addresses the urgent need for health interventions adapted to evolving epidemiological, demographic, and sociocultural paradigms (WHO, 2021b; OECD, 2023). It emphasizes the integration of psychosocial and rehabilitation approaches, which can be complementary despite being grounded in distinct methods and disciplinary frameworks. Specifically, this review aims to: (i) synthesize the most recent evidence on person-centred psychosocial and rehabilitation interventions, identifying those that promote health gains or prevent health deterioration; and (ii) determine the health gains associated with these interventions.

## 2. Methods

This review was conducted between September 2022 and September 2024, peer-reviewed, and included a quality assessment using the revised Cochrane Risk of Bias tool 2 (RoB 2) (Sterne et al., 2019), alongside a narrative synthesis of the results. A prior protocol for this review was developed and published (Lista et al., 2023), and the review was registered on the PROSPERO platform under code CRD42022363860. Initially, our scope was restricted to Home Care settings. However, following an exploratory literature analysis and team discussion, we decided to broaden the inclusion criteria to encompass additional LTC contexts as defined by the WHO (2023a), including Nursing homes, Day-care centres, Residential Care Homes and Assisted Living Facilities. This adjustment aimed to better reflect the diversity of LTC settings where older adults with multimorbidity and functional limitations receive psychosocial and rehabilitation interventions, thereby enhancing the clinical relevance and applicability of the findings.

In addition to methodological considerations, this expansion also aligns with two key principles in the field of aging and care provision. First, it prioritizes settings associated with lower-intensity care and theoretically lower costs, contributing to the sustainability of LTC systems (de Biase and Dougherty, 2023). Second, it is consistent with the *aging in place* paradigm, which reflects the commonly expressed preference of older adults to remain in familiar environments and maintain social and community ties for as long as possible (Ratnayake et al., 2022). In contrast, high-intensity care settings, such as hospitals or equivalent acute care settings, were excluded. Table 1 summarizes the final eligibility and selection criteria.

**Table 1**
Inclusion and exclusion criteria.

| | Inclusion criteria | Exclusion criteria |
|---|---|---|
| Population | Older adults (≥65 years; baseline mean age ≥70) in LTC settings (Home Care, Day-care/ Community Care/Primary Care, Nursing Homes, Residential Care Homes, Assisted Living Facilities) without continuous high-intensity medical or nursing care; presence of multimorbidity (≥2 chronic diseases); evidence of functioning deficits or dependence in basic or instrumental activities of daily living. | Older adults residing in institutions that provide continuous, high-intensity medical supervision (e.g., specialized care facilities) and individuals who are hospitalized or admitted to acute care facilities. |
| Intervention | Any psychosocial or rehabilitation interventions delivered by healthcare professionals (e.g., nurses, physicians, therapists) and developed using a person-centred approach, involving shared decision-making, goal setting, care planning, and active engagement of the individual in managing their condition. | Interventions focused on highly specific or non-comprehensive domains (e.g., medication-only interventions); interventions delivered by non-qualified personnel or individuals without formal health-professional training (e.g., assistants, caregivers); and interventions primarily aimed at modifying organizational or institutional structure or culture rather than individual-level health outcomes. |
| Comparison | Assessments using a comparator intervention, where the comparison group receives usual or standard care within the given context. | Studies comparing multiple interventions that are all superior to usual care; studies without a comparison group; or studies comparing interventions not applicable to LTC contexts (e.g., comparisons between LTC and interventions implemented in acute or emergency care settings) |
| Outcomes | ***Primary:***<br>Any positive health outcome or non-deterioration in the health status of the individual, family, community, or healthcare system, resulting in health gains<br>***Secondary:***<br>Outcomes related to individual satisfaction and quality of care, identified in the implementation of person-centred care | Outcomes primarily targeting individuals other than the main care recipient; studies that do not report measurable outcomes; or studies reporting outcomes not aligned with the objectives of this review. |
| Studies and Study Design | Published intervention studies.<br>Randomized controlled trials | Non-RCT studies, pilot RCTs or feasibility RCTs, unpublished studies, conference proceedings, and conference abstracts. |

### 2.1. Eligibility and selection criteria

#### 2.1.1. Types of participants

This review included studies with older adult participants (aged ≥65 years) residing in LTC settings, as defined by the World Health Organization (WHO, 2015, 2023a). Specifically, LTC settings comprise “Home Care,” “Day-care Centres,” “Nursing Homes,” “Residential Care Homes,” and “Assisted Living Facilities” (WHO, 2023a, pp. 78–80): “Home care” provides support for daily activities and autonomy at individuals’ residences, with scheduled professional visits; “Day-care centres” offer daytime socialization and occasional health support without residency; “Nursing homes” deliver 24-h supervision, daily activity assistance, social engagement, and basic health monitoring without intensive medical care; “Residential care homes” offer 24-h personal support, daily activity assistance, medication supervision, and social care, without continuous skilled nursing; and “Assisted living facilities” provide supportive housing with help in hygiene, nutrition, mobility, and sometimes limited nursing support. In addition, interventions delivered within primary health care or community care settings (e.g., services coordinated by Primary Health Care Centres) were included, provided they specifically targeted older adults with LTC needs — such as sustained support for functional limitations and chronic disease management — and fulfilled the inclusion criteria related to functional dependency and multimorbidity, in line with WHO’s recognition of LTC provision across home, community and primary care contexts (WHO, 2021a, 2023a). Interventions delivered in community contexts without structured, facility-based services were categorized as "Community care (non-facility based)". Settings characterized by permanent medical supervision or hospital-like clinical complexity were explicitly excluded. In line with Organisation for Economic Co-operation and Development (OECD) recommendations for international comparability, studies conducted in inpatient rehabilitation centres were also excluded (OECD, 2023). Although the WHO definition of long-term care may include hospital-based services in some national contexts, this review focused on community- and residence-based settings to ensure contextual consistency. Hospital settings were excluded due to their clinical complexity and limited comparability with typical LTC environments, consistent with OECD guidance.

Participants were also required to have multimorbidity (defined as the presence of two or more chronic diseases) (Van Den Akker et al., 1996; Fortin et al., 2005; Uijen and van de Lisdonk, 2008) and a baseline mean age of ≥70 years. In accordance with the International Classification of Functioning, Disability and Health (WHO, 2001), our inclusion criteria aimed to capture studies reporting any quantitative or qualitative evidence of impaired functioning. Eligible studies included participants with documented reductions in functioning, assessed either through validated measurement instruments or qualitatively described indicators such as frailty, dependency in basic or instrumental activities of daily living (ADLs/IADLs), or cognitive impairment. Additionally, the presence of chronic conditions strongly associated with functional decline (e.g., COPD, heart failure, stroke, dementia) was considered indicative of impaired functional ability. Studies involving acute hospital settings, individuals without multimorbidity, fully independent individuals, or those lacking evidence of impaired functioning were excluded.

### *2.1.2. Types of interventions*

We included randomized controlled trials (RCTs) comparing person-centred rehabilitation and/or psychosocial interventions with usual care, delivered by qualified healthcare professionals (e.g., nurses, physicians, or therapists). Interventions were required to adhere to the WHO's principles of person-centred care (WHO, 2007, 2015), incorporating at least one of two core elements: (i) the establishment of a partnership through the recognition of the individual's narrative and (ii) the co-creation of an individualized care plan (Britten et al., 2017; Ekman et al., 2021). Interventions were further operationalized using terminology and concepts from the International Classification for Nursing Practice (ICNP) (International Council of Nurses, 2021, 2024). This review adopted the ICNP framework for its capacity to (1) describe complex interventions across disciplines, (2) encompass a broad range of rehabilitation, psychosocial, and clinical actions, including those transcending traditional disciplinary boundaries (e.g., training in Instrumental Activities of Daily Living), and (3) justify a "complementary interventions" category for hybrid approaches implemented by multidisciplinary teams (International Council of Nurses, 2021).

At the same time, for this review, interventions were categorized into two levels based on their technical depth and implementation requirements:

- **Core interventions:** Defined as structured, theory-informed therapeutic strategies with a clear clinical intent and they often include multiple interrelated components (e.g., self-care training, behavior change techniques, functional training), which act synergistically to generate change (Craig et al., 2008; Skivington et al., 2024). These interventions typically require specialized training grounded in rehabilitation, psychological or social models. These formed the primary analytical focus of this review:
    - o *Rehabilitation interventions*: Structured therapeutic actions aimed at optimizing, restoring, or maintaining functional ability and reducing disability, particularly in the physical and cognitive domains. These interventions are typically delivered by rehabilitation professionals, such as rehabilitation nurses, physiotherapists, or occupational therapists (e.g., structured exercise programmes, balance training, post-acute rehabilitation, prescription and training in the use of assistive products for mobility) (WHO, 2017, 2023c).
    - o *Psychosocial interventions*: defined as structured clinical actions targeting psychological, emotional, cognitive, behavioral, interpersonal or social dimensions, based on recognized psychological or social theories, and delivered with therapeutic intent (e.g., cognitive-behavioral strategies, interpersonal approaches, psychoeducation, emotional support, social participation enhancement) (WHO, 2016, 2024).
- **Complementary interventions:** Defined as interventions that, while potentially contributing to well-being, autonomy, or adherence, are not anchored in a formal therapeutic model and require less specialized competencies. These include, for example, organizational or facilitation activities, unstructured social support, or general health promotion, typically delivered by clinically less specialized professionals. Although potentially aligned with psychosocial or rehabilitative goals, these interventions, when delivered in isolation, were not considered to possess sufficient complexity or technical density to constitute the core of a complex intervention (Craig et al., 2008; Skivington et al., 2024).

Concerning the exclusion criteria, studies were excluded if interventions were hospital-based, targeted only one sex, were misaligned with person-centred care principles, or lacked both psychosocial and rehabilitation components. Additionally, studies focusing solely on institutional or organizational changes rather than direct individual interventions were excluded.

### *2.1.3. Types of outcome measures*

Primary outcomes of this review included indicators of positive change or non-deterioration in participants' health status across the domains of individual, family, community, and healthcare system, covering health gains such as improved mental health, maintained or enhanced functioning, and overall well-being (Lista et al., 2023). Secondary outcomes focused on user satisfaction and quality of care, especially regarding the implementation of person-centred care. Studies were excluded only if they did not report any evidence of benefit — such as improvement, stabilization, or slowed decline — in outcomes considered clinically relevant for older adults with multimorbidity. Deterioration per se was not an exclusion criterion, provided the intervention showed some beneficial effect in at least one targeted outcome domain (Lista et al., 2023).

### *2.1.4. Types of studies*

Randomized controlled studies were included (RCTs) comparing psychosocial or rehabilitation person-centred interventions with usual care. Exclusion criteria comprised unpublished studies, abstracts, conference proceedings, feasibility and pilot RCTs (Lancaster, 2015; Eldridge et al., 2016), and studies with unclear methods or insufficient reporting. Usual care was defined as the routine clinical care provided to individuals aged 65 and over in the study setting. This could include structured or guideline-based care, provided it represented the standard approach commonly delivered to patients in that context. Only RCTs that included a usual care control group and allowed for a clear comparison between the intervention(s) and standard practice were eligible. Multi-arm trials were included if at least one of the intervention groups could be meaningfully compared with the usual care group, either separately or as a combined intervention arm. This criterion was adopted to ensure a minimum level of comparability and to control for contextual variability, thereby allowing meaningful interpretation of intervention effects relative to standard care (Higgins et al., 2024).

## 2.2. *Search methods for identification of studies*

### 2.2.1. *Electronic searches*

The search strategy followed PRISMA guidelines (Moher et al., 2009; Page et al., 2021) and the PICO framework (Higgins et al., 2024). The databases included PubMed, CINAHL, MedicLatina, SPORTDiscus with Full Text, Psychology and Behavioral Sciences Collection, Cochrane Central Register of Controlled Trials (CENTRAL), LILACS, ClinicalTrials.gov, and Google Scholar. Database searches were conducted from their inception to June 2025, with the last search performed on June 30, 2025. To structure the search strategy, six thematic term groups were created based on the PICO framework. These groups, which included both controlled vocabulary and free-text terms, were developed from international guidelines (e.g., WHO ICOPE), recent systematic reviews, and expert consensus within the research team. Terms describing innovative and digital interventions (e.g., “Internet-Based Intervention” and “Telerehabilitation”) were explicitly included to ensure the capture of emerging practices that may not yet be well indexed. Detailed methods are in Supplementary material (Part A). Controlled vocabulary terms were validated using MeSH/DeCS and supplemented for databases without thesauri (Bramer et al., 2017), covering the target population, quality of care, care context, outcomes, and study types.

### 2.2.2. *Searching other resources*

We searched ClinicalTrials.gov for eligible or ongoing RCTs and conducted a gray literature search (Canada’s Drug Agency, 2024), including Google Scholar’s top 100 results. References from included studies and systematic reviews were also screened for additional eligible studies.

## 2.3. *Data collection and analysis*

### 2.3.1. *Selection of studies*

Studies identified through electronic searches were entered into a reference manager, duplicates were removed, and the studies were screened independently by two authors (AL, IC) based on titles, abstracts, and full texts. Disagreements were resolved through discussion or by a third reviewer (CA/LP). Excluded studies, along with reasons, were summarized in a table. The unit of analysis was each study rather than individual reports, with the process illustrated in a flow diagram (Fig. 1) and study characteristics detailed in Table 2.

### 2.3.2. *Data extraction and management*

We developed a standardized form to extract key data from the studies, with four authors (AL, CA, TC, and IC) independently recording information on study characteristics, participants, and interventions. Extracted data included author, year, design, participant numbers, setting, main findings, comorbidities, intervention type and duration, outcomes, and measuring instruments. Discrepancies were resolved through discussion or consultation with a fifth author. All data were systematically organized to ensure accuracy and consistency during analysis (LP). All studies included in this systematic review reported effect measures directly extracted from the original publications. The analysis focused on the primary outcomes defined by each trial. No data conversions or handling of missing summary statistics were required, as all data were complete and ready for synthesis.

### 2.3.3. *Methods for data preparation and synthesis*

Studies were selected based on the inclusion criteria and the reporting of effect measures for primary outcomes, with characteristics

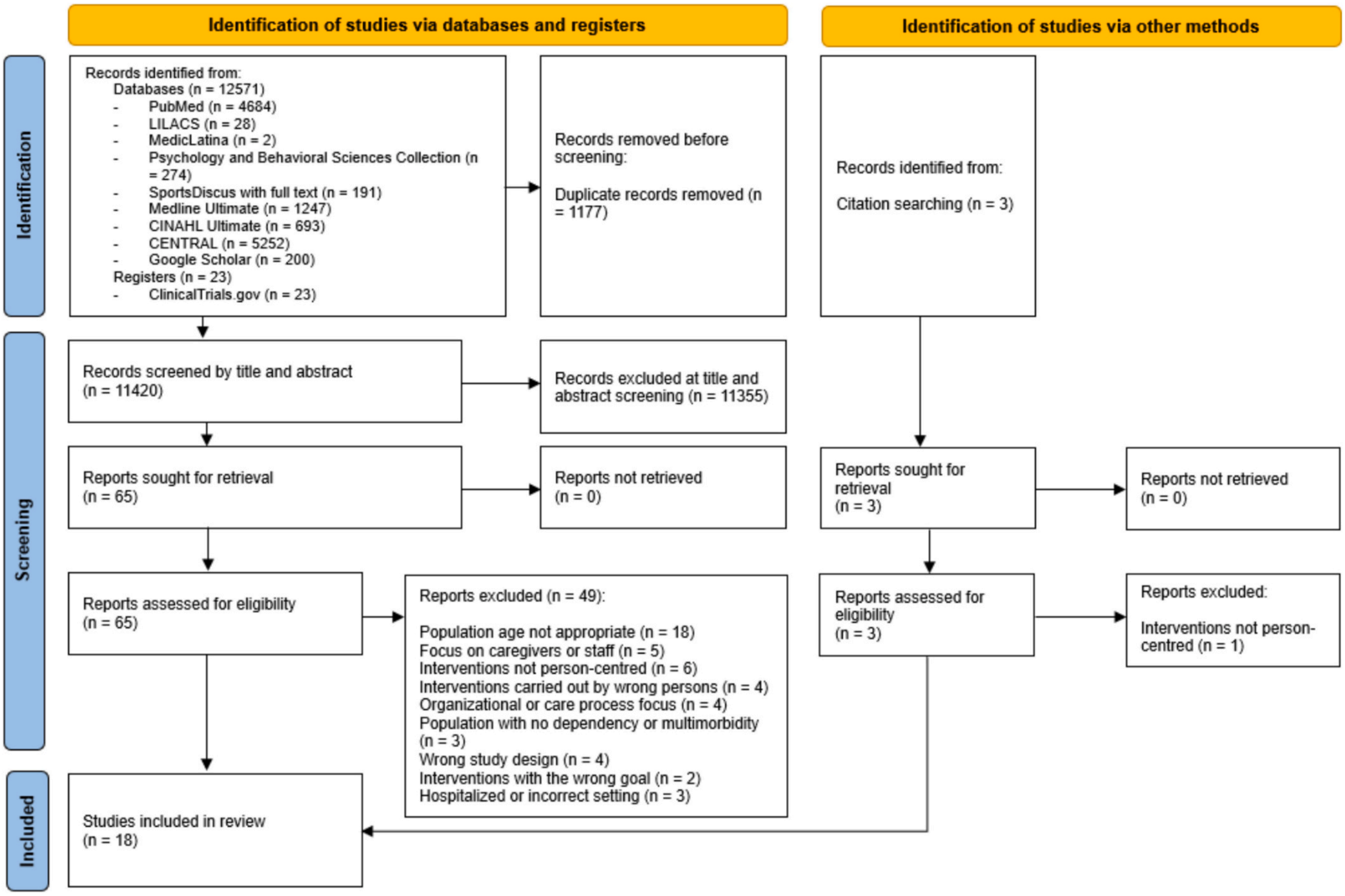

**Fig. 1.** Flowchart of research development.

**Table 2**
Summary of the design, interventions and findings of included studies.

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| Ali et al. (2021)<br>**Region**: Sweden, Europe<br>**Setting:** Home Care + Exclusively Remote Support (Telephone & Digital Platform)<br>**Design:** Individual, Multicentre, Open-Label, | **Population:** Adults diagnosed with COPD or HF<br>**n** = 222 [I[a] = 110; I[b] = 76; C = 112]<br>**Sample mean age:** 70.8 (SD 9.4) | **Duration:** 6 months<br>**Aim:** Evaluate the effects of Person-Centred Care through a combination of digital platform and telephone support for people with COPD and CHF<br>**Content:** Program included:<br>1) A structured telephone support program, where participants had an optional number of phone calls (median 4, range 0–11) with healthcare professionals to co-create and update a personalized health plan.<br>2) A digital platform that supported communication between phone calls, allowed participants to track symptoms, and provided access to information and resources. | **Psychosocial Interventions:**<br>o Promoting Self-Efficacy<br>o Providing Self-Management Support<br>o Providing Social Support<br>**Complementary Interventions:**<br>o Facilitating the use of digital health technologies<br>o Implementing Individual Care and Support Plan<br>o Implementing Telephone Support<br>o Involving Caregiver<br>o Monitoring Vital Signs and Symptoms<br>o Teaching Patient | **Personnel:** A total of five healthcare professionals participated in the intervention: three registered nurses, one occupational therapist, and one physiotherapist, with professional experience ranging from 6 to 26 years.<br>**Education & Training:** All professionals were involved in the development of a digital platform and received targeted training on remote person-centred communication.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Fidelity was indirectly supported through integrated strategies. Follow-up appointments were jointly scheduled by healthcare professionals (HCPs) and patients, based on an individualized care plan, which was revised during each phone call. Both parties had continuous access to a digital platform throughout the six-month intervention period. Regular meetings and seminars promoted constructive discussions and continuous education in person-centred care (PCC). HCPs were monitored by researchers and field experts, and mutual peer reviews of care plans and telephone consultations were conducted to support consistency with the intervention protocol. | **Primary Outcomes:** Change in general self-efficacy (GSE) and hospitalisations or deaths (composite score) measured at 6 months<br>**Risk of Bias:**<br>+ | **Comparator:** Usual Care | **Main results:** The intervention did not improve the composite outcome in the intention-to-treat analysis (OR = 1.66, 95 % CI [0.71, 3.88], p = 0.240) but showed significant improvements in general self-efficacy at 3 months in the per-protocol analysis (OR = 2.42, 95 % CI [1.01, 5.79], p = 0.047) |
| Callahan et al. (2017) | **Population:** People with dementia (Alzheimer's) living in the community | **Duration:** 24 months | **Rehabilitation Interventions:**<br>o Managing Exercise Regime<br>o Teaching About Balance Exercises | **Personnel:** Licensed occupational therapists and one certified occupational therapy assistant, all experienced in geriatric care and dementia intervention. Occupational therapists conducted assessments, care planning, and supervised interventions; the | **Primary Outcomes:** Traditional basic activities of daily living, variations in instrumental activities of daily living and several more complex and explicit self-care tasks measured at 24 months (Alzheimer's Disease Cooperative Study | **Comparator:** Augmented usual care (the control group received collaborative dementia care as best practice primary care delivered through a specialized institution) | **Main results:** The study found no significant difference in functional decline between Alzheimer's patients receiving in-home occupational therapy and those receiving only collaborative care (ADCS ADL: MD = 2.34, 95 % CI [− 5.27, 9.96], p = 0.540). The results |

(*continued on next page*)

**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| **Region**: Indiana, United States | **n** = 180 [I = 91; C = 89]<br>**Setting:** Home Care + Remote Support (Telephone)<br>**Risk of Bias:**<br>! | **Aim:** To determine whether collaborative care with the addition of 2 years of occupational therapy at home delays functional decline.<br>**Sample mean age:** 78.4 (SD 8.9)<br>**Design:** Individual, Single-blind | o Teaching About Exercise<br>o Teaching about Housing Safety<br>o Teaching use of Assistive Devices<br>o Training Activities of Daily Living<br>o Training Balance<br>o Training in Transfer Technique<br>o Training Instrumental Activities of Daily Living<br>**Psychosocial Interventions:**<br>o Implementing Cognitive Training<br>o Implementing Problem-Solving Techniques<br>o Teaching about Stress and Anxiety Management Techniques<br>**Complementary Interventions:**<br>o Counseling Patient<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Implementing telephone support<br>o Involving Caregiver<br>o Teaching About Housing Safety | assistant provided supplementary care under therapist supervision.<br>**Education & Training:** Therapists completed an orientation module covering dementia fundamentals, evidence-based practice principles, and structured intervention protocol, followed by 3–5 supervised home visits for practical training. A formal, comprehensive training programme was not explicitly described.<br>**Content:** In-home occupational therapy delivered in 24 sessions, with three cycles of sessions involving eight 90-min sessions approximately every other week for 16 weeks in the first cycle. The intervention aimed to support and augment the self-care functional capability of the patient. | Group Activities of Daily Living Scale (ADCS ADL))<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Implementation fidelity was promoted through the use of a structured, evidence-based intervention manual, standardized session protocols, detailed therapist documentation after each session, and regular supervision and team meetings to ensure consistent practice. | | were inconclusive, highlighting challenges in assessing the long-term effectiveness of occupational therapy in delaying functional decline. |
| Chen et al. (2021) | **Population:** Older adults with high health | **Duration:** 6 months | **Psychosocial Interventions:** | **Personnel**: Care coordinators in both the intervention and comparison groups averaged | **Primary Outcomes:** Functioning (Barthel Index), quality of life (WHOQOL- | **Comparator:** Usual Care | **Main results:** The intervention significantly improved well-being in high-need older adults, |

(*continued on next page*)

**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| **Region**: Taiwan, Asia | needs living in the community<br>**n** = 145 [I = 63; C = 69]<br>**Setting:** Community Care + Remote Support (Telephone)<br>**Risk of Bias:** | **Aim:** To test the effectiveness of the High-Need Community-Dwelling Older Adults Care Delivery Model (HCOACDM) in Taiwan.<br>**Sample mean age:** 77.97 (SD 6.9) | o Providing Social Support<br>**Complementary Interventions:**<br>o Counseling Patient<br>o Facilitating navigation in the health and social system<br>o Implementing Comprehensive Assessment<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Implementing Telephone Support<br>o Involving Caregiver<br>o Prioritizing Treatment Regime<br>o Referring to Care Provider | 36 years old, had social work training, and about 9 years of experience working with older adults.<br>**Education & Training:** Coordinators received a 3-day training on older adults care, care management procedures, and assessment tools.<br>**Content:** The intervention was the High-Need Community-Dwelling Older Adults Care Delivery Model (HCOACDM), which involved case screening, comprehensive in-home assessments, individualized care planning using a list of categorized care services, linkage and coordination of health care, social welfare, and caregiver resources, and regular 3-month follow-up home visits and reassessments by a care coordinator over a 6-month period. | BREF), depressive symptoms (HDRS), health care and social service utilizations after 3 and 6 months<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Fidelity was promoted through a 3-day training program on older adults care, case management, and assessment tools. During the 6-month intervention, care coordinators conducted quarterly home visits, monitored health status, and updated care plans accordingly. Continuous alignment with the protocol was supported through monthly steering group meetings, internal case discussions, and regular communication with the research team. | | including functioning (WHOQoL-BREF: $\beta = 4.87$, 95 % CI [1.09, 8.65], $p = 0.012$, ES $d = 0.37$ at 6 months; no significant change at 3 months: $\beta = 0.72$, 95 % CI [$-0.74$, 2.17], $p = 0.333$), quality of life ($\beta = 12.72$, 95 % CI [10.66, 14.78], $p < 0.001$), depressive symptoms (HDRS: $\beta = -5.18$, 95 % CI [$-6.39$, $-3.98$], $p < 0.001$), satisfaction with care ($M = 33.75$, $SD = 5.06$ vs. $M = 10.35$, $SD = 5.26$, $t = 26.04$, $p < 0.001$), and use of health and social services ($\beta = 1.90$, 95 % CI [1.61, 2.20], $p < 0.001$ at 3 months; $\beta = 2.25$, 95 % CI [1.90, 2.60], $p < 0.001$ at 6 months, ES $d = 1.15$). |
| Connor et al. (2019)<br>**Region**: United States, North America<br>**Setting:** Home care + Exclusively Remote Support | **Population:** War veterans with Parkinson Disease<br>**n** = 328 [I = 162; C = 166]<br>**Sample mean age:** 70.59 (SD 9.6) | **Design:** Cluster, Single-blind<br>**Duration:** 18 months<br>**Aim:** Test the effects on the quality of care through a model based on the Chronic Care Model for the management of Parkinson's Disease<br>**Content:** The intervention was a guided care management program called CHAPS (Care Coordination for Health | **Psychosocial Interventions:**<br>o Coaching Patient<br>o Facilitating the appointment of a legal guardian for decision-making<br>o Implementing problem-solving techniques<br>o Promoting Self Efficacy<br>o Providing Emotional Support<br>o Providing Self Management Support | **Personnel:** The CHAPS intervention involved collaboration between Case Management Nurses (NCMs) and local Parkinson's Disease (PD) specialists. NCMs were registered nurses with training ranging from associate degree to nurse specialist, and required experience in outpatient care.<br>**Education & Training:** Initial assessments were conducted upon study enrolment to identify PD-related issues and topics for each veteran.<br>**Intervention Fidelity Assessment:** | **Primary Outcomes:** Adherence to 18 Parkinson's Disease quality of care indicators (proportion of indicators met) at 18 months<br>**Risk of Bias:** | **Comparator:** Usual Care | **Main results:** The intervention increased adherence to PD care quality indicators, with higher adherence in the intervention group (77 %) compared to usual care (58 %) ($MD = 0.19$, 95 % CI [0.16, 0.22], $p < 0.050$, $ES = 0.49$, 95 % CI [0.39, 0.59]).<br>Among secondary outcomes, depressive symptom screening significantly improved in the intervention arm (PHQ-2: $MD = -11.52$, 95 % CI [$-20.42$, $-2.62$], $p = 0.0130$). The intervention group also received significantly more telephone calls per patient ($M = 3.02$, $SD = 2.2$) compared |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
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| (Telephone & Digital Platform)<br>**Design:** Individual, Multicentre, Single-blind | | Promotion and Activities in Parkinson's Disease), led by nurse care managers in collaboration with Parkinson's disease specialists. The key components were: 1) a structured telephone-based assessment to identify problems, 2) evidence-based care protocols and incorporation of patient preferences, 3) communication tools like a patient portal and personalized notebooks, and 4) documentation templates for coordinated, patient-centred care. Nurse care managers conducted initial assessments, developed action plans, and had follow-up calls approximately monthly and then every 6 months or as needed. | **Complementary Interventions:**<br>o Counseling Patient<br>o Facilitating Navigation in the Health and Social System<br>o Facilitating the use of Digital Health Technologies<br>o Implementing Comprehensive Assessment<br>o Implementing Individual Care and Support Plan<br>o Implementing Telephone Support<br>o Monitoring Vital Signs and Symptoms<br>o Providing Instructional Material<br>o Referring to Care Provider<br>o Teaching Patient (General) | - Formally assessed: Yes, through structured data extraction and qualitative process evaluation.<br>- Fidelity indicators included nurse care manager (NCM) coverage, initial assessments, distribution of health notebooks, and number of follow-up contacts, collected via EMR review and research logs over 18 months. Median NCM coverage was 68 %, and 86 % of participants received an initial assessment. A process evaluation also included analysis of meeting minutes and interviews to explore implementation barriers and facilitators. | - | | to usual care ($M = 0.11$, $SD = 0.4$; $p < 0.0001$). |
| **Main results:** At 24 months, the | Counsell et al. (2007)<br>**Region**: United States, North America | **Population:** Older adults (≥ 65) with low income living in the community<br>**n** = 951 [I = 474; C = 477] | **Duration:** 24 months<br>**Aim:** To determine whether the GRACE | **Psychosocial Interventions:**<br>o Coaching Patient<br>o Counseling Patient<br>o Documenting Advance Directive<br>o Promoting Self Efficacy<br>o Providing Emotional Support<br>o Providing Self Management Support<br>o Providing Social Support<br>**Complementary Interventions:**<br>o Facilitating Navigation in the Health and Social System<br>o Implementing Case Conferences | **Personnel:** The GRACE model was delivered by teams consisting of an advanced practice nurse practitioner (certified in gerontological or family nursing) and a licensed clinical social worker trained in case management. These teams were supported by a multidisciplinary group comprising a board-certified geriatrician, clinical pharmacist, physiotherapist, mental-health social worker, and a community-services coordinator, all collaborating closely with each participant's primary-care physician.<br>**Education & Training:** All core GRACE staff completed | **Primary Outcomes:** Change from baseline to 24 months in: (1) health-related quality of life (SF-36 scales and summary scores); (2) functional status —instrumental activities (7-item IADL index, AHEAD) and basic activities (6-item ADL index, AHEAD); and (3) cumulative 24-month rates of ED visits and hospital admissions per 1000 person-years | **Comparator:** Usual Care |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| GRACE intervention produced significant and robust improvements in health-related quality of life domains. Participants in the intervention arm reported increased scores on the SF-36 Vitality domain (MD = 5.1, 95 % CI [2.2, 7.9], p < 0.001) and Mental Component Summary (MD = 2.4, 95 % CI [0.9, 3.8], p < 0.001), both remaining significant after Bonferroni correction. No significant differences were found in functional status or in overall emergency-department visits and hospital admissions after multiplicity adjustment. Among secondary outcomes, adherence to ACOVE geriatric-care indicators significantly improved in the GRACE group (71 %) compared to | **Setting:** Home Care + Remote Support (Telephone)<br>**Design:** Cluster, Multicentre, Single-blind | **Sample mean age:** 71.7 (SD 5.7) | home-based, interdisciplinary care-management programme improves health-related quality of life, preserves functional status, and reduces acute-care utilization and healthcare costs in low-income, community-dwelling adults aged 65 years and older, compared with usual primary care.<br>**Content:** The GRACE intervention began with a home-based comprehensive geriatric assessment by a nurse practitioner and a social-worker case-manager. Using twelve ACOVE-derived protocols (falls, chronic pain, incontinence, depression, polypharmacy, cognitive deficit, nutrition, advance-care planning, immunization, vision, hearing, osteoporosis), they created an individual care plan, which was reviewed face-to-face with the participant's primary-care physician. Over 24 months the GRACE team provided active case-management: at least one contact per month, a post-discharge home visit after every ED or hospital episode, and coordination of community and | o Implementing Comprehensive Assessment<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Implementing Telephone Support<br>o Involving Caregiver<br>o Managing Medication Regime<br>o Managing Symptom<br>o Monitoring Vital Signs and Symptoms<br>o Referring to Care Provider<br>o Teaching Pati<br>o Teaching Patient / Providing Instructional Material | twelve weekly pre-launch seminars covering the 12 ACOVE protocols, home-based comprehensive geriatric assessment procedures, use of the electronic care-management platform, and interdisciplinary team-working; primary-care physicians and clinic staff received orientation briefings on programme goals and communication workflows.<br>**Intervention Fidelity Assessment:**<br>- Formally assessed: No<br>- Fidelity was not formally assessed but actively promoted through standardized procedures and supervision. Intervention delivery followed the GRACE manual and twelve protocol checklists integrated into the electronic medical record (EMR). Each home visit required documentation, and weekly interdisciplinary case-review meetings led by the geriatrician ensured adherence. The nurse practitioner and social worker documented all interactions in the EMR, reviewed weekly by a project coordinator who provided feedback on deviations. Staff received twelve weekly pre-implementation training seminars and ongoing coaching during case reviews. No protocol deviations necessitating amendments were | **Risk of Bias:**<br>🔴 | |

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| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| usual care (57 %; MD = 0.14, 95 % CI [0.10, 0.18], $p < 0.001$). Additionally, in the high-risk subgroup (Probability of Repeated Admission ≥ 0.40), the intervention significantly reduced total healthcare costs by USD 1487 (95 % CI [− 2422, − 552], $p < 0.001$). | | | specialist services. Weekly interdisciplinary meetings (geriatrician, pharmacist, physiotherapist, mental-health social worker, community-services liaison) ensured protocol fidelity, while an electronic health-record tool logged interventions and generated follow-up alerts. | | reported, though quantitative fidelity measures were not published. | | |
| Dalal et al. (2019)<br>**Region**: United Kingdom, Europe<br>**Setting:** Home Care + Remote Support (Telephone)<br>**Design:** Individual, Multicentre, Single-blind | **Population:** Adults with heart failure with reduced ejection fraction<br>**n** = 216 [I = 107; C = 109]<br>**Sample mean age:** 69.88 (SD 10.9) | **Duration:** 12 Weeks<br>**Aim:** To compare the REACH-HF (Rehabilitation EnAblement in Chronic Heart Failure) intervention, a home-based cardiac rehabilitation and facilitated self-care programme, with usual care for adults with heart failure with reduced ejection fraction (HFrEF).<br>**Content:** The intervention (REACH-HF) included: 1) A REACH-HF manual for patients with structured exercise programs (chair-based and progressive walking), advising exercise 3 times per week, increasing over 2–3 months; 2) A “Progress Tracker” booklet for patients to record physical activity, symptoms, and self-care; 3) A “Family and Friends Resource” manual for caregivers to understand heart failure and improve their wellbeing; and 4) Facilitation | **Rehabilitation Interventions:**<br>o Managing Exercise Regime<br>o Managing Haemodynamic Status<br>o Teaching about Exercise Training<br>o Teaching about Functional Dyspnoea Management<br>**Psychosocial Interventions:**<br>o Coaching Patient<br>o Facilitating Mindfulness Therapy<br>o Implementing Motivational Interviewing Techniques<br>o Providing Social Support | **Personnel:** The REACH-HF interventions were delivered by specially trained facilitators, including heart failure specialist nurses and physiotherapists.<br>**Education & Training:** Facilitators underwent a three-day training course on patient-centred counseling, customizing interventions, and behavior change techniques.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: Yes, via checklist-based observation.<br>• Fidelity was evaluated using a structured checklist covering 13 domains, applied to 110 audio recordings of facilitator-participant sessions. While most domains scored adequately (≥3), aspects related to caregiver involvement scored significantly lower. Despite over 90 % adherence to the minimum | **Primary Outcomes:** Disease-specific health-related quality of life (HRQoL) measured using the Minnesota Living with Heart Failure Questionnaire (MLHFQ)<br>**Risk of Bias:**<br>! | **Comparator:** Usual Care | **Main results:** The intervention resulted in significant and clinically meaningful improvements in disease-specific HRQoL (MD = − 5.7, 95 % CI [− 10.6, − 0.7], $p = 0.025$) and self-care maintenance for patients with heart failure with reduced ejection fraction. |

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| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| | | by trained cardiac nurses or physiotherapists providing person-centred counseling and tailoring the intervention. The intervention was delivered through a mix of in-person and telephone contacts. | o Teaching about Stress and Anxiety Management Technique<br>**Complementary Interventions:**<br>o Counseling Patient<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Involving Caregiver<br>o Monitoring Vital Signs and Symptoms<br>o Promoting Self Managing Symptom<br>o Providing Instructional Material<br>o Teaching about self-monitoring of vital signs and symptoms<br>o Teaching Patient | intervention dose, variability in session quality highlighted areas for improvement, particularly in caregiver engagement and facilitator skill development. | | | |
| Evans et al. (2021)<br>**Region**: United Kingdom, Europe<br>**Setting:** Home care + Support (Telephone) | **Population:** Frail older adults (≥ 75) living at home or care home<br>**n** = 50 [I = 24; C = 26]<br>**Sample mean age**: 85.7 (SD 5.9) | **Duration:** 12 Weeks<br>**Aim:** Evaluate the impact of short-term integrated palliative and supportive care intervention for older people living with chronic non-oncological diseases and frailty on clinical and economic outcomes and perception of care<br>**Content:** The intervention (SIPScare) was a community-based, short-term integrated | **Psychosocial Interventions:**<br>o Implementing Problem-Solving Techniques<br>o Providing Emotional Support<br>o Providing Self-Management Support<br>**Complementary Interventions:**<br>o Counseling Patient<br>o Implementing Comprehensive Assessment | **Personnel:** Person-centred multidimensional assessment and multidisciplinary management were coordinated by a specialist palliative care nurse. Integration involved general practitioners and community health services, including district and community nurses.<br>**Education & Training:** Although not explicitly described, the study involved coordinated care delivered by experienced multidisciplinary teams<br>**Intervention Fidelity Assessment:** | **Primary Outcomes:** Change in five key palliative care symptoms at 12-weeks<br>**Risk of Bias:** | **Comparator:** Usual Care | **Main results:** The intervention significantly reduced symptom distress (MD = − 1.32, 95 % CI [− 2.45, − 0.19], p = 0.023) with a medium effect size, demonstrating effectiveness. It was cost-effective, lowering costs compared to usual care while reducing symptom distress. |

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| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
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| **Design:** Individual, Single-blind | | palliative and supportive care program delivered by a specialist multidisciplinary team. It included comprehensive person-centred palliative care assessment and management, integrated with the patient's general practitioners and community healthcare services. The specialist team was involved for up to 12 weeks, with an initial assessment visit, multidisciplinary review, and 2 follow-up visits/contacts to monitor and review care. The intervention aimed to provide specialist support during escalating ill-health, collaborating with primary and community healthcare services. | o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Implementing Telephone Support<br>o Involving Caregiver<br>o Managing Symptom | • Formally assessed: Yes, through structured data extraction from health records.<br>• Fidelity assessment included delivery duration, contact type and frequency, professional roles, and multidisciplinary reviews over a 12-week period. Participants received the intervention for a mean of 58.4 days (SD = 27.94). Rural areas had more frequent home visits than urban ones. High levels of interprofessional collaboration were observed, though advance care planning was less consistently implemented. The intervention was overall delivered as per protocol. | ! | | |
| Fisher et al. (2020)<br>**Region**: Canada, North America<br>**Setting:** Home Care<br>**Design:** Individual, | **Population:** Older adults living in the community<br>**n** = 59 [I = 30; C = 29]<br>**Sample mean age:** Not Stated | **Duration:** 6 months<br>**Aim:** To determine the effectiveness of a 6-month community-based intervention compared to usual home care services for community-dwelling older people (65 years old) with multimorbidity (3 chronic conditions) who have recently been referred to and receive home care services.<br>**Content:** The intervention consisted of:<br>1) In-home visits by an interprofessional team including a Care Coordinator | **Psychosocial Interventions:**<br>o Promoting Self-Efficacy<br>o Provide Social Support<br>o Providing Self-Management Support<br>**Complementary Interventions:**<br>o Facilitating navigation in the health and social system<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Involving Caregiver | **Personnel:** The multimorbidity intervention was delivered by an interprofessional team consisting of a Care Coordinator (CC), a Registered Nurse (RN), a Physiotherapist (PT), an Occupational Therapist (OT), and a Personal Support Worker (PSW), in addition to usual care.<br>**Education & Training:** Researchers conducted a two-day training session for the care providers (CC, RN, OT, PT, PSW) before implementing the intervention at study sites. The training included manuals specific to each role and focused on intervention components, acceptable adaptations, interprofessional collaboration, motivational interviewing, self-management promotion, best practices for multimorbidity prevention and management, and caregiver support strategies.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No. | **Primary Outcomes:** Physical domain of Health-Related Quality of Life at 6 months (Physical Component Summary (PCS) score of the Short Form-12)<br>**Risk of Bias:**<br>! | **Comparator:** Usual Care | **Main results:** The self-management intervention for older adults with multimorbidity was cost-neutral compared to usual care but did not significantly improve physical or mental health outcomes (MD = − 4.94, 95 % CI [− 12.53, 2.66], p = 0.200). |

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| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
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| Pragmatic, Single-blind | | (minimum 1 visit), Registered Nurse, Physiotherapist/ Occupational Therapist (minimum 3 visits), and Personal Support Worker, with the remaining visits tailored to participant needs and preferences.<br>2) Monthly case conferences involving the interprofessional team and PSW supervisor to develop and discuss the care plan.<br>3) Ongoing case management by the Care Coordinator to facilitate access to services and coordinate care.<br>4) Four embedded strategies: strengths-based approach, holistic care focused on prevention, engaging caregivers, and interprofessional collaboration. | o Managing Medication Regime | • Fidelity was supported through evidence-based strategies: 2-day provider training, monthly implementation meetings, structured reminders, and audits of activity logs. Minimum care delivery standards (e.g., number of home visits) were met. These measures aimed to maintain protocol adherence while allowing pragmatic flexibility in care delivery. | | | |
| ***Forbat 2020*** (Forbat et al. (2020)) | **Population:** Older adults living in care homes | **Duration:** Variable: for the first sites: around 14.5 months; for the last sites: exactly 6 months | **Psychosocial Interventions:**<br>o Providing Social Support<br>**Complementary Interventions:**<br>o Facilitating the Appointment of a Legal Guardian for Decision-Making | **Personnel:** Palliative care specialist nurses, including two nurse practitioners and one clinical consultant nurse, who had access to specialist advice in palliative medicine for clinical decision-making. The city's specialized palliative care team, based in the specialized palliative care unit, provided outreach services to nursing homes. Nursing home staff involved included registered nurses, enrolled nurses, nursing assistants, activity coordinators, and managers. | **Primary Outcomes:** Length of stay in acute care (over 24-h duration) | **Comparator:** Usual Care | **Main results:** The Specialist Palliative Care 'Needs Rounds' intervention significantly reduced the length of stay in hospitals (MD = − 0.22 days, 95 % CI [− 0.44, − 0.01], p = 0.038), decreased the number of hospitalizations, and generated substantial cost savings. |
| **Region**: Australia, Oceania | **n** = 1700 | **Aim:** To determine whether a care model that provides specialized palliative care in nursing homes, called Specialist Palliative Care Needs, could reduce the length of stay in hospital. | o Implementing Case Conferences<br>o Implementing Individual Care and Support Plan<br>o Managing Medication Regime<br>o Managing Symptoms<br>o Monitoring Vital Signs and Symptoms | **Education & Training:** Although no structured training programme was formally reported, ongoing in-situ education was provided during the Needs Rounds by the specialist nurse. This included case-based learning on symptom management (e.g., constipation, pain, delirium), communication skills, end-of-life care, and interdisciplinary coordination. | | | |

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| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
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| **Setting:** Residential Care Homes<br>**Design:** Cluster Stepped-Wedge, Open-Label | **Sample mean age:** Not stated | **Content:** The intervention ("Needs Rounds") had two main components: 1) Direct support with clinical work by specialist palliative care clinicians, and 2) Indirect support through monthly 60-min "Needs Rounds" meetings for discussing up to 10 high-risk residents. | o Prioritizing Treatment Regime<br>o Referring to Care Provider | **Intervention Fidelity Assessment:**<br>- Formally assessed: Yes, using a three-tier classification system (low, moderate, high fidelity).<br>- Fidelity was monitored via (1) checklist-based review of 20 % of audio-recorded Needs Rounds and (2) clinician feedback on intervention engagement and action implementation. Two sites had low fidelity, affecting outcomes. Greater reductions in hospital stays were observed in sites with moderate to high fidelity, confirming the relevance of adherence to the model. | **Risk of Bias:**<br>! | | |
| Fors et al. (2018) | **Population:** Adults with COPD and/or HF | **Duration:** 6 months | **Psychosocial Interventions:** | **Personnel:** Nurses | **Primary Outcomes:** Composite score comprising General Self-Efficacy (GSE), re-hospitalization and death | **Comparator:** Usual care | **Main results:** The study found no significant difference in composite scores between usual care and intervention groups (ITT: OR = 1.56, 95 % CI [0.92, 2.65], p = 0.102). However, person-centred care was effective in improving healthcare, with greater deterioration observed in the control group (PP: OR = 1.81, 95 % CI [1.03, 3.19], p = 0.039), highlighting the importance of person-centred communication skills and health plans in building patient-provider relationships. |
| **Region:** Sweden, Europe | **n** = 221 [I = 103; C = 118] | **Aim:** To evaluate the effects of person-centred telephone support on two groups of chronic patients, chronic obstructive pulmonary disease (COPD) and/or chronic heart failure (HF). | o Implementing motivational interviewing techniques<br>o Providing Emotional Support | **Education & Training:** Nurses received extensive training in person-centred communication and a two-day dedicated course on CHF and COPD. The training focused on listening skills, open-ended questions, reflective communication, and understanding the principles of PCC. | | | |
| **Setting:** Home Care + Exclusively Remote Support (Telephone + Smartphone App)<br>**Design:** Individual, Open-Label | **Sample mean age:** 77.55 (SD 8,88) | **Content:** The intervention was a telephone support program provided by registered nurses, including a call one to four weeks after discharge. It followed the person-centred care approach to build a partnership with patients, identify capabilities and resources, and formulate attainable goals. | **Complementary Interventions:**<br>o Facilitating Coaching for the Client<br>o Implementing Comprehensive Assessment<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Involving Caregiver<br>o Perform Exploratory | **Intervention Fidelity Assessment:**<br>- Formally assessed: No.<br>- Fidelity was encouraged through biweekly supervision with experts in PCC, communication, and education. Nurses participated in training and peer-review of calls and documentation. The GPCC model guided all interactions, and care plans were continually revised based on patient needs over six months, ensuring consistency and alignment with intervention principles. | **Risk of Bias:**<br>! | | |

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| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
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| | | | Interview Technique<br>o Providing Instructional Material<br>o Providing Self-Management Support | | | | |
| Fu et al. (2020)<br>**Region**: New Zealand, Oceania<br>**Setting:** Home Care<br>**Design:** Individual, Open-Label | **Population:** Adults post-stroke living in the community (non-institutionalized)<br>**n** = 400 [I[c] = 132; I[d] = 138; C = 130]<br>**Sample mean age:** 72 (SD 12.5) | **Duration:** Take Charge 1: 30–60 min, Take Charge 2: 6 weeks +30–60 min<br>**Aim:** To confirm whether the Take Charge intervention improved quality of life 12 months after stroke in a different population and whether two sessions were more effective than one.<br>**Content**: The intervention was a one-on-one, non-directive session facilitated by a research clinician that explored the participant's views on what was important to them and what they wanted to prioritize for the next 12 months. Participants were randomized to receive 0 (control), 1, or 2 Take Charge (intervention) sessions, with the second session occurring 6 weeks after the first. | **Psychosocial Interventions:**<br>o Implementing motivational interviewing techniques<br>o Promoting Self Efficacy<br>o Providing Emotional Support<br>o Providing Self Management Support<br>**Complementary Interventions:**<br>o Implementing comprehensive assessment<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Perform exploratory interview technique<br>o Providing Instructional Material<br>o Providing Self Management Support | **Personnel:** Physiotherapists, with less than half having experience in rehabilitation or stroke. They worked independently of the community stroke rehabilitation service.<br>**Education & Training:** Training included a half-day initial session for research clinicians, followed by a follow-up session after two months. Support materials included a training manual, and additional support was provided via email and phone from a central trainer and other research clinicians.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Although no external fidelity assessment was conducted, several strategies were used to promote adherence: site initiation visits, training, biannual teleconferences, and a central support system for queries. Clinicians documented session reflections, which were analyzed by the research team. Additional support included monthly teleconferences and newsletters to promote consistency and share best practices | **Primary Outcomes:** Physical Component Summary (PCS) score of the Short Form 36 (SF-36) at 12 months following stroke comparing any Take Charge intervention to control<br>**Risk of Bias:**<br>+ | **Comparator:** Augmented Usual Care (Control group received written educational material about stroke) | **Main results:** The Take Charge intervention significantly improved physical health scores (SF-36 PCS: MD = 2.9, 95 % CI [0.95, 4.9], p = 0.004) and reduced odds of dependency at 12 months post-stroke, effectively enhancing health-related quality of life and independence. |
| Gilbody et al. (2017) | **Population:** Older Adults (65+) with subthreshold depression | **Duration:** 7 to 8 weeks | **Psychosocial Interventions:** | **Personnel:** The case managers were psychological well-being practitioners (PWPs) employed at Band 5 of the NHS. | **Primary Outcomes:** Self-reported depression severity at 4-month follow-up (9-item Patient Health Questionnaire (PHQ-9)) | **Comparator:** Usual care | **Main results:** Collaborative care was effective in reducing depressive symptoms at 4-month follow-up compared to usual care (PHQ-9: MD = − |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| **Region**: United Kingdom, Europe<br>**Setting:** Home Care + Remote Support (Telephone)<br>**Design:** Individual Pragmatic, Multicentre, Open-Label | **n** = 705 [I = 344; C = 361]<br>**Sample mean age:** 77.3 (SD 7.1) | **Aim:** To assess whether a collaborative care intervention can reduce depressive symptoms and prevent more severe depression in older people.<br>**Content:** The intervention group received a collaborative care program delivered by a case manager, which consisted of 8 weekly sessions (first one face-to-face, rest via telephone) of telephone support, symptom monitoring, and a structured program of behavioral activation. | o Implementing Behavioral Activation Techniques<br>o Implementing Coaching Techniques<br>o Providing Emotional Support<br>**Complementary Interventions:**<br>o Counseling Patient<br>o Facilitating navigation in the health and social system<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Implementing Telephone Support<br>o Monitoring Vital Signs and Symptoms<br>o Referring to Care Provider | **Education & Training:** PWPs received training for the CASPER trial, including three sessions across four regions (Durham, Leeds, Newcastle upon Tyne, and York), each lasting two days. Training focused on the case manager manual and was led by two trainers who also supervised the implementation of the collaborative care program.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Fidelity was promoted through a 3-day intensive training for case managers covering behavioral activation, medication management, and collaborative care. A qualitative substudy evaluated acceptability and implementation, revealing overall good engagement, though some participants declined participation due to perceived low need. Positive patient-case manager interactions and adaptation to multimorbidity were key factors in delivery. | **Risk of Bias:**<br>! | | 1.31, 95 % CI [− 1.95, − 0.67], $p < 0.001$, ES $d = 0.3$), with some impact still observed at 12-month follow-up, albeit with limitations due to high attrition rates. |
| Melis et al. (2008)<br>**Region**: Netherlands, Europe<br>**Setting:** Home Care<br>**Design:** Cluster, Multicentre, Single-blind | **Population:** Community-dwelling adults (≥70)<br>**n** = 151 [I = 85; C = 66]<br>**Sample mean age:** 82.2 (SD 6.2) | **Duration:** 3 months<br>**Aim:** To evaluate whether a problem-based multidisciplinary geriatric home-visit programme improves functional ability and mental well-being.<br>**Content:** The intervention was a nurse-led, multidisciplinary home-based programme targeting vulnerable older adults. Participants were referred by primary care physicians due to issues related to cognition, mood, behavior, mobility, or nutrition. Within two weeks of | **Rehabilitation Interventions:**<br>o Providing Adaptive Devices<br>**Psychosocial Interventions:**<br>o Counseling Patient<br>o Facilitating Meaningful Activities<br>o Providing Social Support<br>**Complementary Interventions:** | **Personnel:** Two geriatric specialist nurses, supervised by two geriatricians, working with 54 General Practitioners across 36 practices.<br>**Education & Training:** Not reported<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Fidelity was promoted through a structured evidence-based manual with NANDA/NIC/NOC guidelines, Standardized visit protocols, | **Primary Outcomes:** Functional ability assessed by the Groningen Activity Restriction Scale (GARS-3) and mental well-being measured by the Mental Health subscale of the MOS-20, at 3 months after randomization.<br>**Risk of Bias:**<br>- | **Comparator:** Usual care | **Main results:** The EASYcare home-visit programme resulted in a modest but statistically significant improvement in functional ability at 3 months (GARS-3: MD = −2.2, 95 % CI [−4.2, −0.3], $p < 0.05$). This early functional benefit was not sustained at 6 months (MD = −1.6, 95 % CI [−3.9, 0.7], $p = 0.18$). Mental well-being showed clinically meaningful and sustained improvements at both 3 months (MOS-20 MH: MD = +5.8, 95 % CI [0.1, 11.4], $p < 0.05$) and 6 months (MD = +9.1, 95 % CI [2.4, 15.6], $p < 0.01$). Among secondary outcomes, negative affect measured by the Dementia Quality of Life scale |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| | | referral, a geriatric specialist nurse conducted an initial home visit to perform a comprehensive EASYcare assessment. Subsequently, up to five additional home visits occurred within three months, focusing on geriatric evaluation, motivational Counseling, medication review, nutritional assessment, mobility needs, and goal adjustment. An individualized care and support plan was developed jointly by the nurse, patient, and caregiver. Throughout the intervention, the nurse coordinated closely with the patient’s primary care physician, supervising geriatrician, and relevant community-based services to facilitate referrals and ensure the effective implementation or revision of the care plan as needed | o Implementing Case Conferences<br>o Implementing Comprehensive Assessment<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Involving Caregiver<br>o Managing Medication Regime<br>o Monitoring Symptoms<br>o Planning Daily Routine<br>o Referring to Care Provider<br>o Supporting Instrumental Activities of Daily Living<br>o Teaching Patient | detailed nurse documentation after each visit, and regular multidisciplinary discussions to maintain consistent practice. | | | significantly improved at 3 months (DQoL Negative Affect: MD = −0.21, 95 % CI [−0.37, −0.04], p = 0.02), though this effect was no longer evident at 6 months. |
| Mountain et al. (2022)<br>**Region**: United Kingdom, Europe<br>**Setting:** Community Care (non-facility based)<br>**Design:** Individual | **Population:** Adults with dementia, living in the community or sheltered accommodation<br>**n** = 480 [I = 241; C = 239]<br>**Sample mean age:** 77 (SD 7.0) | **Duration:** 12 weeks<br>**Aim:** To determine the clinical benefits and cost-effectiveness of Journeying through Dementia (JtD), an intervention designed to promote the well-being and independence of people with mild dementia.<br>**Content:** The intervention, called “Journeying through Dementia” (JtD), consisted of 12 weekly group sessions (maximum 12 participants per group) and 4 one-on-one | **Psychosocial Interventions:**<br>o Implementing Group Therapy<br>o Implementing Problem-Solving Techniques<br>**Complementary Interventions:**<br>o Facilitating Meaningful Activities<br>o Involving Caregiver<br>o Promoting Self Efficacy<br>o Providing Instructional Material | **Personnel:** Facilitators included experienced occupational therapists (grade 8) and a health assistant (grade 2), along with other staff from various backgrounds.<br>**Education & Training:** Facilitators underwent a 2-day training course. Out of 69 facilitators, 53 were trained. The intervention required at least two trained facilitators per site, working one day per week for 12 weeks, including activity preparation, session conduction, record maintenance, and supervision. Additional facilitators were available to cover staff absences.<br>**Intervention Fidelity Assessment:** | **Primary Outcomes:** Dementia Related Quality of Life measure (DEMQOL) at 8 months after randomization<br>**Risk of Bias:**<br>+ | Usual care | **Main results:** The JtD intervention did not significantly improve self-reported quality of life (DEMQOL: MD = 0.9, 95 % CI [− 1.2, 3.0], p = 0.380) but showed a modest improvement in psychological well-being, as measured by Diener’s Flourishing Scale (MD = 1.2, 95 % CI [0.1, 2.3], p = 0.028). |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| Pragmatic, Single-blind | | sessions with a facilitator (approximately every 3 weeks, with the first one before the group sessions started). The group sessions had a structured format and the one-on-one sessions were tailored to the participant's needs, interests, and goals. The intervention was designed to promote independence and self-management in people with mild dementia. | o Providing Self Management Support<br>o Supporting Decision-Making Process<br>o Supporting Instrumental Activities of Daily Living<br>o Teaching Patient | • Formally assessed: Yes, via direct observation and checklists.<br>• Fidelity was evaluated in multiple domains. Facilitator training scored high (95 % in session one; 88–91 % in session two). Group delivery was highly consistent (85–95 %), with 71 % of participants attending ≥10 sessions. Individual sessions (77 %) and supervision (82 %) showed lower fidelity, particularly in goal setting and skills training. Community-based activities were not assessed, representing a limitation. | | | |
| Nielsen et al. (2019)<br>**Region**: Denmark, Europe<br>**Setting:** Home Care<br>**Design:** Individual, Single-blind, | **Population:** Adults ≥60 with occupational performance problems using or seeking home care, living at home or in sheltered housing.<br>**n** = 119 [I = 59; C = 60]<br>**Sample mean age:** 77.6 (SD 8.19) | **Duration:** 11 weeks for ICC-OT; up to 3 weeks for usual practice homecare re-ablement<br>**Aim:** Comparing 11 weeks of intensive client-centred, occupation-based OT (ICC-OT) in the homes of older adults with standard practice in a Danish municipality.<br>**Content:** The intervention was an intensive 11-week client-centred occupational therapy (ICC-OT) program, delivered by research occupational therapists, with up to 22 sessions (2 per week). The goal was to improve the participants' occupational performance in self-care, productivity, and leisure activities that were identified and prioritized by the | **Rehabilitation Interventions:**<br>o Providing Adaptive Devices<br>o Teaching about the use of Adaptive Devices<br>o Training Activities of Daily Living<br>o Training Compensatory Strategies<br>o Training in the Use of Adaptive Devices<br>o Training Instrumental Activities of Daily Living<br>**Complementary Interventions:**<br>o Facilitating Meaningful Activities<br>o Implementing Home Visit | **Personnel:** Six registered occupational therapists were involved in the ICC-OT evaluations and intervention. All were trained in Denmark, had 8 to 23 years of experience with older adult rehabilitation, and were proficient users of COPM and AMPS.<br>**Education & Training:** Therapists attended two 5-h workshops before the study and had regular workshops and team meetings for ongoing support and protocol adherence. An AMPS specialist and an experienced occupational therapist provided additional workshops and were available for questions throughout the study.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Fidelity was promoted through two initial 5-h workshops and regular meetings during the intervention. These sessions aimed to enhance intervention skills and reinforce adherence to study protocols. The six occupational | **Primary Outcomes:** Self-rated occupational performance assessed with the Canadian Occupational Performance Measure (COPM)<br>**Risk of Bias:**<br>🔴 | **Comparator:** Usual care | **Main results:** The ICC-OT intervention significantly improved older adults' self-rated occupational performance (COPM: MD = 1.26, 95 % CI [0.50, 2.02], p = 0.001) compared to usual practice, with improvements maintained at 6 months post-baseline, highlighting its effectiveness over time. |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| | | participants. The ICC-OT used a client-centred approach and was tailored to each individual, using acquisitional, adaptive, and restorative intervention models. | o Implementing Individual Care and Support Plan<br>o Providing Self-Management Support<br>o Teaching About Housing Safety<br>o Training Instrumental Activities of Daily Living | therapists were experienced in older adult rehabilitation and the use of COPM and AMPS. | | | |
| Overbeek et al. (2018)<br>**Region**: Netherlands, Europe<br>**Setting:** Home Care & Residential Care Homes<br>**Design:** Cluster, Open-label | **Population:** Frail older adults (≥75) residing in residential care homes or receiving home care<br>**n** = 201 [I = 101; C = 100]<br>**Sample mean age:** 86,5 (SD 5,6) | **Duration:** Mean of 47 days (range 5–185 days)<br>**Aim:** To determine the effectiveness of advance care planning (ACP) in frail older people.<br>**Content:** The intervention consisted of three main components: 1) Information provision through leaflets, 2) Facilitated Advance Care Planning conversations based on scripted interview cards, and 3) Completion of an advance directive (AD), including appointment of a surrogate decision-maker. The intervention was based on the Respecting Choices ACP program, which was modified for the Dutch context, and was delivered by trained facilitators. | **Psychosocial Interventions:**<br>o Facilitating the Appointment of a Legal Guardian for Decision-Making<br>**Complementary Interventions:**<br>o Documenting Advance Directive<br>o Implementing Individual Care and Support Plan<br>o Involving Caregiver<br>o Perform exploratory interview technique<br>o Promoting Self Efficacy<br>o Providing Instructional Material<br>o Providing Self Management Support<br>o Teaching Patient | **Personnel:** Eight nurses were selected based on their ability to discuss end-of-life topics and an open attitude toward individual preferences.<br>**Education & Training:** The training lasted 3 days and included role-playing exercises and homework.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: Yes, via implementation records.<br>• Fidelity was tracked using indicators such as participation (97/97 received ACP), number and duration of facilitated conversations (mean 1.6 per participant; 125 min average), and time to AD completion (mean 47 days). Follow-up interviews showed that 72 % had positive experiences and 79 % found the intervention useful, indicating high adherence and consistency. | **Primary Outcomes:** Change in patient activation (Patient Activation Measure, PAM-13) between baseline and 12-month follow-up<br>**Risk of Bias:**<br>! | **Comparator:** Usual care | **Main results:** The intervention did not show significant improvements in the primary outcome of patient activation, with no significant differences observed in PAM-13 scores between the intervention (− 0.26) and control groups (− 1.43, p = 0.430). However, importantly, there was no deterioration in patient activation in the intervention group compared to controls. Although secondary outcomes, including quality of life (SF-12 PCS: MD = 0.95 vs. 1.15, p = 0.98; SF-12 MCS: MD = − 4.63 vs. − 4.20, p = 0.71) and healthcare satisfaction, showed no significant improvements, the intervention led to significantly higher completion rates of advance directives (93 % vs. 34 %, p < 0.001) and appointment of surrogate decision-makers (94 % vs. 67 %, p < 0.001). Healthcare staff should consider providing ACP to frail older adults and their relatives. |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| Salisbury et al. (2018)<br>**Region**: United Kingdom, Europe<br>**Setting:** Primary Health Care<br>**Design:** Cluster, Pragmatic, Open-label | **Population:** Adults with multimorbidity<br>**n** = 1546 [I = 797; C = 749]<br>**Sample mean age:** 70,9 (SD 11,5) | **Duration:** 15 months<br>**Aim:** To assess whether a patient-centred 3D approach (based on the dimensions of health, depression and medication) for patients with multimorbidity would improve their health-related quality of life, which is the ultimate goal of the 3D intervention.<br>**Content:** The intervention (3D intervention) involved a single 6-monthly comprehensive multidisciplinary review consisting of: 1) two appointments, one with a nurse and one with a responsible physician, and 2) a medication review by a pharmacist. The review focused on the patient's overall health, depression, and medications. | **Psychosocial Interventions:**<br>o Providing Self Management Support<br>**Complementary Interventions:**<br>o Counseling Patient<br>o Facilitating navigation in the health and social system<br>o Facilitating the use of digital health technologies<br>o Implementing comprehensive assessment<br>o Implementing Individual Care and Support Plan<br>o Involving Caregiver<br>o Managing Medication Regime<br>o Monitoring Vital Signs and Symptoms<br>o Promoting Self Managing Symptom<br>o Providing Self Management Support<br>o Referring To Care Provider<br>o Supporting Decision Making Process<br>o Teaching Patient | **Personnel:** Nurses conducted initial consultations and assessments. Doctors handled follow-ups and collaborative health plans. Pharmacists reviewed and optimized medications.<br>**Education & Training:** Clinical staff received two half-day training sessions, with administrative staff trained separately. Monthly feedback and financial incentives (£30) were provided for completed 3D reviews.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: Not systematically.<br>• Fidelity monitoring was conducted during the pilot phase using process evaluation interviews and feedback, which informed modifications to the main trial. Adjustments included practical training, participant selection criteria, template refinements, and review procedures. These aimed to enhance feasibility and adherence during full implementation. | **Primary Outcomes:** Quality of life (measured using EQ-5D-5L) after 15 months' follow-up<br>**Risk of Bias:**<br>+ | **Comparator:** Usual care | **Main results:** The 3D intervention did not improve the primary outcome, quality of life measured after 15 months' follow-up (MD = 0.00, 95 % CI [− 0.02, 0.02], p = 0.930). However, it significantly improved patient-centred care experiences, including better perceptions of chronic illness management (Adjusted Difference = 0.29, 95 % CI [0.16, 0.41], p < 0.0001) and higher ratings of doctor-patient (1.20, 95 % CI [0.28, 2.13], p = 0.0109) and nurse–patient communication (1.11, 95 % CI [0.03, 2.19], p = 0.044). Additionally, more patients in the intervention group discussed important health problems (42 % vs. 26 %, OR = 1.85, 95 % CI [1.44, 2.38], p < 0.0001), reported higher satisfaction with care (OR = 1.57, 95 % CI [1.19, 2.08], p = 0.0014), and perceived support and care as more integrated (OR = 1.48, 95 % CI [1.18, 1.85], p = 0.0006). The intervention also increased the likelihood of patients having a written care plan (OR = 1.97, 95 % CI [1.32, 2.95], p = 0.0010) |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| Spoorenberg et al. (2018)<br>**Region**: Netherlands, Europe<br>**Setting:** Home Care & Community Care<br>**Design:** Individual, Open-label | **Population:** Older adults (≥75) living at home or in a home for the elderly<br>**n** = 1456 [I = 747; C = 709]<br>**Sample mean age:** 80.7 (SD 4.6) | **Duration:** 12 months<br>**Aim:** The aim of this study is to investigate whether Embrace improves patient outcomes and the quality of healthcare in a cost-effective way for all older people living in the community.<br>**Content:** The intervention (Embrace) provided person-centred, integrated, proactive, and preventive care and support to community-living older adults. The intensity and approach depended on the participant's risk profile (Robust, Frail, or Complex care needs). All participants received a self-management support and prevention program, while those with frail and complex care needs also received individual support from a case manager and a specialized older adults care team. | **Psychosocial Interventions:**<br>o Implementing Motivational Interviewing Techniques<br>o Implementing Problem-Solving Techniques<br>o Implementing Support Group Therapy<br>o Providing Emotional Support<br>o Providing Self Management Support<br>**Complementary Interventions:**<br>o Facilitating navigation in the health and social system<br>o Implementing Case Conferences<br>o Implementing Comprehensive Assessment<br>o Implementing Home Visit<br>o Implementing Individual Care and Support Plan<br>o Implementing Telephone Support | **Personnel:** Social workers and district nurses were trained as case managers. General practitioners (GPs) were trained to manage their teams effectively and provide care for issues like multimorbidity, polypharmacy, and dementia.<br>**Education & Training:** Professionals received intensive training on the Embrace model, teamwork, and prevention. Case managers were trained for individual and group self-management interventions. GPs were trained on team management and targeted care. Project leaders provided ongoing support during monthly meetings.<br>**Intervention Fidelity Assessment:**<br>• Formally assessed: No.<br>• Fidelity was promoted through intensive training (8 days for case managers, 3 days for GPs) on the Embrace model, proactive care, and use of electronic records. Ongoing supervision was provided through monthly multidisciplinary team meetings. Standardized triage instruments (INTERMED-E and GFI) guided stratification and care allocation. Individual care and support plans were developed during structured home visits and monitored regularly through in-person or telephone follow-up. The | **Primary Outcomes:** Various instruments were assessed within three domains: health, well-being and self-management. Health outcomes were measured using instruments that assess overall health status, frailty, and functional abilities. Wellbeing outcomes were evaluated through tools that measure general well-being and quality of life. Self-management outcomes were assessed using scales designed to evaluate self-management abilities and health management behaviors in older adults.<br>**Risk of Bias:**<br>+ | **Comparator:** Usual care | **Main results:** Intervention participants showed greater deterioration in activities of daily living (ADL) and personal activities of daily living (PADL) compared to the care as usual group, but these changes were not clinically relevant. There were no significant differences in wellbeing outcomes between Embrace and care as usual. Embrace participants showed a significant improvement in the 'Knowledge domain of self-management knowledge and behavior' compared to the care as usual group (PIH-OA: ES d = 0.14, 95 % CI [0.12, 0.85], p = 0.009), although this improvement did not reach clinical relevance. In the frail subgroup, the improvement was clinically relevant (ES d = 0.32, 95 % CI [0.23, 2.14], p = 0.015). |

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**Table 2** (*continued*)

| Study, Region, Setting & Design | Population & Participants | Intervention duration, aim & content | Psychosocial, Rehabilitation or Complementary Interventions | Personnel Delivering the Intervention & Fidelity | Main Outcomes measured & Risk of Bias | Comparison group | Main results |
|---|---|---|---|---|---|---|---|
| | | | o Involving Caregiver<br>o Monitoring Vital Signs and Symptoms<br>o Referring to Care Provider<br>o Teaching Patient | Electronic Elderly Record System (EOD) was used to document care activities, support decision-making, and ensure adherence to intervention procedures. | | | |

Note: All interventions in the "Psychosocial, Rehabilitation or Complementary Interventions" column were standardized to the ICNP taxonomy.

I, intervention group; C, control group.

Abbreviations: 3D, intervention approach focused on Dimensions of health, Depression, and Medication; ACOVE, Assessing Care of Vulnerable Elders indicators; ADCS-ADL, Alzheimer's Disease Cooperative Study Activities of Daily Living; AMPS, Assessment of Motor and Process Skills; β, beta coefficient; CARE, Consultation and Relational Empathy Measure; CHAPS, Care Coordination for Health Promotion and Activities in Parkinson's Disease; COPD, Chronic Obstructive Pulmonary Disease; COPM, Canadian Occupational Performance Measure; d, Cohen's d; DEMQOL, Dementia Related Quality of Life; Diener's Flourishing Scale, measure of psychological well-being; DQOL, Dementia Quality of Life; EASYcare, Elderly Assessment System Care; EMR, Electronic Medical Record; EOD, Electronic Elderly Record System; EQ-5D-5L, EuroQol Five-Dimensional Questionnaire, five-level version; GARS-3, Groningen Activity Restriction Scale-3; GFI, Groningen Frailty Indicator; GPs, general practitioners; GRACE, Geriatric Resources for Assessment and Care of Elders; GSE, general self-efficacy; HCPs, healthcare professionals; HDRS, Hamilton Depression Rating Scale; HF, Heart Failure; HFrEF, Heart Failure with reduced Ejection Fraction; HRQoL, Health-Related Quality of Life; ICC-OT, Intensive Client-Centred Occupational Therapy; ICNP, International Classification for Nursing Practice; INTERMED-E, triage instrument for assessment of care needs; ITT, intention-to-treat analysis; JtD, Journeying through Dementia; MCS, Mental Component Summary (Short Form-12/Short Form-36); MLHFQ, Minnesota Living with Heart Failure Questionnaire; MOS-20 MH, Mental Health subscale of the Medical Outcomes Study 20-Item Short-Form (MOS SF-20); NCMs, nurse care managers; PACIC, Patient Assessment of Chronic Illness Care; PAM-13, Patient Activation Measure; PCC, person-centred care; PCS, Physical Component Summary (Short Form-12/Short Form-36); PD, Parkinson's disease; PHQ-2, 2-Item Patient Health Questionnaire; PHQ-9, 9-Item Patient Health Questionnaire; PIH-OA, Partners in Health - Older Adults; PP, Per-protocol analysis; PRA, Probability of Repeated Admission; REACH-HF, Rehabilitation EnAblement in Chronic Heart Failure; SF-12, Short Form-12; SF-36, Short Form-36; SIPScare, Short-term Integrated Palliative and Supportive Care; t, Student's t-statistic; USD, United States dollar; WHOQOL-BREF, World Health Organization Quality of Life - BREF; $\omega^2$, omega-squared.

Risk of bias: 🟢 low; 🟡 some concerns; 🔴 high.

[a] Intention-to-treat group.

[b] Per-protocol group.

[c] Intervention Take Charge 1.

[d] Intervention Take Charge 2.

tabulated and compared against the planned groups. Effect measures were directly extracted from the original publications without the need for conversions or data imputation. Results were presented in structured tables, including outcomes, instruments used, confidence intervals, and p-values. Due to heterogeneity, a narrative synthesis was conducted, highlighting patterns and variations across studies. Subgroup and sensitivity analyses were not performed. While no studies were excluded based on their assessed risk of bias, greater interpretative emphasis was placed on findings from studies with a low risk of bias to support the robustness of the conclusions.

#### 2.3.4. *Assessment of risk of bias in included studies*

Three authors (AL, TC, IC) independently assessed the risk of bias (RoB) in the primary outcomes of each study. We used the Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al., 2024) and the RoB 2 tool (Sterne et al., 2019), resolving any disagreements by discussion. Our assessments were performed at the result level, defined by a specific comparison and its corresponding outcome. The pre-specified effect of interest was the effect of assignment to the intervention (intention to treat, ITT). However, when a given outcome required assessing the effect of adhering to the intervention, we applied the specific Domain 2 rules for that effect.

The RoB 2 framework covers five domains for individually randomized trials: (1) the randomization process; (2) deviations from intended interventions; (3) missing outcome data; (4) measurement of the outcome; and (5) selection of the reported result. For cluster-randomized trials, we additionally assessed Domain 1b, which addresses bias arising from the timing of participant identification and recruitment in relation to cluster randomization.

Our process within each domain involved answering a series of signaling questions using the standard options, such as “Yes/Probably yes” and “No/Probably no”. For decision-making purposes, “Probably yes” was treated as equivalent to “Yes”, and “Probably no” as “No”. Based on these responses, the RoB 2 algorithm mapped a domain-level judgment of “Low risk”, “Some concerns”, or “High risk”. To reach an overall judgment, we followed the tool’s hierarchical principle: an outcome was rated “Low risk” only if all domains were low risk, and “High risk” if any single domain was rated high risk or if multiple domains raised “Some concerns”. To clarify the latter, RoB 2 does not prescribe a fixed count of domains for upgrading to “High”. When “Some concerns” arose in more than one domain, we considered both their number and likely impact on the result. We upgraded to “High risk” only when the cumulative concerns were judged sufficient to substantially lower confidence in the outcome.

Domain-level judgments are presented in the main text, and our full signaling-question responses, with detailed justifications for each study, are provided in Supplementary material (Part B).

## 3. Results

The selection process, illustrated in the flowchart (Fig. 1), began with 12,597 records identified through database searches and other sources. After removing duplicates (n = 1177), 11,420 records were screened by title and abstract, resulting in the exclusion of 11,352 records that did not meet the inclusion criteria. During this initial screening phase, studies were excluded based on predefined eligibility criteria, including ineligible populations (e.g., individuals under 65 years, or specific subpopulations such as women-only samples, younger adults, general adult populations, or older adults without a reported baseline mean age of 70 or above), inappropriate settings (e.g., acute or inpatient care), ineligible study designs (e.g., observational, qualitative, or pilot studies), and wrong publication types (e.g., protocols without outcome data, conference abstracts, or editorial material). Studies were also excluded due to the absence of a structured person-centred psychosocial or rehabilitation intervention, including those lacking sufficient evidence of meeting the criteria to be considered person-centred. After this phase, a total of 68 articles were assessed for eligibility, of which 50 were excluded, leaving 18 studies that met all inclusion criteria and were retained in the final synthesis. The reasons for full-text exclusion are detailed in the flowchart (Fig. 1), and the characteristics of the included studies are summarized in Table 2.

### 3.1. *Study characteristics*

#### 3.1.1. *Study design*

Of the included studies, 12 used traditional RCT methodologies, five employed cluster RCT designs and one adopted a stepped-wedge design. Six were multicentre trials to enhance generalizability.

#### 3.1.2. *Population characteristics*

The 18 included studies involved 9132 participants, with an average of 55.3 % female and a mean age of 77.2 years (SD 8.5), ranging from 50 participants (Evans et al., 2021) to 1700 participants (Forbat et al., 2020). Most studies were conducted in Europe (n = 11) (Melis et al., 2008; Gilbody et al., 2017; Fors et al., 2018; Overbeek et al., 2018; Salisbury et al., 2018; Spoorenberg et al., 2018; Dalal et al., 2019; Nielsen et al., 2019; Ali et al., 2021; Evans et al., 2021; Mountain et al., 2022), followed by North America (n = 4) (Counsell et al., 2007; Callahan et al., 2017; Connor et al., 2019; Fisher et al., 2020), Oceania (n = 2) (Forbat et al., 2020; Fu et al., 2020), and Asia (n = 1) (Chen et al., 2021). The studies spanned 9 high-income countries, with 5 conducted in the UK (Gilbody et al., 2017; Salisbury et al., 2018; Dalal et al., 2019; Evans et al., 2021; Mountain et al., 2022), 3 in the Netherlands (Melis et al., 2008; Overbeek et al., 2018; Spoorenberg et al., 2018), 3 in the USA (Counsell et al., 2007; Callahan et al., 2017; Connor et al., 2019), and 2 in Sweden (Fors et al., 2018; Ali et al., 2021). Studies were also conducted in Australia (Forbat et al., 2020), New Zealand (Fu et al., 2020), Denmark (Nielsen et al., 2019), Canada (Fisher et al., 2020), and Taiwan (Chen et al., 2021). The study populations included specific diseases or conditions such as COPD and heart failure (Fors et al., 2018; Dalal et al., 2019; Ali et al., 2021), Parkinson’s disease (Connor et al., 2019), stroke (Fu et al., 2020), dementia (Callahan et al., 2017; Mountain et al., 2022), and subthreshold depression (Gilbody et al., 2017). Other populations featured high health complexity and frailty (Melis et al., 2008; Overbeek et al., 2018; Forbat et al., 2020; Chen et al., 2021; Evans et al., 2021) or functional deficits, dependency, and multimorbidity (Salisbury et al., 2018; Spoorenberg et al., 2018; Nielsen et al., 2019; Fisher et al., 2020). Twelve studies (Counsell et al., 2007; Gilbody et al., 2017; Fors et al., 2018; Salisbury et al., 2018; Dalal et al., 2019; Fisher et al., 2020; Forbat et al., 2020; Fu et al., 2020; Ali et al., 2021; Evans et al., 2021; Mountain et al., 2022) provided detailed prevalence data for their samples (a total of 6025 participants, corresponding to approximately 66 % of the total sample). Chronic conditions were grouped according to ICD-11 major disease categories. The aggregated prevalence was highest for Circulatory System Diseases (91.7 %), Mental and Behavioral Disorders (40.7 %), Endocrine, Nutritional and Metabolic Diseases (22.0 %), Respiratory System Diseases (22.0 %), Musculoskeletal and Connective Tissue Diseases (12.1 %), and Neoplasms (2.8 %). The three most prevalent individual diseases were hypertension/heart disease (51.1 %), diabetes (25.3 %), and depression/anxiety (31.3 % among 2422 participants from four studies). Five studies did not report complete disease prevalence data (Melis et al., 2008; Overbeek et al., 2018; Spoorenberg et al., 2018; Connor et al., 2019; Nielsen et al., 2019). Four studies reported the mean number of comorbidities per participant: Fisher et al. (n = 59; 8.7 ± 4.5), Evans et al. (n = 50; 3.6 ± 1.9), Chen et al. (n = 145; 2.0 ± 1.4), and Gilbody et al. (n = 705; 2.2). Salisbury et al. (n = 1546) reported the median number of comorbidities, which was 7.0 (IQR 5.0–9.0).

#### 3.1.3. *Comparator intervention*

In all included studies, the comparator intervention was considered usual care, defined as the routine clinical care provided to older adults within the context of each study. While most trials compared experimental interventions to standard care models without additional structured components (e.g., medication optimisation or health promotion), others included comparator groups with more structured care, where this reflected the standard practice in that setting. For example, in Callahan et al. (2017), usual care comprised collaborative dementia management routinely implemented in a public health system. In Fu et al. (2020), the comparator included educational materials routinely provided in that service. Forbat et al. (2020) used a stepped-wedge design in which all clusters began with usual care before sequential implementation of the intervention.

### 3.2. *Interventions characteristics and effects*

#### 3.2.1. *Duration of interventions*

The included studies exhibited considerable variability in terms of both duration and frequency of interventions. The duration of interventions varied widely, ranging from brief, single-session formats lasting between 30 and 60 min (Fu et al., 2020) to extensive programmes with durations of up to 104 weeks (Callahan et al., 2017; Counsell et al., 2007). Interventions were categorized into three groups based on their duration: short-term (≤12 weeks), medium-term (13–26 weeks), and long-term (>26 weeks). Seven studies were classified as short-term (Gilbody et al., 2017; Dalal et al., 2019; Nielsen et al., 2019; Fu et al., 2020; Evans et al., 2021; Mountain et al., 2022; and the active component of Overbeek et al., 2018), five as medium-term (Melis et al., 2008; Fors et al., 2018; Fisher et al., 2020; Ali et al., 2021; Chen et al., 2021), and six as long-term (Callahan et al., 2017; Counsell et al., 2007; Salisbury et al., 2018; Spoorenberg et al., 2018; Connor et al., 2019; Forbat et al., 2020).

Several studies reported interventions with highly variable durations or individually tailored schedules (e.g., Overbeek et al., 2018: 5–185 days; Forbat et al., 2020: 8–60 weeks), making it difficult to derive precise aggregated summaries. Regarding session frequency, the considerable methodological heterogeneity among studies also prevented a reliable quantitative synthesis. Among those studies that did specify frequency clearly, sessions ranged from weekly to monthly intervals or were adjusted according to individual participant needs. This variability underscores the adaptability inherent in these interventions and highlights the diverse practical approaches employed in their implementation.

#### 3.2.2. *Intervention context*

The most common setting among the included studies was home care, as reported in twelve studies (Ali et al., 2021; Callahan et al., 2017; Connor et al., 2019; Counsell et al., 2007; Dalal et al., 2019; Evans et al., 2021; Fisher et al., 2020; Fors et al., 2018; Fu et al., 2020; Melis et al., 2008; Nielsen et al., 2019; Gilbody et al., 2017). Community care was described in two studies (Chen et al., 2021; Mountain et al., 2022). One study was conducted in primary health care settings (Salisbury et al., 2018), while another took place exclusively in residential care homes (Forbat et al., 2020). Two studies reported mixed settings: Spoorenberg et al. (2018) combined home and community care, whereas Overbeek et al. (2018) included participants in both home and residential care.

#### 3.2.3. *Modes of administration*

Most interventions were conducted individually in face-to-face settings. In addition to this mode, eight studies used telephone administration (Callahan et al., 2017; Counsell et al., 2007; Gilbody et al., 2017; Fors et al., 2018; Connor et al., 2019; Dalal et al., 2019; Ali et al., 2021; Evans et al., 2021), two studies used face-to-face group sessions (Spoorenberg et al., 2018; Mountain et al., 2022), two studies employed digital health platforms (Connor et al., 2019; Ali et al., 2021), and one study used a smartphone app (Fors et al., 2018).

#### 3.2.4. *Operational methods, personnel, and training*

Regarding intervention implementation, seventeen studies reported using a personalized health plan co-created between healthcare professionals and care recipients In nine studies, other implementation methods included the use of Case/Care Managers (Callahan et al., 2017; Gilbody et al., 2017; Spoorenberg et al., 2018; Connor et al., 2019; Counsell et al., 2007; Melis et al., 2008) or Care Coordinators (Fisher et al., 2020; Chen et al., 2021; Evans et al., 2021). In studies employing this approach, both care coordinators and case managers shared similar responsibilities, focusing on care coordination, integration, assessment, planning, and monitoring, with a cross-cutting emphasis on providing continuous, personalized support to ensure comprehensive, needs-centred care. Most studies used a multidisciplinary team. Non-multidisciplinary interventions were led by nurses (Overbeek et al., 2018; Connor et al., 2019; Ali et al., 2021), specialist nurses (Forbat et al., 2020; Evans et al., 2021), occupational therapists (Callahan et al., 2017; Nielsen et al., 2019), social workers (Chen et al., 2021) and psychological well-being practitioners (specific NHS professionals in the UK) (Gilbody et al., 2017).

Twelve studies included specific training for healthcare professionals tailored to the intervention's objectives and the needs of target populations, and training varied in duration and intensity.

#### 3.2.5. *Used resources*

There was significant diversity in the resources used to deliver interventions. Key resources included educational materials, such as literacy-promoting books, booklets, instructional CDs, and DVDs; health assessment and screening tools and checklists; planning and problem-solving tools; health information systems and health documentation models.

#### 3.2.6. *Interventions fidelity*

Connor et al. (2019), Evans et al. (2021), Forbat et al. (2020), and Mountain et al. (2022) formally assessed intervention fidelity through clinical record extraction, direct observation, session recordings, and structured checklists, demonstrating overall good fidelity despite specific implementation limitations. Other included studies did not formally assess fidelity but employed indirect strategies to enhance adherence, such as structured training, regular supervision, systematic follow-ups, and audits. Specifically, Chen et al. (2021), Fors et al. (2018), Gilbody et al. (2017), Nielsen et al. (2019), Counsell et al. (2007), and Melis et al. (2008) utilized explicit training and monitoring frameworks, including structured evidence-based manuals, standardized protocols, detailed documentation following each session, and regular multidisciplinary team supervision. Overbeek et al. (2018) reported high adherence informally. In contrast, Salisbury et al. (2018), Spoorenberg et al. (2018), and Callahan et al. (2017) faced operational challenges, lacked systematic fidelity data, and, in the case of Callahan et al., did not describe structured team training.

### 3.3. *Interventions retrieved*

This review identified 51 interventions that improved or maintained participants' health, categorized as rehabilitation, psychosocial, or complementary interventions. Interventions were standardized using ICNP terminology (Table 3).

#### 3.3.1. *Rehabilitation interventions*

This review identified several rehabilitation interventions focused on maintaining and improving functioning in home settings, targeting populations with personalized needs. Interventions to train basic and instrumental life activities were implemented in the studies by Callahan et al. (2017) and Nielsen et al. (2019), constituting core actions aimed at enhancing functional ability in basic and instrumental daily tasks, specifically for older adults with dementia and individuals with limitations in occupational performance. Physical exercise was also targeted

**Table 3**
Summary of the identified interventions, standardized to the ICNP taxonomy.

| Core interventions | | Complementary interventions |
|---|---|---|
| Rehabilitation interventions | Psychosocial interventions | |
| 1. **Advising about housing** (Callahan et al., 2017) | 1. **Coaching patient** (Connor et al., 2019; Counsell et al., 2007; Fors et al., 2018) | 1. **Facilitating navigation in the health and social system** (Chen et al., 2021; Connor et al., 2019; Counsell et al., 2007; Fisher et al., 2020; Gilbody et al., 2017; Spoorenberg et al., 2018) |
| 2. **Assessing housing condition** (Callahan et al., 2017) | 2. **Counseling Patient** (Connor et al., 2019; Counsell ET al., 2007; Dalal et al., 2019; Fors et al., 2018; Melis et al., 2008) | 2. **Facilitating the use of digital health technologies** (Ali et al., 2021; Connor et al., 2019; Fors et al., 2018) |
| 3. **Facilitating adapted housing** (Callahan et al., 2017; Nielsen et al., 2019) | 3. **Documenting advance directive** (Counsell et al., 2007; Forbat et al., 2020; Overbeek et al., 2018) | 3. **Implementing case conferences** (Counsell et al., 2007; Fisher et al., 2020; Forbat et al., 2020; Melis et al., 2008; Spoorenberg et al., 2018) |
| 4. **Managing exercise regime** (Callahan et al., 2017; Dalal et al., 2019) | 4. **Facilitating meaningful activities** (Gilbody et al., 2017; Melis et al., 2008; Mountain et al., 2022; Nielsen et al., 2019) | 4. **Implementing comprehensive assessment** (Chen et al., 2021; Connor et al., 2019; Counsell et al., 2007; Evans et al., 2021; Fisher et al., 2020; Fors et al., 2018; Melis et al., 2008; Salisbury et al., 2018; Spoorenberg et al., 2018) |
| 5. **Providing adaptive devices** (Melis et al., 2008; Nielsen et al., 2019) | 5. **Facilitating the appointment of a legal guardian for decision-making** (Forbat et al., 2020; Overbeek et al., 2018) | 5. **Implementing group education** (Spoorenberg et al., 2018) |
| 6. **Teaching about exercise** (Dalal et al., 2019) | 6. **Implementing behavioral activation techniques** (Gilbody et al., 2017) | 6. **Implementing home visit** (Callahan et al., 2017; Chen et al., 2021; Counsell et al., 2007; Dalal et al., 2019; Evans et al., 2021; Fisher et al., 2020; Fu et al., 2020; Gilbody et al., 2017; Melis et al., 2008; Nielsen et al., 2019; Spoorenberg et al., 2018) |
| 7. **Teaching about functional dyspnoea management** (Dalal et al., 2019) | 7. **Implementing group therapy** (Mountain et al., 2022) | 7. **Implementing individual care and support plan** (Ali et al., 2021; Callahan et al., 2017; Chen et al., 2021; Connor et al., 2019; Counsell et al., 2007; Dalal et al., 2019; Evans et al., 2021; Fisher et al., 2020; Forbat et al., 2020; Fors et al., 2018; Gilbody et al., 2017; Melis et al., 2008; Mountain et al., 2022; Nielsen et al., 2019; Overbeek et al., 2018; Salisbury et al., 2018; Spoorenberg et al., 2018) |
| 8. **Training activities of daily living** (Callahan et al., 2017; Nielsen et al., 2019) | 8. **Implementing motivational interviewing techniques** (Dalal et al., 2019; Fisher et al., 2020; Fors et al., 2018; Spoorenberg et al., 2018) | 8. **Implementing telephone support** (Ali et al., 2021; Callahan et al., 2017; Chen et al., 2021; Connor et al., 2019; Counsell et al., 2007; Evans et al., 2021; Fors et al., 2018; Gilbody et al., 2017) |
| 9. **Training balance** (Callahan et al., 2017) | 9. **Implementing problem-solving techniques** (Callahan et al., 2017; Connor et al., 2019; Evans et al., 2021; Mountain et al., 2022) | 9. **Involving caregiver** (Callahan et al., 2017; Chen et al., 2021; Counsell et al., 2007; Dalal et al., 2019; Evans et al., 2021; Fisher et al., 2020; Forbat et al., 2020; Fors et al., 2018; Melis et al., 2008; Mountain et al., 2022; Overbeek et al., 2018; Salisbury et al., 2018; Spoorenberg et al., 2018) |
| 10. **Training cognitive function** (Callahan et al., 2017) | 10. **Monitoring psychological status** (Gilbody et al., 2017) | 10. **Managing medication regime** (Counsell et al., 2007; Fisher et al., 2020; Forbat et al., 2020; Melis et al., 2008; Salisbury et al., 2018) |
| 11. **Training compensatory strategies** (Nielsen et al., 2019) | 11. **Promoting self-efficacy** (Ali et al., 2021; Connor et al., 2019; Counsell et al., 2007; Fisher et al., 2020; Fors et al., 2018; Fu et al., 2020; Mountain et al., 2022) | 11. **Managing symptom** (Counsell et al., 2007; Evans et al., 2021; Forbat et al., 2020) |
| 12. **Training in functional mobility and strength** (Callahan et al., 2017) | 12. **Providing emotional support** (Connor et al., 2019; Counsell et al., 2007; Evans et al., 2021; Forbat et al., 2020; Fors et al., 2018; Fu et al., 2020; Gilbody et al., 2017; Salisbury et al., 2018) | 12. **Monitoring vital signs and symptoms** (Ali et al., 2021; Connor et al., 2019; Counsell et al., 2007; Dalal et al., 2019; Forbat et al., 2020; Melis et al., 2008; Salisbury et al., 2018) |
| 13. **Training in the use of adaptive devices** (Nielsen et al., 2019) | 13. **Providing self-management support** (Ali et al., 2021; Connor et al., 2019; Counsell et al., 2007; Evans et al., 2021; Fisher et al., 2020; Fors et al., 2018; Fu et al., 2020; Mountain et al., 2022; Nielsen et al., 2019; Overbeek et al., 2018; Salisbury et al., 2018; Spoorenberg et al., 2018) | 13. **Perform exploratory interview technique** (Fors et al., 2018; Fu et al., 2020; Overbeek et al., 2018) |
| 14. **Training in transfer technique** (Callahan et al., 2017) | 14. **Providing social support** (Ali et al., 2021; Chen et al., 2021; Counsell et al., 2007; Dalal et al., 2019; Fisher et al., 2020; Forbat et al., 2020; Fors et al., 2018; Melis et al., 2008) | 14. **Planning daily routine** (Melis et al., 2008) |
| 15. **Training instrumental activities of daily living** (Callahan et al., 2017; Nielsen et al., 2019) | 15. **Teaching about stress and anxiety management techniques** (Dalal et al., 2019) | 15. **Prioritizing treatment regime** (Chen et al., 2021; Forbat et al., 2020) |
| | | 16. **Promoting self-management of symptom** (Dalal et al., 2019; Fors et al., 2018; Salisbury et al., 2018) |
| | | 17. **Providing instructional material** (Connor et al., 2019; Counsell et al., 2007; |

(*continued on next page*)

**Table 3** (*continued*)

| Core interventions | | Complementary interventions |
|---|---|---|
| Rehabilitation interventions | Psychosocial interventions | |
| | | Dalal et al., 2019; Fors et al., 2018; Fu et al., 2020; Mountain et al., 2022; Overbeek et al., 2018; Salisbury et al., 2018)<br>18. **Referring to care provider** (Chen et al., 2021; Connor et al., 2019; Counsell et al., 2007; Forbat et al., 2020; Gilbody et al., 2017; Melis et al., 2008; Salisbury et al., 2018)<br>19. **Supporting instrumental activities of daily living** (Melis et al., 2008; Mountain et al., 2022)<br>20. **Teaching about self-monitoring of vital signs and symptoms** (Dalal et al., 2019; Fors et al., 2018; Melis et al., 2008)<br>21. **Teaching patient** (Connor et al., 2019; Dalal et al., 2019; Fors et al., 2018; Melis et al., 2008; Mountain et al., 2022; Overbeek et al., 2018; Spoorenberg et al., 2018) |

through the interventions Training in Transfer Technique, Training Balance, and Training in Functional Mobility and Strength, as reported by Callahan et al. (2017), which were managed and supervised by professionals. Callahan et al. (2017) and Nielsen et al. (2019) also included interventions focused on home safety and environmental adaptation, including Assessing Housing Condition, Advising About Housing, and Facilitating Adapted Housing. Nielsen et al. also incorporated functional capacity components by providing Adaptive Devices, Training Compensatory Strategies, and Training in the Use of Adaptive Devices. These interventions reflect a common focus on training for daily living activities, personalized functional training, promotion of home safety, and support for structured physical activity, all aiming to preserve autonomy and functioning.

### 3.3.2. *Psychosocial interventions*

Psychosocial interventions were a transversal element in most studies included in this review. The most frequently reported intervention was self-management support, albeit with diverse operational strategies (Ali et al., 2021; Connor et al., 2019; Counsell et al., 2007; Evans et al., 2021; Fors et al., 2018; Fu et al., 2020; Fisher et al., 2020; Mountain et al., 2022; Nielsen et al., 2019; Salisbury et al., 2018; Spoorenberg et al., 2018; Overbeek et al., 2018). Typically, this was delivered through empowerment strategies for active health management, including personalized care planning, shared goal-setting, symptom education, structured follow-up, engagement in decision-making, and shared responsibility. Self-efficacy promotion emerged as a cross-cutting component, either standalone or integrated with self-management support, also reported by Counsell et al. (2007). Strategies aimed to strengthen the individual's confidence in managing and planning their care, through person-centred approaches (Fu et al., 2020; Mountain et al., 2022) or sustained support (remote or in-person) focused on active reflection, informed decision-making, and individual accountability (Ali et al., 2021; Connor et al., 2019; Fors et al., 2018; Fisher et al., 2020; Mountain et al., 2022; Counsell et al., 2007).

Motivational techniques were also used across studies, with motivational interviewing employed as a tool to support reflection on behavior change and to foster autonomy and intrinsic motivation (Dalal et al., 2019; Fisher et al., 2020; Fors et al., 2018; Spoorenberg et al., 2018). Additionally, where functional adaptation or specific health challenges were addressed, structured problem-solving was commonly used, focusing on identifying barriers and generating practical solutions (Callahan et al., 2017; Connor et al., 2019; Evans et al., 2021; Mountain et al., 2022). Gilbody et al. (2017) implemented group-based behavioral activation with validated psychological monitoring for subthreshold depression. Fors et al. (2018), Connor et al. (2019), and Counsell et al. (2007) implemented structured coaching, incorporating goal-setting, motivation, accountability, and follow-up. End-of-life and irreversible illness contexts were addressed in Overbeek et al. (2018), Forbat et al. (2020), and Counsell et al. (2007), incorporating advance care planning, legal representative designation, and documentation of advance directives to support shared decision-making in clinically complex, socially vulnerable settings. Counseling patients was explicitly described by Counsell et al. (2007) and Melis et al. (2008).

Two additional psychosocial domains were consistently addressed: social and emotional support. Social support was operationalized as mobilization and reinforcement of formal and informal networks as therapeutic resources (Ali et al., 2021; Chen et al., 2021; Counsell et al., 2007; Dalal et al., 2019; Fisher et al., 2020; Forbat et al., 2020; Fors et al., 2018; Melis et al., 2008). Emotional support focused on reducing psychological distress related to multimorbidity, loneliness or end-of-life, using strategies such as active listening, emotional validation, and sustained therapeutic relationships (Connor et al., 2019; Counsell et al., 2007; Evans et al., 2021; Forbat et al., 2020; Fors et al., 2018; Fu et al., 2020; Gilbody et al., 2017; Salisbury et al., 2018). Dalal et al. (2019) notably included educational components to help manage stress and anxiety in individuals with disabling heart disease.

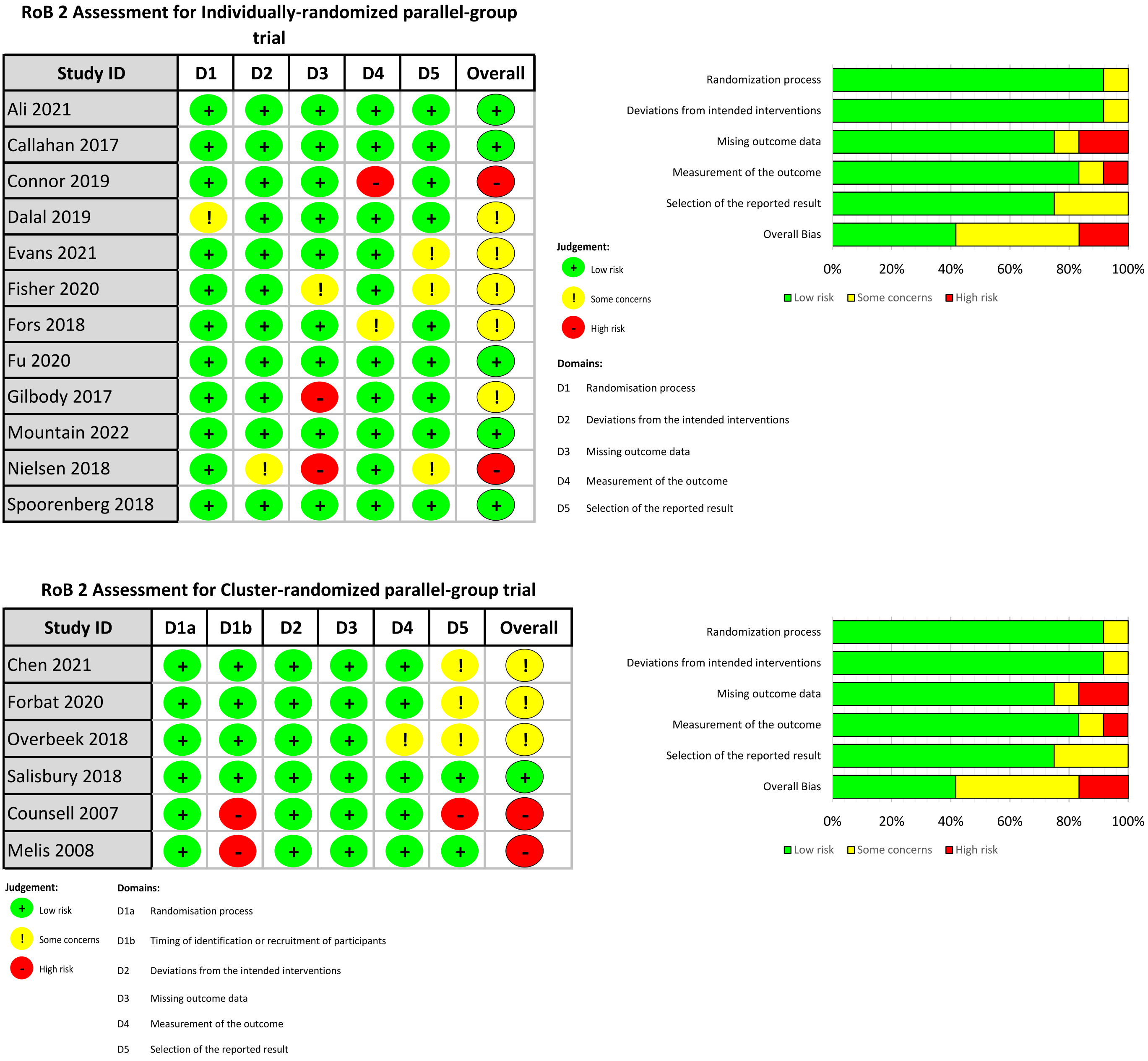
Finally, in populations at risk of social exclusion (Gilbody et al., 2017), occupational impairment (Nielsen et al., 2019), or cognitive decline (Mountain et al., 2022; Melis et al., 2008), there was a consistent effort to integrate meaningful activities aligned with individual values, interests, and life history, promoting purpose, identity, and positive engagement.

### 3.3.3. *Complementary interventions*

Complementary interventions included various actions across multiple health disciplines, such as nursing, occupational therapy, psychology, medicine, and social work. While relevant when incorporated into a broader care framework, these interventions generally demonstrated greater fragmentation and lower structural consistency than core interventions. We identified interventions focused on educational components, such as teaching patients, providing educational materials, supporting self-monitoring of vital signs and symptoms, promoting symptom self-management, assisting with instrumental activities of daily living, and implementing group education. Care operationalization was another vital domain identified, including the development of individualized care and support plans, which emerged as the most commonly used complementary intervention. Other essential actions included conducting case conferences, home visits, remote follow-up (via phone or digital tools), facilitating patient navigation through health and social care systems, involving caregivers to enhance health outcomes, planning daily routines, and referring to care providers. Additionally, we identified interventions focused on health assessment, monitoring, and management, which included the use of exploratory interview techniques, comprehensive multidomain assessments, symptom and vital sign monitoring, medication management, and prioritizing treatment regimens.

## 3.4. *Risk of bias in included studies*

Overall, out of the 18 included studies, a comprehensive risk of bias



**RoB 2 Assessment for Individually-randomized parallel-group trial**

| Study ID | D1 | D2 | D3 | D4 | D5 | Overall |
|---|---|---|---|---|---|---|
| Ali 2021 | + | + | + | + | + | + |
| Callahan 2017 | + | + | + | + | + | + |
| Connor 2019 | + | + | + | - | + | - |
| Dalal 2019 | ! | + | + | + | + | ! |
| Evans 2021 | + | + | + | + | ! | ! |
| Fisher 2020 | + | + | ! | + | ! | ! |
| Fors 2018 | + | + | + | ! | + | ! |
| Fu 2020 | + | + | + | + | + | + |
| Gilbody 2017 | + | + | - | + | + | ! |
| Mountain 2022 | + | + | + | + | + | + |
| Nielsen 2018 | + | ! | - | + | ! | - |
| Spoorenberg 2018 | + | + | + | + | + | + |

**Judgement:**
+ Low risk
! Some concerns
- High risk

**Domains:**

| | |
|---|---|
| D1 | Randomisation process |
| D2 | Deviations from the intended interventions |
| D3 | Missing outcome data |
| D4 | Measurement of the outcome |
| D5 | Selection of the reported result |

**RoB 2 Assessment for Cluster-randomized parallel-group trial**

| Study ID | D1a | D1b | D2 | D3 | D4 | D5 | Overall |
|---|---|---|---|---|---|---|---|
| Chen 2021 | + | + | + | + | + | ! | ! |
| Forbat 2020 | + | + | + | + | + | ! | ! |
| Overbeek 2018 | + | + | + | + | ! | ! | ! |
| Salisbury 2018 | + | + | + | + | + | + | + |
| Counsell 2007 | + | - | + | + | + | - | - |
| Melis 2008 | + | - | + | + | + | + | - |

**Judgement:**
+ Low risk
! Some concerns
- High risk

**Domains:**

| | |
|---|---|
| D1a | Randomisation process |
| D1b | Timing of identification or recruitment of participants |
| D2 | Deviations from the intended interventions |
| D3 | Missing outcome data |
| D4 | Measurement of the outcome |
| D5 | Selection of the reported result |

**Fig. 2.** Risk of Bias assessment of included studies.

assessment using the RoB 2 tool revealed that seven studies had a low risk of bias (Ali et al., 2021; Callahan et al., 2017; Fu et al., 2020; Gilbody et al., 2017; Mountain et al., 2022; Salisbury et al., 2018; Spoorenberg et al., 2018), eight had some concerns (Chen et al., 2021; Dalal et al., 2019; Evans et al., 2021; Fisher et al., 2020; Forbat et al., 2020; Fors et al., 2018; Overbeek et al., 2018), and four were judged to have a high risk of bias (Connor et al., 2019; Counsell et al., 2007; Melis et al., 2008; Nielsen et al., 2019) (Fig. 2).

Regarding the randomization process, seventeen studies were judged to have a low risk of bias. One study raised some concerns due to significant baseline imbalances (Dalal et al., 2019), and a high risk of selection bias was specifically identified in the two cluster-randomized trials (CRTs) because participants were recruited after the clusters had been randomized (Counsell et al., 2007; Melis et al., 2008). In the domain of deviations from intended interventions, the risk was also low for seventeen studies, with only one study raising some concerns due to the lack of blinding of participants and professionals (Nielsen et al., 2019).

For missing outcome data, fifteen studies were rated as low risk. A high risk of bias was identified in two studies due to high attrition rates (Gilbody et al., 2017; Nielsen et al., 2019), and one study raised some concerns due to its reduced sample size (Fisher et al., 2020). In the measurement of the outcome, fourteen studies demonstrated a low risk of bias. Three studies were judged to have some concerns, mostly due to lack of blinding in the assessment (Fisher et al., 2020; Fors et al., 2018; Overbeek et al., 2018), while one study was rated as high risk for using non-validated instruments (Connor et al., 2019).

Finally, regarding bias in the selection of the reported result, ten studies were considered to have a low risk. Six studies were rated as having some concerns, typically because no pre-published protocol was available (Chen et al., 2021; Evans et al., 2021; Fisher et al., 2020; Forbat et al., 2020; Fors et al., 2018; Overbeek et al., 2018). Two studies were rated as having a high risk of bias due to evidence of selective reporting (Nielsen et al., 2019; Counsell et al., 2007).

**Table 4**
Summary of the primary and secondary outcomes of the included studies.

| Primary outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outcome | Instrument | Timepoint | Analysis type | Gains | *p*-Value | Observations | Risk of bias |
| ***Self-efficacy*** *(composite score)* | GSE + hospitalization or death[a] | 3 months | PP | ↑ (Ali et al., 2021) | 0.047 | OR = 2.42, 95 % CI [1.01, 5.79] | + |
| | GSE + hospitalization or death[a] | 3 months | ITT | → (Ali et al., 2021) | 0.240 | OR = 1.66, 95 % CI [0.71, 3.88]; no statistically significant change | + |
| | GSE + hospitalization or death[a] | 6 months | PP | → (Ali et al., 2021) | 0.500 | OR = 1.66, 95 % CI [0.72, 3.80]; no statistically significant change | + |
| | GSE + hospitalization or death[a] | 6 months | ITT | → (Ali et al., 2021) | 0.470 | OR = 1.34, 95 % CI [0.61, 2.94]; no statistically significant change | + |
| | GSE + hospitalization or death[b] | 6 months | PP | ↑ (Fors et al., 2018) | 0.039 | Greater deterioration in the CG; OR = 1.81, 95 % CI: [1.03, 3.19] | ! |
| | GSE + hospitalization or death[b] | 6 months | ITT | → (Fors et al., 2018) | 0.102 | OR = 1.56, 95 % CI: [0.92, 2.65]; no statistically significant change | ! |
| ***Self-management*** *and* ***patient activation*** | PAM-13 | 12 months | ITT | → (Overbeek et al., 2018) | 0.430 | No statistically significant change. CI not reported in the original study | ! |
| | PIH-OA (Knowledge domain) | 12 months | ITT | → (Spoorenberg et al., 2018) | 0.009 | Whole sample; ES *d* = 0.14, 95 % CI [0.12, 0.85], no clinical relevance | + |
| | PIH-OA (Knowledge domain) | 12 months | ITT | ↑ (Spoorenberg et al., 2018) | 0.015 | Frail people stratified; ES *d* = 0.32, 95 % CI [0.23, 2.14], clinically relevant | + |
| | PIH-OA | 12 months | ITT | ↑ (Spoorenberg et al., 2018) | 0.020 | Frail people stratified; ES *d* = 0.31, 95 % CI [0.40, 4.69]; clinically relevant | + |
| ***Quality of life (QoL)*** | WHOQoL-BREF | 3 months | ITT | ↑ (Chen et al., 2021) | < 0.001 | β = 6.83, 95 % CI [5.36, 8.30]; ES over 6 months: *d* = 0.86 | ! |
| | WHOQoL-BREF | 6 months | ITT | ↑ (Chen et al., 2021) | < 0.001 | β = 12.72, 95 % CI [10.66, 14.78]; ES over 6 months: *d* = 0.86 | ! |
| ***Health-related quality of life (HRQoL)*** | MOS-20 MH | 3 months | ITT | ↑ (Melis et al., 2008) | 0.040 | MD = 5.8, 95 % CI [0.1, 11.4]; clinically meaningful | - |
| | MOS-20 MH | 6 months | ITT | ↑ (Melis et al., 2008) | 0.008 | MD = 9.1, 95 % CI [2.4, 15.6]; sustained improvement | - |
| | SF-12: PCS | 6 months | ITT | → (Fisher et al., 2020) | 0.200 | MD = − 4.94, 95 % CI [− 12.53, 2.66]; no statistically significant change | ! |
| | DEMQOL | 8 months | ITT | → (Mountain et al., 2022) | 0.380 | MD = 0.9, 95 % CI [− 1.2, 3.0]; no statistically significant change | + |
| | SF-36: PCS | 12 months | ITT | ↑ (Fu et al., 2020) | 0.004 | MD = 2.9, CI 95 % [0.95, 4.9]; dose–response: 1.9 points per session | + |
| | MLHFQ | 12 months | ITT | ↑ (Dalal et al., 2019) | 0.025 | MD = − 5.7, 95 % CI [− 10.6, − 0.7] | ! |
| | EQ-5D-5L | 15 months | ITT | → (Salisbury et al., 2018) | 0.930 | MD = 0.00 (95 % CI: [− 0.02, 0.02]); no statistically significant change | + |
| | SF-36: Vitality | 24 months | ITT | ↑ (Counsell et al., 2007) | < 0.001 | MD = 5.1, 95 % CI [2.2, 7.9] | - |
| | SF-36: MCS | 24 months | ITT | ↑ (Counsell et al., 2007) | < 0.001 | MD = 2.4, 95 % CI [0.9, 3.8] | - |
| ***Depressive symptoms*** | HDRS | 3 months | ITT | ↑ (Chen et al., 2021) | < 0.001 | β = − 3.26, 95 % CI [− 4.36, − 2.16]; large ES over 6 months: d = 1.08 | ! |
| | PHQ-9 | 4 months | ITT | ↑ (Gilbody et al., 2017) | < 0.001 | MD = − 1.31, 95 % CI [− 1.95, − 0.67]; ES *d* = 0.3 | ! |
| | HDRS | 6 months | ITT | ↑ (Chen et al., 2021) | < 0.001 | β = − 5.18 (95 % CI [− 6.39, − 3.98]); large ES over 6 months: *d* = 1.08 | ! |
| ***Functioning*** | COPM | 3 months | ITT | ↑ (Nielsen et al., 2019) | 0.001 | MD = 1.26 95 % CI [0.50, 2.02] | - |
| | Bartel index | 3 months | ITT | → (Chen et al., 2021) | 0.333 | β = 0.72 (95 % CI [− 0.74, 2.17]); ES *d* = 0.37 | ! |

(*continued on next page*)

**Table 4** (*continued*)

Primary outcomes

| Outcome | Instrument | Timepoint | Analysis type | Gains | *p*-Value | Observations | Risk of bias |
|---|---|---|---|---|---|---|---|
| | GARS-3 | 3 months | ITT | ↑ (Melis et al., 2008) | 0.02 | MD = −2.2, 95 % CI [−4.2, −0.3]; modest improvement in ADL/IADL | - |
| | Barthel Index | 6 months | ITT | ↑ (Chen et al., 2021) | 0.012 | $\beta$ = 4.87, 95 % CI [1.09, 8.65]; ES $d$ = 0.37 | ! |
| | GARS-3 | 6 months | ITT | → (Melis et al., 2008) | 0.18 | MD = −1.6, 95 % CI [−3.9, 0.7]; early gain not sustained | - |
| | ADCS ADL | 24 months | ITT | → (Callahan et al., 2017) | 0.540 | MD = 2.34, 95 % CI [−5.27, 9.96]; no statistically significant change | ! |
| | Instrumental ADL index[c] | 24 months | ITT | → (Counsell et al., 2007) | 0.77 | MD = −0.2, 95 % CI [−1.3, 0.9]; no statistically significant change | - |
| | Basic ADL Index [d] | 24 months | ITT | → (Counsell et al., 2007) | 0.37 | MD = −0.2, 95 % CI [−0.7, 0.3]; no statistically significant change | - |
| ***Quality of care*** | Parkinson's disease care quality indicators[e] | 18 months | ITT | ↑ (Connor et al., 2019) | <0.050 | Higher adherence in IG (77 %) vs CG (58 %); MD = 0.19 (95 % CI [0.16, 0.22]); ES = 0.49 (95 % CI [0.39, 0.59]) | - |
| ***Chronic disease management*** | Palliative care symptoms[f] | 12 weeks | ITT | ↑ (Evans et al., 2021) | 0.023 | Reduction in adverse symptoms; -MD = 1.32, IC 95 % [−2.45, −0.19]; ES $\omega^2$ = 0.087 | ! |
| ***Healthcare utilization*** | Length of stay in hospital | Variable | ITT | ↑ (Forbat et al., 2020) | 0.038 | Reduced length of stay; MD = −0.22 days, 95 % CI [− 0.44, − 0.01] | ! |
| | Use of health and social services | 3 months | ITT | ↑ (Chen et al., 2021) | <0.001 | Significant increase; $\beta$ = 1.90, 95 % CI [1.61, 2.20]; ES $d$ = 1.15 | ! |
| | Use of health and social services | 6 months | ITT | ↑ (Chen et al., 2021) | <0.001 | Significant increase; $\beta$ = 2.25, 95 % CI [1.90, 2.60]; ES $d$ = 1.15 | ! |
| | ED visits | 24 months | ITT | → (Counsell et al., 2007) | 0.42 | Per 1000 PY; MD = −303; non-significant after Bonferroni adjustment | - |
| | Hospital admissions | 24 months | ITT | → (Counsell et al., 2007) | 0.66 | Per 1000 PY; MD = −40; non-significant after Bonferroni adjustment | - |

Secondary outcomes

| Outcome | Instrument | Timepoint | Gains | p-Value | Observations |
|---|---|---|---|---|---|
| ***Client satisfaction** and **care quality*** | Satisfaction Survey | 6 months | ↑ (Chen et al., 2021) | <0.0010 | Intervention group (M = 33.75, SD = 5.06) vs. comparison group (M = 10.35, SD = 5.26); t = 26.04 |
| | PACIC | 15 months | ↑ (Salisbury et al., 2018) | <0.0001 | Adjusted difference: 0.29, 95 % CI [0.16, 0.41] |
| | CARE Doctor Score | 15 months | ↑ (Salisbury et al., 2018) | 0.0109 | Adjusted difference: 1.20, 95 % CI [0.28, 2.13] |
| | CARE Nurse Score | 15 months | ↑ (Salisbury et al., 2018) | 0.044 | Adjusted difference: 1.11, 95 % CI [0.03, 2.19] |
| | Discussion of important problems for patients | 15 months | ↑ (Salisbury et al., 2018) | <0.0001 | 42 % in intervention discussed issues vs. 26 % in control; OR = 1.85, 95 % CI [1.44, 2.38] |
| | Satisfaction with Care | 15 months | ↑ (Salisbury et al., 2018) | 0.0014 | Very satisfied with care: OR = 1.57, 95 % CI [1.19, 2.08] |
| | Integrated Support and Care | 15 months | ↑ (Salisbury et al., 2018) | 0.0006 | Support and care almost always joined-up: OR = 1.48, 95 % CI [1.18, 1.85] |
| | Written Care Plan | 15 months | ↑ (Salisbury et al., 2018) | 0.0010 | Patients with a written care plan: OR = 1.97, 95 % CI [1.32, 2.95] |
| | ACOVE indicators | 24 months | ↑ (Counsell et al., 2007) | <0.0001 | 71 % vs 57 % (MD = 0.14, 95 % CI [0.10–0.18] |

Symbols: ↑ improved; → no improvement.

Abbreviations: ACOVE, Assessing Care of Vulnerable Elders; ADL, activities of daily living; AHEAD, Assets and Health Dynamics Among the Oldest Old Study; ADCS-ADL, Alzheimer's Disease Cooperative Study – Activities of Daily Living; $\beta$, beta coefficient; Barthel Index, Barthel Index of Activities of Daily Living; CARE, Consultation and Relational Empathy (Doctor Score; Nurse Score); CHF, congestive heart failure; CI, confidence interval; CG, control group; COPD, chronic obstructive pulmonary disease; COPM, Canadian Occupational Performance Measure; d, Cohen's $d$; DEMQOL, Dementia Quality of Life Measure; ED, emergency department; EQ-5D-5L, EuroQol 5-Dimension 5-Level; ES, effect size; GARS-3, Groningen Activity Restriction Scale-3; GSE, general self-efficacy; HDRS, Hamilton Depression Rating Scale; HRQoL, health-related quality of life; HRS, Health and Retirement Study; IADL, instrumental activities of daily living; IG, intervention group; IPOS, Integrated Palliative Care Outcome Scale; ITT, intention-to-treat analysis; M, mean; MCS, Mental Component Summary of the Short Form-36; MD, mean difference; MLHFQ, Minnesota Living with Heart Failure Questionnaire; MOS-20 MH, Mental Health sub-scale of the Medical Outcomes Study 20-Item Short-Form; OR, odds ratio; PAM-13, Patient Activation Measure (13 items); PACIC, Patient Assessment of Chronic Illness Care; PCS (SF-12/SF-36), Physical Component Summary of the Short Form-12/Short Form-36; PY, person-years; PHQ-9, Patient Health Questionnaire-9; PIH-OA, Partners in Health – Older Adults version; PP, per-protocol analysis; QoL, quality of life; SD, standard deviation; SF-12, Short Form-12; SF-36, Short Form-36; t, Student's $t$-statistic; TE, treatment effect; $\omega^2$, omega-squared; WHOQOL-BREF, World

Health Organization Quality of Life – BREF.
Risk of bias: 🟢 low; 🟡 some concerns; 🔴 high.

[a] Composite score 1 (Ali et al., 2021): dichotomous classification – Improved (GSE $\geq +5$, no COPD/CHF-related hospitalization, no death) vs no improvement/deteriorated (GSE $\leq -5$, hospitalization or death).

[b] Composite score (Fors et al., 2018): Improved (GSE $\geq +5$, no hospitalization, no death); unchanged (GSE between $+5$ and $-5$, no hospitalization, no death); deteriorated (GSE $\leq -5$, hospitalization or death).

[c] Instrumental ADL index (seven items, score 0–21) derived from AHEAD/HRS instrumental-ADL questions; ad-hoc index without formal psychometric validation.

[d] Basic ADL Index (six items, score 0–18) derived from AHEAD/HRS basic-ADL questions; ad-hoc index without formal psychometric validation.

[e] Eighteen Parkinson Disease Care Quality Indicators based on the Chronic Care Model and best clinical practice (Connor et al., 2019).

[f] Five key symptoms (pain, breathlessness, anxiety, drowsiness, constipation) assessed with the Integrated Palliative Care Outcome Scale (IPOS) (Evans et al., 2021).

### 3.5. Outcomes

The studies in this review assessed various primary outcomes across different health domains: Self-efficacy (Composite Score); Self-management and Patient Activation; Quality of Life (QoL); Health-Related Quality of Life (HRQoL); Depressive Symptoms; Functioning; Chronic Disease Management; and Healthcare Utilization. Primary outcomes are presented according to the evaluated risk of bias. Secondary outcomes were synthesized but not analyzed for risk of bias. The primary and secondary outcomes of the included articles are summarized in Table 4.

#### 3.5.1. Primary outcomes with low risk of bias

*3.5.1.1. Self-efficacy (composite score).* Ali et al. (2021) demonstrated a statistically significant improvement in the intervention group at 3 months in the per-protocol analysis (OR = 2.42, 95 % CI [1.01, 5.79]; $p = 0.047$). However, in the intention-to-treat analysis, no statistically significant differences were observed between the groups.

*3.5.1.2. Self-management and patient activation.* Spoorenberg et al. (2018) reported no clinically important improvement in the overall sample at 12 months, despite a statistically significant small effect size (ES = 0.14, 95 % CI [0.12, 0.85]; $p = 0.009$). Among frail individuals, statistically and clinically important improvements were observed, with an effect size of ES = 0.32, 95 % CI [0.23, 2.14]; $p = 0.015$ in knowledge, and ES = 0.31, 95 % CI [0.40, 4.69]; $p = 0.020$ in self-management behavior.

*3.5.1.3. Health-related quality of life (HRQoL).* Fu et al. (2020) reported a statistically significant improvement at 12 months (MD = 2.9, 95 % CI [0.95, 4.9]; $p = 0.004$). A dose–response effect was observed, with gains of 1.9 points per session.

#### 3.5.2. Primary outcomes with "some concerns" risk of bias

*3.5.2.1. Self-efficacy (composite score).* Fors et al. (2018) demonstrated a statistically significant improvement at 6 months in the intervention group in the per-protocol analysis, with greater deterioration observed in the control group (OR = 1.81, 95 % CI [1.03, 3.19]; $p = 0.039$). However, in the intention-to-treat analysis, no statistically significant differences were observed between the groups.

*3.5.2.2. Quality of life (QoL).* Chen et al. (2021) reported a statistically significant improvement in QoL in the intervention group at 3 months ($\beta = 6.83$, 95 % CI [5.36, 8.30]; $p < 0.001$) and 6 months ($\beta = 12.72$, 95 % CI [10.66, 14.78]; $p < 0.001$). The effect size over 6 months was moderate ($d = 0.86$).

*3.5.2.3. Health-related quality of life (HRQoL).* Dalal et al. (2019) observed a statistically significant improvement at 12 months (MD = $-5.7$, 95 % CI [$-10.6$, $-0.7$]; $p = 0.025$) in HRQoL through a cardiac rehabilitation program.

*3.5.2.4. Depressive symptoms.* Chen et al. (2021) reported a statistically significant reduction in depressive symptoms at 3 months ($\beta = -3.26$, 95 % CI [$-4.36$, $-2.16$]; $p < 0.001$) and 6 months ($\beta = -5.18$, 95 % CI [$-6.39$, $-3.98$]; $p < 0.001$), with large effect sizes over 6 months ($d = 1.08$). Gilbody et al. (2017) observed a statistically significant reduction in depressive symptoms at 4 months (MD = $-1.31$, 95 % CI [$-1.95$, $-0.67$]; $p < 0.001$), with a small effect size ($d = 0.3$).

*3.5.2.5. Functioning.* Chen et al. (2021) reported a statistically significant improvement at 6 months ($\beta = 4.87$, 95 % CI [1.09, 8.65]; $p = 0.012$; ES = 0.37).

*3.5.2.6. Chronic disease management.* Evans et al. (2021) reported a statistically significant reduction in adverse symptoms at 12 weeks (MD = $-1.32$, 95 % CI [$-2.45$, $-0.19$]; $p = 0.023$), with a small effect size ($\omega^2 = 0.087$).

*3.5.2.7. Healthcare utilization.* Forbat et al. (2020) reported a statistically significant reduction in length of hospital stay (MD = $-0.22$ days, 95 % CI [$-0.44$, $-0.01$]; $p = 0.038$) and Chen et al. (2021) observed a statistically significant increase in the use of health and social services at 3 months ($\beta = 1.90$, 95 % CI [1.61, 2.20]; $p < 0.001$; ES = 1.15) and 6 months ($\beta = 2.25$, 95 % CI [1.90, 2.60]; $p < 0.001$; ES = 1.15).

#### 3.5.3. Primary outcomes with high risk of bias

*3.5.3.1. Health-related quality of life.* Melis et al. (2008) observed a statistically significant improvement in mental and emotional well-being (MOS-20 MH) at 3 months (MD = 5.8, 95 % CI [0.1, 11.4]; $p = 0.040$), indicating a clinically meaningful improvement. At 6 months, the effect was sustained and further improved (MD = 9.1, 95 % CI [2.4, 15.6]; $p = 0.008$).

Counsell et al. (2007) reported significant improvements at 24 months in SF-36 vitality (MD = 5.1, 95 % CI [2.2, 7.9]; $p < 0.001$) and SF-36 Mental Component Summary (MCS) scores (MD = 2.4, 95 % CI [0.9, 3.8]; $p < 0.001$).

*3.5.3.2. Functioning.* Nielsen et al. (2019) observed a statistically significant improvement at 3 months (MD = 1.26, 95 % CI [0.50, 2.02]; $p = 0.001$).

Melis et al. (2008) observed a statistically significant improvement in functional abilities measured by the GARS-3 at 3 months (MD = $-2.2$, 95 % CI [$-4.2$, $-0.3$]; $p = 0.02$), reflecting a modest improvement in ADL/IADL. However, at 6 months this improvement was not sustained (MD = $-1.6$, 95 % CI [$-3.9$, 0.7]; $p = 0.18$).

*3.5.3.3. Quality of care.* Connor et al. (2019) reported significantly higher adherence to 18 Parkinson's disease care quality indicators in the intervention group (77 %) compared to usual care (58 %) (difference in mean proportion = 0.19, 95 % CI [0.16, 0.22]; $p < 0.001$). The effect size was moderate (ES = 0.49, 95 % CI [0.39, 0.59]).

## 4. Discussion

The findings of this systematic review indicate that while both psychosocial and rehabilitation interventions improve health outcomes for older adults with multimorbidity in long-term care, they do so through distinct patterns of effectiveness. Psychosocial approaches show broad, transversal applicability, whereas the benefits of rehabilitation are contingent on participants' potential for functional improvement. Overall, this review identified and taxonomically categorized 51 distinct person-centred interventions (15 rehabilitation, 15 psychosocial, and 21 complementary) that led to health gains or stabilization for this population.

### 4.1. *Heterogeneity and complexity of long-term care*

Significant heterogeneity and complexity were observed across the included studies, particularly regarding target populations, clinical conditions, and care settings. Although all studies were conducted in high-income countries, substantial variation was noted in healthcare operationalization, professionals involved, and adopted care models. These findings align with global evidence highlighting fragmentation and variability in LTC delivery worldwide (Waitzberg et al., 2020; WHO, 2021a).

The studied populations shared a profile characterized by multimorbidity, with a high prevalence of circulatory, mental and behavioral disorders and metabolic diseases. Circulatory and metabolic disorders are common among older adults (McCarthy et al., 2022; Chowdhury et al., 2023) and frequently co-occur as cardiometabolic multimorbidity, increasing clinical complexity and worsening health outcomes (Fishbook et al., 2022; Jin et al., 2023). Mental disorders further complicate diagnosis and treatment by negatively interacting with physical and cognitive comorbidities (Petrova and Khvostikova, 2021).

The evidence from this review demonstrates that care needs arise along distinct and non-linear trajectories. In some cases, needs appear abruptly following acute events such as stroke (Fu et al., 2020) or during end-of-life states requiring urgent palliative intervention (Evans et al., 2021; Forbat et al., 2020). In other instances, needs develop more gradually, driven by the progression of chronic conditions like dementia (Mountain et al., 2022), heart failure (Dalal et al., 2019), Parkinson's disease (Connor et al., 2019), or cumulative functional decline (Counsell et al., 2007; Melis et al., 2008; Chen et al., 2021). This confirms that functioning is a dynamic construct, subject to fluctuations over time and shaped by multiple clinical, social, and environmental factors (OECD, 2025). Indeed, external evidence corroborates these dynamic patterns. Hu et al. (2022) identified distinct functional trajectories shaped by social inequalities, while Egbujie et al. (2024) documented both abrupt and gradual declines in institutional settings. Similarly, Fonseca et al. (2023) reported initial functional improvements in LTC, followed by a decline influenced by educational attainment and anxiety symptoms.

This panorama aligns with the global structure of LTC, characterized by an adaptive capacity to meet varying levels of need and by substantial operational variability across countries and regions (Barczyk and Kredler, 2019; OECD, 2025). The structural differences observed reflect highly contextual, and sometimes unpredictable, variables inherent to the complex, multidimensional care needs of older adults with multimorbidity (Prathapan et al., 2020; Henderson et al., 2021). These LTC contexts therefore do not follow a linear path but rather function as adaptive intervention fields where integrated, multicomponent, person-centred strategies are deployed (Cammer et al., 2014; Gaugler, 2014).

### 4.2. *Potential and limitations of integrated core interventions*

In older adult populations, physical and psychosocial problems frequently coexist and influence each other reciprocally (Resnick et al., 2016; Zhang et al., 2023). Among the findings of this review, a robust and integrated use of core interventions—combining rehabilitation and psychosocial components—was particularly notable in studies conducted by Dalal et al. (2019), Nielsen et al. (2019), and Callahan et al. (2017). These studies demonstrated considerable synergistic potential, reflecting the clinical and functional complexity characteristic of these populations.

The criteria for implementing rehabilitation interventions in these studies explicitly accounted for participants' functional potential, aiming to preserve or improve their physical and cognitive abilities, which are often compromised in older adults (Gopi et al., 2022; Dibben et al., 2023). For instance, Dalal et al. (2019) assessed older adults with stable chronic heart failure, a condition for which cardiac rehabilitation is widely recommended due to its recognized potential for stabilizing or enhancing functional capacity (Dibben et al., 2023). Nielsen et al. (2019) implemented intensive occupational therapy among older adults with significant occupational limitations but clear adaptive potential, resulting in both objective and perceived improvements in quality of life. Conversely, Callahan et al. (2017) conducted home-based interventions aimed at functional maintenance among individuals with moderate to advanced dementia, but no significant functional gains were observed. This result aligns with existing evidence suggesting that dementia-specific factors, such as rapid cognitive decline, multimorbidity, frailty, and increased care needs, often limit the benefits of psychosocial and rehabilitation interventions in this population (Evenden et al., 2019; Di Lorito et al., 2023). Additionally, the intervention by Callahan et al. (2017) was conducted in an already highly structured primary dementia care context, potentially contributing to a "ceiling effect" of the implemented occupational therapy (Arslan and Benke, 2023). These findings suggest that the effectiveness of rehabilitation interventions essentially depends on participants' realistic potential for functional recovery or stabilization.

In contrast, psychosocial interventions were universally implemented across all settings studied, independent of participants' functional status. These interventions addressed emotional, behavioral, and social dimensions essential to functional and emotional support (Thuesen et al., 2021). Studies such as Gilbody et al. (2017), Evans et al. (2021), Chen et al. (2021), and Mountain et al. (2022) consistently reported improvements in mental health, emotional well-being, and social interactions, even in the absence of expectations for functional recovery (Ng et al., 2012; Bose et al., 2020; Zhang et al., 2023). Similarly, studies involving populations with chronic diseases and multimorbidity (Counsell et al., 2007; Melis et al., 2008; Ali et al., 2021; Connor et al., 2019) highlighted the crucial role of psychosocial interventions in managing clinical complexity, particularly when functional recovery was either not expected or represented a secondary goal.

Additionally, rehabilitation interventions were not implemented in palliative or end-of-life contexts, as exemplified by Forbat et al. (2020), due to the absence of functional recovery potential, reducing their relevance in these situations. Instead, the exclusive use of psychosocial and complementary strategies focused on symptom management, advanced care planning, and promotion of comfort and dignity, which are central elements of palliative care, was justified (Barawid et al., 2015; Blinderman and Billings, 2015).

### 4.3. *Psychosocial interventions: evidence, transversal health gains, and theoretical foundations*

Despite the limited number of studies that have formally combined core interventions (psychosocial and rehabilitation), those employing psychosocial interventions (accompanied by complementary interventions) as their primary intervention domain consistently demonstrated cross-context effectiveness, irrespective of participants' baseline functioning. Studies focusing on these interventions frequently reported significant improvements in key outcomes, including quality of life (Fu et al., 2020; Chen et al., 2021); depressive symptoms (Gilbody et al., 2017; Chen et al., 2021); self-efficacy and self-management capabilities (Spoorenberg et al., 2018; Fors et al., 2018; Ali et al., 2021); emotional well-being and psychosocial adaptation (Mountain et al., 2022; Melis et al., 2008; Counsell et al., 2007); symptom management in palliative care (Evans et al., 2021); and functioning (Melis et al., 2008; Chen et al., 2021).

The consistency of these benefits can be attributed to the robust theoretical foundations underpinning psychosocial interventions, derived from psychology and behavioral sciences. These theoretical models are particularly relevant to older adults with multimorbidity, whose challenges are not merely physical but also social and psychological. Prominent theoretical frameworks identified include Social Cognitive Theory (Fisher et al., 2020; Mountain et al., 2022), Self-Determination Theory (Fu et al., 2020; Dalal et al., 2019), Behavioral Activation Theory (Gilbody et al., 2017), and Self-Efficacy Theory (Ali et al., 2021; Fors et al., 2018).

Within this context, it is important to emphasize that aging, especially in situations of multimorbidity, is frequently associated with sociocognitive deficits, such as difficulties in mentalization, empathy, and emotional regulation, as well as behavioral changes that negatively affect motivation, social engagement, and self-regulation (Moran et al., 2012). For example, social isolation and loneliness, highly prevalent among older adults in long-term care, are associated with significant negative outcomes such as depression, suicidal ideation, and frailty (Lapane et al., 2022). Additionally, factors like inadequate social support, mental health problems, and difficulties in internalizing motivation constitute critical barriers to the adoption of healthy behaviors in this population (Collazo-Castiñeira et al., 2025). Furthermore, poor social relationships are associated with cognitive decline in older adults, underscoring the relational dimension as a potentially modifiable risk factor (Piolatto et al., 2022).

The studies by Fu et al. (2020), Chen et al. (2021), Melis et al. (2008), and Gilbody et al. (2017) clearly illustrate these theoretical foundations. Fu et al. developed a psychosocial intervention focused on post-stroke self-management, achieving sustained improvements in functioning and physical quality of life. Chen et al. implemented a coordinated care model, resulting in significant improvements in global quality of life, functioning, and sustained reductions in depressive symptoms through explicit integrated care coordination and psychosocial support strategies. Melis et al. (2008) adopted a multidisciplinary home-based approach grounded in structured assessment, motivational counseling, individualized care planning, and care coordination. This intervention produced clinically meaningful improvements in physical functioning and mental well-being among older adults, specifically aiming to prevent further functional decline and reduce future care needs. Likewise, Gilbody et al. (2017) clearly demonstrated the effectiveness of psychosocial interventions based on behavioral activation, observing a reduction in subclinical depressive symptoms and preventing progression to major depression, thereby highlighting a significant additional preventive benefit.

Indeed, we observed that psychosocial interventions generate significant health gains even when implemented without direct physical rehabilitation components (Gotaas et al., 2021; Yokozuka et al., 2022). While rehabilitation interventions require participants to have a minimum level of functional potential for improvement or stabilization, psychosocial interventions maintain broader relevance in long-term care settings. This broader relevance stems from their transversal applicability across various health and illness trajectories, including advanced frailty or palliative care contexts, where clinical priorities shift from functional goals toward symptom management, preservation of dignity, and emotional support (Tappen and Sopcheck, 2023). Another explanation for their transversal relevance lies in the fact that psychosocial interventions facilitate adaptive neuroplasticity mechanisms, indirectly enhancing the outcomes of functional training programmes, even when implemented separately (Kumar et al., 2023; Jones and Dolsten, 2024; Mou et al., 2025). Furthermore, the sustainable impact of these interventions appears strongly related to their intrinsically person-centred approach, promoting self-regulation, intrinsic motivation, and a sense of personal control, all recognized as essential factors for behavioral change and psychosocial adaptation in older adults with multimorbidity (Ng et al., 2012; Stein et al., 2021; Chen et al., 2023).

### 4.4. *Complementary interventions supporting education, care operationalization, and continuous management*

In this review, complementary interventions emerged as essential support strategies, facilitating the effective implementation of core interventions. Despite their comparatively lower technical complexity, complementary interventions were crucial in the overall intervention structure, primarily addressing education, practical operationalization, and continuous care management and monitoring.

Educational interventions—such as the provision of instructional materials, structured training for participants and caregivers, and explicit strategies to support symptom self-management—were frequently implemented across studies (Ali et al., 2021; Dalal et al., 2019; Fors et al., 2018; Fu et al., 2020; Spoorenberg et al., 2018; Counsell et al., 2007; Melis et al., 2008). These interventions improved adherence to core treatments by enhancing health literacy, participant empowerment, and promoting personal control in health management. Recent evidence emphasizes health literacy interventions as effective strategies in high-income countries, frequently surpassing traditional lifestyle modification approaches (Walters et al., 2020; Sardareh et al., 2024). Indeed, improved health literacy significantly strengthens self-management capabilities and self-efficacy, creating a beneficial feedback cycle for health outcomes (van der Gaag et al., 2022; Dinh and Bonner, 2023). Educational approaches were particularly critical in remote or digital interventions, effectively addressing the absence of face-to-face interactions by maintaining adherence and continuity (Shah et al., 2013).

Operational components of interventions frequently included personalized care plans, regular home visits, and frequent remote contacts (telephone or digital). These strategies were widely implemented, significantly enhancing care continuity and coordination and mitigating common LTC organizational barriers such as care fragmentation and complexity. Individual care plans — recommended yet underutilized in chronic disease management (WHO, 2023a) — structured interventions and facilitated patient-provider communication, self-management, and access to health and social services (Ali et al., 2021; Callahan et al., 2017; Chen et al., 2021; Counsell et al., 2007; Connor et al., 2019; Coulter et al., 2015; Melis et al., 2008; Salisbury et al., 2018). Similarly, home visits provided essential continuity and proximity, potentially reducing hospitalization and improving overall physical, psychological, and social outcomes for older adults (Ergin et al., 2022). Remote support, notably via telephone, was a key operational strategy, facilitating social connection, adherence to care, and emotional health (Ali et al., 2021; Fors et al., 2018; Jeong et al., 2018; Lee et al., 2021). Digital platforms also emerged as facilitators, promoting autonomy and active engagement among older adults in managing their health (Graham et al., 2021; Kainiemi et al., 2023).

Caregivers also played a significant operational role by enhancing adherence, supporting clinical decision-making, and reducing hospitalizations (Adekpedjou et al., 2020; Pristavec and Luth, 2020). Their involvement was particularly impactful in dementia care, improving therapy adherence and safety monitoring (Callahan et al., 2017; Mountain et al., 2022; Sultana et al., 2023). Several studies facilitated caregiver engagement explicitly via family conferences and multidisciplinary meetings, resulting in better care coordination and quality (Forbat et al., 2020; Salisbury et al., 2018; Fisher et al., 2020).

Lastly, continuous monitoring and management were also central components, primarily implemented through comprehensive assessments covering functional status, family and social support, and clinical signs (Chen et al., 2021; Connor et al., 2019; Evans et al., 2021; Fisher et al., 2020; Fors et al., 2018; Salisbury et al., 2018; Spoorenberg et al., 2018). Such assessments enabled personalized interventions and adjustments over time, potentially reducing institutionalization and functional decline (Ellis et al., 2011). Additionally, regular symptom and vital-sign monitoring allowed rapid care adjustments, significantly enhancing symptom management, particularly in palliative contexts (Ali et al., 2021; Dalal et al., 2019; Evans et al., 2021; Forbat et al., 2020; Salisbury et al., 2018).

### 4.5. *Methodological appraisal of the evidence: integrating risk of bias, fidelity, and statistical significance*

The interpretation of this systematic review requires a critical assessment of the methodological quality of included studies. The RoB 2 tool, specific for RCTs (Moon and Rao, 2021), was employed to mitigate inconsistencies arising from different assessment tools (Losilla et al., 2018). Rigorous risk of bias (RoB) assessment is critical, as systematic errors can lead to invalid effect estimates (Losilla et al., 2018). The RoB evaluation was restricted to the primary outcomes reported by each study in this review.

Studies assessed as having a low risk of bias reported improvements in self-efficacy (Ali et al., 2021), self-management (Spoorenberg et al., 2018), and health-related quality of life (HRQoL) (Fu et al., 2020). The effect on self-efficacy reported by Ali et al. (2021) was not confirmed in the intention-to-treat analysis. Spoorenberg et al. (2018) demonstrated clinically relevant improvements in self-management, particularly in frail participants. The study by Fu et al. (2020) provided robust evidence for HRQoL, supported by a dose–response relationship.

Studies with "some concerns" regarding risk of bias reported clinically relevant improvements in HRQoL (Chen et al., 2021; Dalal et al., 2019), depressive symptoms (Chen et al., 2021; Gilbody et al., 2017), functioning (Chen et al., 2021), palliative symptom management (Evans et al., 2021), and healthcare utilization (Forbat et al., 2020; Chen et al., 2021). Accordingly, these findings must be interpreted with caution due to the identified methodological limitations.

In contrast, studies with a high risk of bias provided findings with limited interpretability. Although Nielsen et al. (2019) reported significant functional improvements, high participant attrition and lack of blinding compromised the robustness of the results. The use of non-validated measures by Connor et al. (2019) compromised the internal validity of their findings on care quality. Melis et al. (2008) and Counsell et al. (2007) both recruited participants post-randomization, introducing a high risk of selection bias. The findings from Counsell et al. (2007) were further confounded by selective outcome reporting.

Intervention fidelity, a critical component of methodological quality, was formally assessed in only six studies (Connor et al., 2019; Dalal et al., 2019; Evans et al., 2021; Forbat et al., 2020; Mountain et al., 2022; Overbeek et al., 2018). The combination of moderate risk of bias and positive fidelity assessments in studies by Dalal et al. (2019) and Evans et al. (2021) lends support to their significant findings. Conversely, the absence of a fidelity assessment in the study by Nielsen et al. (2019), which was already at high risk of bias, further diminishes the confidence in its reported outcomes.

In conclusion, the methodological robustness of the evidence is variable. The combination of a low or moderate risk of bias with a formal, positive assessment of intervention fidelity indicates higher quality evidence. Based on this criterion, the most robust findings from this review support improvements in Health-Related Quality of Life (Fu et al., 2020; Dalal et al., 2019) and palliative symptom management (Evans et al., 2021). Future research in this field requires more rigorous application of these methodological standards, particularly concerning fidelity assessment.

### 4.6. *Agreements and disagreements with other studies or reviews*

To our knowledge, this is the first systematic review to focus on the integrated application of psychosocial and rehabilitation interventions for older adults with multimorbidity in LTC settings. While previous reviews have typically examined these domains in isolation — focusing either on physical rehabilitation (Forster et al., 2010; Cao et al., 2018) or psychosocial health (Nordhausen et al., 2019) — the work by Arias-Casais et al. (2022) provides the most relevant, broad comparison. They conducted a related scoping review of LTC interventions, identifying 51 interventions — such as multimodal exercise, personalized care plans, case management, and psychoeducational caregiver support—within WHO's healthy aging domains, primarily in high-income settings.

Our findings align on the importance of multicomponent interventions, physical and cognitive exercises, personalized care plans, and case management. However, our review differs significantly by using ICNP terminology for a structured categorization, by specifically emphasizing the synthesis of rehabilitation and psychosocial interventions, and by providing a detailed analysis of health outcomes, which Arias-Casais et al. (2022) did not assess. No other studies with a similarly specific and integrated focus were found.

### 4.7. *Implications for practice, policy and research*

The findings of this review underline the significance of psychosocial and rehabilitation interventions in improving essential health outcomes for older adults with multimorbidity, simultaneously reinforcing the necessity of interdisciplinary and multidimensional approaches (McMurtry and Sasser, 2020). In clinical practice, it is critical to rigorously implement the core theoretical components of these interventions (e.g., self-efficacy, self-determination, and person-centred care), while preserving sufficient flexibility for adaptation to individual goals of older adults. Additionally, appropriate intensity, sufficient duration, and high participant adherence emerged as decisive factors for achieving consistent improvements in quality of life, functioning, and mental health. Systematic and rigorous assessment of intervention fidelity should become standard practice, as studies incorporating fidelity evaluation demonstrated more robust and interpretable outcomes.

Given the increasing longevity and multimorbidity, a coordinated and integrated policy response to address the complex needs of older populations is imperative. In this context, rehabilitation remains essential for optimizing intrinsic capacity and promoting healthy aging (Cieza et al., 2020). The COVID-19 pandemic has clearly highlighted the necessity to strengthen mental health services and psychosocial support directed toward older adults (WHO, 2022; Möhler et al., 2023). Consequently, health policies should promote the effective integration of rehabilitation services, palliative care, mental health, and social support through an integrated and person-centred approach, respecting individual goals and ensuring active participation of older adults in planning and managing their own care (Kitson et al., 2013).

From a research perspective, a future priority is the clear operationalisation and evaluation of the concept of psychosocial adaptation, which we identified as a domain addressed by the interventions but rarely measured as an explicit outcome. Concurrently, the taxonomic categorization developed in this review offers a foundational framework to facilitate a more objective definition and comparison of future care models. Future research should aim to incorporate these interventions within established international frameworks, such as the WHO's long-term care model (WHO, 2023a), explicitly encompassing the physical, psychosocial, and palliative dimensions. To enhance the generalisability and global relevance of the findings, it is also essential to expand research into more diverse clinical, cultural, and socioeconomic contexts. Finally, pragmatic studies conducted in real-world settings are critical for refining intervention implementation and for rigorously evaluating their cost-effectiveness and financial sustainability, thereby contributing to the long-term viability of healthcare systems in the face of population aging (OECD, 2024).

### 4.8. *Strengths & limitations*

The methodological robustness of this systematic review is supported by several strengths. Firstly, the implementation of a comprehensive search strategy across multiple databases minimized the risk of publication bias. Secondly, the study selection, conducted independently by three reviewers, reduced the risk of selection bias and reinforced procedural rigor. Additionally, the systematic assessment of the risk of bias in the included studies, using the validated RoB 2 tool, contributed to the review's transparency and internal validity. Finally, the normalization and taxonomic categorization of the interventions based on the ICNP represents an original contribution to structuring a heterogeneous field of research.

Notwithstanding the aforementioned strengths, some limitations should be considered. The exclusive focus on randomized controlled trials (RCTs), while strengthening the internal validity of the evidence, may have omitted relevant data from other study designs. The marked heterogeneity of the interventions, populations, and care contexts precluded a quantitative synthesis (meta-analysis), which restricts the generalizability (external validity) of the findings. Another limitation lies in the delimitation of the analysis to outcomes in care recipients, excluding a systematic assessment of the impact on informal caregivers. Lastly, the conclusions are conditioned by the quality of the primary evidence, in which the formal assessment of intervention implementation fidelity was often limited.

## 5. Conclusions

This review identified and normalized 51 person-centred interventions (categorized as psychosocial, rehabilitation, and complementary) that improve or stabilize health outcomes for older adults with multimorbidity in LTC settings. A key finding is the distinct applicability of the two core intervention types: psychosocial interventions demonstrated robust and transversal effectiveness across diverse contexts, consistently producing meaningful health gains in quality of life, emotional well-being, and symptom management. In contrast, rehabilitation interventions were specifically beneficial when participants presented a clear potential for functional improvement or stabilization.

The strongest, most methodologically robust evidence was found for improvements in health-related quality of life and palliative symptom management, with particularly notable benefits among frail individuals and those with complex chronic conditions. These findings underline the importance of integrated, multidisciplinary, and theoretically grounded interventions. Supported by continuous monitoring and technological innovations, these person-centred approaches provide a solid foundation for developing effective, personalized, and sustainable long-term care strategies.

## CRediT authorship contribution statement

**António José Lista:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Lara Guedes de Pinho:** Writing – review & editing, Validation, Supervision, Methodology, Formal analysis, Conceptualization. **Tânia Correia:** Writing – review & editing, Visualization, Methodology, Investigation, Data curation. **Catarina Afonso:** Writing – review & editing, Visualization, Methodology, Investigation, Data curation. **Inês Cardoso:** Investigation, Formal analysis, Data curation. **César Fonseca:** Writing – review & editing, Validation, Supervision, Methodology, Formal analysis, Conceptualization.

## Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) exclusively to translate Portuguese text into English and for minor language edits. After using this tool, the authors reviewed and revised the translated content as needed and take full responsibility for the content of the publication. No AI system was used to generate, analyze, or interpret study data, and no identifiable participant information was entered into the tool.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnurstu.2025.105219.

## References

Adekpedjou, R., et al., 2020. Engaging caregivers in health-related housing decisions for older adults with cognitive impairment: a cluster randomized trial. Gerontologist 60 (5), 947–957. https://doi.org/10.1093/geront/gnz045.

Adja, K.Y.C., et al., 2020. The importance of taking a patient-centred, community-based approach to preventing and managing frailty: a public health perspective. Front. Public Health 8 (November), 1–10. https://doi.org/10.3389/fpubh.2020.599170.

Ali, L., et al., 2021. Effects of person-centered care using a digital platform and structured telephone support for people with chronic obstructive pulmonary disease and chronic heart failure: randomized controlled trial. J. Med. Internet Res. 23 (12), 1–13. https://doi.org/10.2196/26794.

Arias-Casais, N., et al., 2022. What long-term care interventions have been published between 2010 and 2020? Results of a WHO scoping review identifying long-term care interventions for older people around the world. BMJ Open 12 (1). https://doi.org/10.1136/bmjopen-2021-054492.

Arslan, J., Benke, K., 2023. Statistical analysis of ceiling and floor effects in medical trials. Appl. Biosci. 2 (4), 668–681. https://doi.org/10.3390/applbiosci2040042.

Balqis-Ali, N.Z., et al., 2024. The impact of long-term care interventions on healthcare utilisation among older persons: a scoping review of reviews. BMC Geriatr. 24 (1), 484. https://doi.org/10.1186/s12877-024-05097-9.

Barawid, E., et al., 2015. The benefits of rehabilitation for palliative care patients. Am. J. Hosp. Palliat. Med. 32 (1), 34–43. https://doi.org/10.1177/1049909113514474.

Barczyk, D., Kredler, M., 2019. Long-term care across Europe and the United States: the role of informal and formal care. Fisc. Stud. 40 (3), 329–373. https://doi.org/10.1111/1475-5890.12200.

Barker, K., et al., 2023. Clinical outcomes following exercise rehabilitation in people with multimorbidity: a systematic review. J. Rehabil. Med. 55, jrm00377–jrm00377. https://doi.org/10.2340/jrm.v55.2551.

Bayly, J., et al., 2021. Common elements of service delivery models that optimise quality of life and health service use among older people with advanced progressive conditions: a tertiary systematic review. BMJ Open 11 (12), e048417. https://doi.org/10.1136/bmjopen-2020-048417.

Blinderman, C.D., Billings, J.A., 2015. Comfort care for patients dying in the hospital. N. Engl. J. Med. 373 (26), 2549–2561. https://doi.org/10.1056/NEJMra1411746.

Bose, C.N., et al., 2020. Adaptation of coping effectiveness training for patients with heart failure and patient-reported experience of the intervention. J. Patient Experience 7 (6), 1054–1061. https://doi.org/10.1177/2374373520916012.

Bramer, W.M., et al., 2017. Optimal database combinations for literature searches in systematic reviews: a prospective exploratory study. Syst. Rev. 6 (1), 1–12. https://doi.org/10.1186/s13643-017-0644-y.

Britten, N., et al., 2017. Elaboration of the Gothenburg model of person-centred care. Health Expect. 20 (3), 407–418. https://doi.org/10.1111/hex.12468.

Callahan, C.M., et al., 2017. Targeting functional decline in Alzheimer disease: a randomised trial. Ann. Intern. Med. 166 (3), 164–171. https://doi.org/10.7326/M16-0830.

Cammer, A., et al., 2014. The hidden complexity of long-term care: how context mediates knowledge translation and use of best practices. Gerontologist 54 (6), 1013–1023. https://doi.org/10.1093/geront/gnt068.

Canada's Drug Agency (CDA), 2024. Grey Matters: A Tool for Searching Health-related Grey Literature. Available from: https://greymatters.cda-amc.ca (Accessed 17 September 2025).

Candio, P., et al., 2022. Cost-effectiveness of home-based stroke rehabilitation across Europe: a modelling study. Health Policy 126 (3), 183–189. https://doi.org/10.1016/j.healthpol.2022.01.007.

Cao, P., et al., 2018. The effectiveness of exercise for fall prevention in nursing home residents: a systematic review meta-analysis. J. Adv. Nurs. 74 (11), 2511–2522. https://doi.org/10.1111/jan.13814.

Chen, K.-M., et al., 2021. Effectiveness of a care delivery model for high-need older adults in communities. Res. Soc. Work. Pract. 31 (3), 298–306. https://doi.org/10.1177/1049731520982355.

Chen, N., Zhang, J., Wang, Z., 2023. Effects of middle-aged and elderly people's self-efficacy on health promotion behaviors: mediating effects of sports participation. Front. Psychol. 13. https://doi.org/10.3389/fpsyg.2022.889063.

Chowdhury, S.R., et al., 2023. Global and regional prevalence of multimorbidity in the adult population in community settings: a systematic review and meta-analysis. eClinicalMedicine 57, 101860. https://doi.org/10.1016/j.eclinm.2023.101860.

Cieza, A., et al., 2020. Global estimates of the need for rehabilitation based on the Global Burden of Disease study 2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 396 (10267), 2006–2017. https://doi.org/10.1016/S0140-6736(20)32340-0.

Collazo-Castiñeira, P., et al., 2025. Exploring motivation, goals, facilitators, and barriers to adopt health behaviors at retirement age: a focus group study. BMC Public Health 25 (1), 348. https://doi.org/10.1186/s12889-025-21377-4.

Colombo, F., et al., 2011. Help Wanted? Providing and Paying for Long-term Care. OECD. https://doi.org/10.1787/9789264097759-en.

Connor, K.I., et al., 2019. Randomized trial of care management to improve Parkinson disease care quality. Neurology 92 (16), E1831–E1842. https://doi.org/10.1212/WNL.0000000000007324.

Coulter, A., et al., 2015. Personalised care planning for adults with chronic or long-term health conditions. Cochrane Database Syst. Rev. 2015 (3). https://doi.org/10.1002/14651858.CD010523.pub2.

Counsell, S.R., et al., 2007. Geriatric care management for low-income seniors: a randomized controlled trial. JAMA 298 (22), 2623. https://doi.org/10.1001/jama.298.22.2623.

Craig, P., et al., 2008. Developing and evaluating complex interventions: the new Medical Research Council guidance. BMJ 337, a1655. https://doi.org/10.1136/bmj.a1655.

Dalal, H.M., et al., 2019. The effects and costs of home-based rehabilitation for heart failure with reduced ejection fraction: the REACH-HF multicentre randomized controlled trial. Eur. J. Prev. Cardiol. 26 (3), 262–272. https://doi.org/10.1177/2047487318806358.

de Biase, Pietrangelo, Dougherty, Sean, 2023. From Local to National: Delivering and Financing Effective Long-term Care, p. 45. https://doi.org/10.1787/578b296f-en.

Di Lorito, C., et al., 2023. The facilitators and barriers to improving functional activity and wellbeing in people with dementia: a qualitative study from the process evaluation of Promoting Activity, Independence and Stability in Early Dementia (PrAISED). Age Ageing 52 (8), afad166. https://doi.org/10.1093/ageing/afad166.

Dibben, G.O., et al., 2023. Exercise-based cardiac rehabilitation for coronary heart disease: a meta-analysis. Eur. Heart J. 44 (6), 452–469. https://doi.org/10.1093/eurheartj/ehac747.

Dinh, T.T.H., Bonner, A., 2023. Exploring the relationships between health literacy, social support, self-efficacy and self-management in adults with multiple chronic diseases. BMC Health Serv. Res. 23 (1), 923. https://doi.org/10.1186/s12913-023-09907-5.

Egbujie, B.A., et al., 2024. Trajectories of functional decline and predictors in long-term care settings: a retrospective cohort analysis of Canadian nursing home residents. Age Ageing 53 (12), afae264. https://doi.org/10.1093/ageing/afae264.

Ekman, I., Swedberg, K., 2022. Person-centred care, theory, operationalisation and effects. In: Intelligent Systems Reference Library. Springer International Publishing. https://doi.org/10.1007/978-3-030-79353-1_2.

Ekman, I., Ebrahimi, Z., Olaya Contreras, P., 2021. Person-centred care: looking back, looking forward. Eur. J. Cardiovasc. Nurs. 20 (2), 93–95. https://doi.org/10.1093/eurjcn/zvaa025.

Eldridge, S.M., et al., 2016. CONSORT 2010 statement: extension to randomised pilot and feasibility trials. BMJ 355. https://doi.org/10.1136/bmj.i5239.

Ellis, G., et al., 2011. Comprehensive geriatric assessment for older adults admitted to hospital. In: The Cochrane Collaboration (Ed.), Cochrane Database of Systematic Reviews. John Wiley & Sons, Ltd, Chichester, UK. https://doi.org/10.1002/14651858.CD006211.pub2 (p. CD006211.pub2).

Ergin, E., Akin, B., Kocoglu-Tanyer, D., 2022. Effect of home visits by nurses on the physical and psychosocial health of older adults: a systematic review and meta-analysis. Iran. J. Public Health 51 (4), 733–745. https://doi.org/10.18502/ijph.v51i4.9234.

Evans, C.J., et al., 2021. Community-based short-term integrated palliative and supportive care reduces symptom distress for older people with chronic noncancer conditions compared with usual care: a randomised controlled single-blind mixed method trial. Int. J. Nurs. Stud. 120, 103978. https://doi.org/10.1016/j.ijnurstu.2021.103978.

Evenden, D.C., et al., 2019. OP52 dementia progression in the ageing population: a computer simulation accounting for individual cognitive and functional decline variability. J. Epidemiol. Community Health 73 (Suppl. 1), A25–A26. https://doi.org/10.1136/jech-2019-SSMabstracts.53.

Fishbook, B.N., et al., 2022. Cardiometabolic multimorbidity and activity limitation: a cross-sectional study of adults using the Canadian Longitudinal Study on Aging data. Fam. Pract. 39 (3), 455–463. https://doi.org/10.1093/fampra/cmab129.

Fisher, K., et al., 2020. Self-management program versus usual care for community-dwelling older adults with multimorbidity: a pragmatic randomized controlled trial in Ontario, Canada. J. Comorbidity 1–18. https://doi.org/10.1177/2235042X20963390.

Fonseca, C., et al., 2023. Long-term care units: a Portuguese study about the functional profile. Front. Aging 4. https://doi.org/10.3389/fragi.2023.1192718.

Forbat, L., et al., 2020. Reducing time in acute hospitals: a stepped-wedge randomised control trial of a specialist palliative care intervention in residential care homes. Palliat. Med. 34 (5), 571–579. https://doi.org/10.1177/0269216319891077.

Fors, A., et al., 2018. Effects of a person-centred telephone-support in patients with chronic obstructive pulmonary disease and/or chronic heart failure – a randomized controlled trial. PLoS One 13 (8), 1–12. https://doi.org/10.1371/journal.pone.0203031.

Forster, A., Lambley, R., Young, J.B., 2010. Is physical rehabilitation for older people in long-term care effective? Findings from a systematic review. Age Ageing 39 (2), 169–175. https://doi.org/10.1093/ageing/afp247.

Fortin, M., et al., 2005. Multimorbidity is common to family practice: is it commonly researched? Can. Fam. Physician 51, 244–245.

Fu, V., et al., 2020. Taking Charge after Stroke: a randomised controlled trial of a person-centred, self-directed rehabilitation intervention. Int. J. Stroke 15 (9), 954–964. https://doi.org/10.1177/1747493020915144.

Gao, J., et al., 2022. Impaired activity of daily living status of the older adults and its influencing factors: a cross-sectional study. Int. J. Environ. Res. Public Health 19 (23). https://doi.org/10.3390/ijerph192315607.

Gaugler, J.E., 2014. Long-term care: multiple methods and multiple perspectives. J. Appl. Gerontol. 33 (6), 651–654. https://doi.org/10.1177/0733464814544088.

Gilbody, S., et al., 2017. Effect of collaborative care vs usual care on depressive symptoms in older adults with subthreshold depression: the CASPER randomized clinical trial. JAMA 317 (7), 728–737. https://doi.org/10.1001/jama.2017.0130.

Gillespie, P., et al., 2022. Cost-effectiveness of an occupational therapy-led self-management support programme for multimorbidity in primary care. Fam. Pract. 39 (5), 826–833. https://doi.org/10.1093/fampra/cmac006.

Gopi, Y., Wilding, E., Madan, C.R., 2022. Memory rehabilitation: restorative, specific knowledge acquisition, compensatory, and holistic approaches. Cogn. Process. 23 (4), 537–557. https://doi.org/10.1007/s10339-022-01099-w.

Gotaas, M.E., et al., 2021. Cognitive behavioral therapy improves physical function and fatigue in mild and moderate chronic fatigue syndrome: a consecutive randomized controlled trial of standard and short interventions. Front. Psychiatry 12. https://doi.org/10.3389/fpsyt.2021.580924.

Graham, S.A., et al., 2021. Older adults engage with personalized digital coaching programs at rates that exceed those of younger adults. Front. Digit. Health 3, 642818. https://doi.org/10.3389/fdgth.2021.642818.

Harling, G., et al., 2020. Impairment in activities of daily living, care receipt, and unmet needs in a middle-aged and older rural South African population: findings from the HAALSI Study. J. Aging Health 32 (5–6), 296–307. https://doi.org/10.1177/0898264318821220.

Henderson, D.A.G., et al., 2021. Linkage of national health and social care data: a cross-sectional study of multimorbidity and social care use in people aged over 65 years in Scotland. Age Ageing 50 (1), 176–182. https://doi.org/10.1093/ageing/afaa134.

Higgins, J.P.T., et al. (Eds.), 2024. Cochrane Handbook for Systematic Reviews of Interventions version 6.5 (updated August 2024). Available from: www.training.cochrane.org/handbook.

Hu, B., Cartagena-Farias, J., Brimblecombe, N., 2022. Functional disability and utilisation of long-term care in the older population in England: a dual trajectory analysis. Eur. J. Ageing 19 (4), 1363–1373. https://doi.org/10.1007/s10433-022-00723-0.

International Council of Nurses, 2021. International Classification for Nursing Practice (ICNP): Technical Implementation Guide. International Council of Nurses.

International Council of Nurses, 2024. ICNP browser. Available at:, ICN - International Council of Nurses. https://www.icn.ch/icnp-browser. (Accessed 18 April 2024).

IOM (Institute of Medicine), 2015. Psychosocial Interventions for Mental and Substance Use Disorders: A Framework for Establishing Evidence-based Standards. IOM (Institute of Medicine), Washington, DC.

Jeong, S., et al., 2018. Telephone support and telemonitoring for low-income older adults. Res. Gerontol. Nurs. 11 (4), 198–206. https://doi.org/10.3928/19404921-20180502-01.

Jin, Y., et al., 2023. Cardiometabolic multimorbidity, lifestyle behaviours, and cognitive function: a multicohort study. Lancet Healthy Longev. 4 (6), e265–e273. https://doi.org/10.1016/S2666-7568(23)00054-5.

Jones, C.H., Dolsten, M., 2024. Healthcare on the brink: navigating the challenges of an aging society in the United States. NPJ Aging 10 (1), 22. https://doi.org/10.1038/s41514-024-00148-2.

Kainiemi, E., et al., 2023. Perceived benefits of digital health and social services among older adults: a population-based cross-sectional survey. Digit. Health 9, 20552076231173559. https://doi.org/10.1177/20552076231173559.

Khan, H.T.A., Addo, K.M., Findlay, H., 2024. Public health challenges and responses to the growing ageing populations. Pub. Health Challenges 3 (3), e213. https://doi.org/10.1002/puh2.213.

Kitson, A., et al., 2013. What are the core elements of patient-centred care? A narrative review and synthesis of the literature from health policy, medicine and nursing. J. Adv. Nurs. 69 (1), 4–15. https://doi.org/10.1111/j.1365-2648.2012.06064.x.

Kumar, J., et al., 2023. Innovative approaches and therapies to enhance neuroplasticity and promote recovery in patients with neurological disorders: a narrative review. Cureus. https://doi.org/10.7759/cureus.41914 (Preprint).

Kyu, H.H., et al., 2018. Global, regional, and national disability-adjusted life-years (DALYs) for 359 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet 392 (10159), 1859–1922. https://doi.org/10.1016/S0140-6736(18)32335-3.

Lancaster, G.A., 2015. Pilot and feasibility studies come of age! Pilot Feasibility Stud. 1 (1), 1–4. https://doi.org/10.1186/2055-5784-1-1.

Lapane, K.L., et al., 2022. Health effects of loneliness and social isolation in older adults living in congregate long term care settings: a systematic review of quantitative and qualitative evidence. Arch. Gerontol. Geriatr. 102, 104728. https://doi.org/10.1016/j.archger.2022.104728.

Lee, H.-J., et al., 2020. Effects of healthcare interventions on psychosocial factors of patients with multimorbidity: a systematic review and meta-analysis. Arch. Gerontol. Geriatr. 91, 104241. https://doi.org/10.1016/j.archger.2020.104241.

Lee, K., et al., 2021. Caring callers: the impact of the telephone reassurance program on homebound older adults during COVID-19. Home Health Care Serv. Q. 40 (4), 247–261. https://doi.org/10.1080/01621424.2021.1997861.

Lewis, C., Buffel, T., 2020. Aging in place and the places of aging: a longitudinal study. J. Aging Stud. 54 (September), 100870. https://doi.org/10.1016/j.jaging.2020.100870.

Lista, A., et al., 2023. What psychosocial and rehabilitation interventions in people aged 65 and over with multimorbidity, at home, Lead to health gains? A systematic review protocol. In: Moguel, E., De Pinho, L.G., Fonseca, C. (Eds.), Gerontechnology V, Lecture Notes in Bioengineering. Springer Nature Switzerland, Cham, pp. 374–381. https://doi.org/10.1007/978-3-031-29067-1_35.

Losilla, J.-M., et al., 2018. Three risk of bias tools lead to opposite conclusions in observational research synthesis. J. Clin. Epidemiol. 101, 61–72. https://doi.org/10.1016/j.jclinepi.2018.05.021.

Makovski, T.T., et al., 2019. Multimorbidity and quality of life: systematic literature review and meta-analysis. Ageing Res. Rev. 53, 100903. https://doi.org/10.1016/j.arr.2019.04.005.

Marengoni, A., et al., 2011. Aging with multimorbidity: a systematic review of the literature. Ageing Res. Rev. 10 (4), 430–439. https://doi.org/10.1016/J.ARR.2011.03.003.

McCarthy, K., et al., 2022. An examination of the prevalence of metabolic syndrome in older adults in Ireland: findings from The Irish Longitudinal Study on Ageing (TILDA). PLoS One 17 (9), e0273948. https://doi.org/10.1371/journal.pone.0273948 (Edited by L. Xie).

McMurtry, A., Sasser, J., 2020. Interdisciplinary and transdisciplinary approaches to ageing and gerontology. In: Researching Ageing, pp. 29–40. https://doi.org/10.4324/9781003051169-4.

Melis, R.J.F., et al., 2008. Multidimensional geriatric assessment: back to the future a randomized study of a multidisciplinary program to intervene on geriatric syndromes in vulnerable older people who live at home (Dutch EASYcare Study). J. Gerontol. Ser. A Biol. Med. Sci. 63 (3), 283–290. https://doi.org/10.1093/gerona/63.3.283.

Moher, D., et al., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ (Online) 339 (7716), 332–336. https://doi.org/10.1136/bmj.b2535.

Möhler, R., et al., 2023. Personally tailored activities for improving psychosocial outcomes for people with dementia in long-term care. Cochrane Database Syst. Rev. (3). https://doi.org/10.1002/14651858.CD009812.pub3 (Preprint).

Moon, K., Rao, S., 2021. Assessment of the risk of bias. In: Patole, S. (Ed.), Principles and Practice of Systematic Reviews and Meta-analysis. Springer International Publishing, Cham, pp. 43–55. https://doi.org/10.1007/978-3-030-71921-0_4.

Moran, J.M., Jolly, E., Mitchell, J.P., 2012. Social-cognitive deficits in normal aging. J. Neurosci. 32 (16), 5553–5561. https://doi.org/10.1523/JNEUROSCI.5511-11.2012.

Mou, H., et al., 2025. Motivational interviewing for improving functional and psychosocial outcomes among stroke survivors. Cochrane Database Syst. Rev. 2025 (4). https://doi.org/10.1002/14651858.CD016110 (Edited by Cochrane Central Editorial Service).

Mountain, G.A., et al., 2022. The Journeying through Dementia psychosocial intervention versus usual care study: a single-blind, parallel group, phase 3 trial. Lancet Healthy Longev. 3 (4), e276–e285. https://doi.org/10.1016/S2666-7568(22)00059-9.

Navickas, R., et al., 2016. Multimorbidity: what do we know? What should we do? J. Comorbidity 6 (1), 4–11. https://doi.org/10.15256/joc.2016.6.72.

Ng, J.Y.Y., et al., 2012. Self-determination theory applied to health contexts: a meta-analysis. Perspect. Psychol. Sci. 7 (4), 325–340. https://doi.org/10.1177/1745691612447309.

Nielsen, T.L., et al., 2019. Intensive client-centred occupational therapy in the home improves older adults' occupational performance. Results from a Danish randomized controlled trial. Scand. J. Occup. Ther. 26 (5), 325–342. https://doi.org/10.1080/11038128.2018.1424236.

Nordhausen, T., et al., 2019. Improving psychosocial health of nursing home residents: a systematic review of interventions for prevention and health promotion. Z. Evid. Fortbild. Qual. Gesundhswes. 147–148, 7–19. https://doi.org/10.1016/j.zefq.2019.09.005.

OECD, 2023. Health at a Glance 2023: OECD Indicators. OECD Publishing, Paris. https://doi.org/10.1787/7a7afb35-en.

OECD, 2024. Fiscal Sustainability of Health Systems: How to Finance More Resilient Health Systems When Money Is Tight? OECD, Paris. https://doi.org/10.1787/880f3195-en.

OECD, 2025. Does Healthcare Deliver?: Results From the Patient-Reported Indicator Surveys (PaRIS). OECD Publishing. https://doi.org/10.1787/c8af05a5-en.

Overbeek, A., et al., 2018. Advance care planning in frail older adults: a cluster randomized controlled trial. J. Am. Geriatr. Soc. 66 (6), 1089–1095. https://doi.org/10.1111/jgs.15333.

Page, M.J., et al., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 372, n71. https://doi.org/10.1136/bmj.n71.

Pengpid, S., Peltzer, K., Anantanasuwong, D., 2022. Bidirectional association between functional disability and multimorbidity among middle-aged and older adults in Thailand. Front. Public Health 10, 1055699. https://doi.org/10.3389/fpubh.2022.1055699.

Petrova, N.N., Khvostikova, D.A., 2021. Prevalence, structure, and risk factors for mental disorders in older people. Adv. Gerontol. 11 (4), 409–415. https://doi.org/10.1134/S2079057021040093.

Piolatto, M., et al., 2022. The effect of social relationships on cognitive decline in older adults: an updated systematic review and meta-analysis of longitudinal cohort studies. BMC Public Health 22 (1), 278. https://doi.org/10.1186/s12889-022-12567-5.

Prathapan, S., et al., 2020. The rising complexity and burden of multimorbidity in a middle-income country. PLoS One 15 (12 December), 1–15. https://doi.org/10.1371/journal.pone.0243614.

Pristavec, T., Luth, E.A., 2020. Informal caregiver burden, benefits, and older adult mortality: a survival analysis. J. Gerontol. Ser. B 75 (10), 2193–2206. https://doi.org/10.1093/geronb/gbaa001 (Edited by J.J. Suitor).

Qiao, Y., et al., 2021. Longitudinal follow-up studies on the bidirectional association between ADL/IADL disability and multimorbidity: results from two national sample cohorts of middle-aged and elderly adults. Gerontology 67 (5), 563–571. https://doi.org/10.1159/000513930.

Ratnayake, M., et al., 2022. Aging in place: are we prepared? Del. J. Pub. Health 8 (3), 28–31. https://doi.org/10.32481/djph.2022.08.007.

Resnick, B., et al., 2016. Rehabilitation interventions for older individuals with cognitive impairment post hip fracture: a systematic review. J. Am. Med. Dir. Assoc. 17 (3), 200–205. https://doi.org/10.1016/j.jamda.2015.10.004.

Rodrigues, L.P., et al., 2022. Association between multimorbidity and hospitalization in older adults: systematic review and meta-analysis. Age Ageing 51 (7), 1–16. https://doi.org/10.1093/ageing/afac155.

Ryan, A., et al., 2015. Multimorbidity and functional decline in community-dwelling adults: a systematic review. Health Qual. Life Outcomes 13 (1). https://doi.org/10.1186/s12955-015-0355-9.

Salisbury, C., et al., 2018. Management of multimorbidity using a patient-centred care model: a pragmatic cluster-randomised trial of the 3D approach. Lancet 392 (10141), 41–50. https://doi.org/10.1016/S0140-6736(18)31308-4.

Sardareh, M., et al., 2024. Interventions for improving health literacy among older people: a systematic review. BMC Geriatr. 24, 911. https://doi.org/10.1186/s12877-024-05522-z.

Shah, S., et al., 2013. Skilled nursing facility functional rehabilitation outcome: analyses of stroke admissions. Int. J. Ther. Rehabil. 20 (7), 352–360.

Shepard, D.S., et al., 2024. Cost-effectiveness of cardiac rehabilitation in older adults with coronary heart disease. J. Cardiopulm. Rehabil. Prev. 44 (2), 107. https://doi.org/10.1097/HCR.0000000000000827.

Shields, G.E., et al., 2023. Cost-effectiveness of home-based cardiac rehabilitation: a systematic review. Heart 109 (12), 913–920. https://doi.org/10.1136/heartjnl-2021-320459.

Sims-Gould, J., et al., 2017. Reablement, reactivation, rehabilitation and restorative interventions with older adults in receipt of home care: a systematic review. J. Am. Med. Dir. Assoc. 18 (8), 653–663. https://doi.org/10.1016/j.jamda.2016.12.070.

Skivington, K., et al., 2024. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. Int. J. Nurs. Stud. 154, 104705. https://doi.org/10.1016/j.ijnurstu.2024.104705.

Skou, S.T., et al., 2022. Multimorbidity. Nat. Rev. Dis. Primers 8 (1). https://doi.org/10.1038/s41572-022-00376-4.

Soley-Bori, M., et al., 2021. Children and Young People's Health Partnership Evelina London Model of Care: economic evaluation protocol of a complex system change. BMJ Open 11 (11), e047085. https://doi.org/10.1136/bmjopen-2020-047085.

Spoorenberg, S.L.W., et al., 2018. Effects of a population-based, person-centred and integrated care service on health, wellbeing and self-management of community-living older adults: a randomised controlled trial on Embrace. PLoS One 13 (1), 1–16. https://doi.org/10.1371/journal.pone.0190751.

Stein, A.T., et al., 2021. Looking beyond depression: a meta-analysis of the effect of behavioral activation on depression, anxiety, and activation. Psychol. Med. 51 (9), 1491–1504. https://doi.org/10.1017/S0033291720000239.

Sterne, J.A.C., et al., 2019. RoB 2: a revised tool for assessing risk of bias in randomised trials. BMJ 366, l4898. https://doi.org/10.1136/bmj.l4898.

Sultana, M., et al., 2023. Involvement of informal caregivers in preventing falls in older adults with cognitive impairment: a rapid review. J. Alzheimers Dis. 92 (3), 741–750. https://doi.org/10.3233/JAD-221142.

Tappen, R.M., Sopcheck, J., 2023. Nursing home resident, family, and staff perspectives on achieving comfort at end of life: a qualitative study. J. Hosp. Palliat. Nurs. 25 (4), 188. https://doi.org/10.1097/NJH.0000000000000953.

Thuesen, J., Ravn, M.B., Petersen, K.S., 2021. Towards person-centred rehabilitation in dementia – a narrative synthesis. Disabil. Rehabil. 43 (18), 2673–2679. https://doi.org/10.1080/09638288.2019.1709910.

Uijen, A., van de Lisdonk, E., 2008. Multimorbidity in primary care: prevalence and trend over the last 20 years. Eur. J. Gen. Pract. 14 (Suppl. 1), 28–32. https://doi.org/10.1080/13814780802436093.

United Nations, 2022. World Population Prospects 2022. United Nations, New York. Available at: www.un.org/developmentdesa/pd/.

Valderas, J.M., et al., 2009. Defining comorbidity: implications for understanding health and health services. Ann. Fam. Med. 7, 357–363. https://doi.org/10.1370/afm.983.Martin.

Van Den Akker, M., Buntinx, F., Knottnerus, J.A., 1996. Comorbidity or multimorbidity: what's in a name? A review of literature. Eur. J. Gen. Pract. 2 (2), 65–70. https://doi.org/10.3109/13814789609162146.

van der Gaag, M., et al., 2022. The importance of health literacy for self-management: a scoping review of reviews. Chronic Illn. 18 (2), 234–254. https://doi.org/10.1177/17423953211035472.

Vargas-González, J.-C., et al., 2022. The association between multimorbidity and cognitive decline: a systematic review. Alzheimers Dement. 18 (S11), e067769. https://doi.org/10.1002/alz.067769.

Waitzberg, R., et al., 2020. Mapping variability in allocation of Long-Term Care funds across payer agencies in OECD countries. Health Policy 124 (5), 491–500. https://doi.org/10.1016/j.healthpol.2020.02.013.

Walters, R., et al., 2020. Establishing the efficacy of interventions to improve health literacy and health behaviours: a systematic review. BMC Public Health 20 (1), 1040. https://doi.org/10.1186/s12889-020-08991-0.

WHO (World Health Organization), 2001. International Classification of Functioning. Disability and Health, Geneve.

WHO (World Health Organization), 2007. People-centred Health Care A Policy Framework. World Health Organization, pp. 13–14.

WHO (World Health Organization), 2015. Global strategy on people-centred integrated health services: interim report. In: Service Delivery and Safety, pp. 1–25.

WHO (World Health Organization), 2016. mhGAP Intervention Guide for Mental, Neurological and Substance Use Disorders in Non-specialized Health Settings: mental health Gap Action Programme (mhGAP). Version 2.0. World Health Organization, Geneva. Available at: https://iris.who.int/handle/10665/250239. (Accessed 13 March 2025).

WHO (World Health Organization), 2017. Rehabilitation in Health Systems. World Health Organization, Geneva, Swiss, p. 92.

WHO (World Health Organization), 2020. Rehabilitation Competency Framework. World Health Organization, Geneva.

WHO (World Health Organization), 2021a. Framework for Countries to Achieve an Integrated Continuum of Long-Term Care (Geneva).

WHO (World Health Organization), 2021b. UN decade of healthy ageing 2021–2030. Available at:, World Health Organization. https://www.who.int/initiatives/decade-of-healthy-ageing.

WHO (World Health Organization), 2022. Mental Health and COVID-19 : Early evidence of the pandemic's impact. Sci. Brief 2 (March), 1–11.

WHO (World Health Organization), 2023a. Long-term Care for Older People: Package for Universal Health Coverage. World Health Organization, Geneva, Swiss.

WHO (World Health Organization), 2023b. Long-term Care Financing: Lessons for Low- and Middle-income Settings. Brief 1. Drivers of the Demand for Long-term Care. World Health Organization, Geneva.

WHO (World Health Organization), 2023c. Package of Interventions for Rehabilitation. Module 4. Cardiopulmonary Conditions. World Health Organization, Geneva.

WHO (World Health Organization), 2024. Psychological Interventions Implementation Manual: Integrating Evidence-based Psychological Interventions into Existing Services (Geneva).

Yokozuka, M., et al., 2022. Effects of self-management exercise group participation in community-dwelling older adults. BMC Geriatr. 22 (1), 814. https://doi.org/10.1186/s12877-022-03509-2.

Zhang, Q., et al., 2023. Interventions targeting psychosocial adaptation in people with stroke: a scoping review. Patient Educ. Couns. 113, 107751. https://doi.org/10.1016/j.pec.2023.107751.