

# Interventions Addressing Symptoms in Older Adults with Multimorbidity: An Umbrella Review

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**Abstract:** This umbrella review was to synthesize the summarized evidence-based research regarding interventions addressing symptoms in older populations with multimorbidity. Three databases including PsycINFO, MEDLINE, and CINAHL were searched systematically. The JBI Methodology for Umbrella Reviews and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statements were used to report this review. Six reviews published between 2016 and 2010 were included for analysis. Interventions were mixed and included components on health-related behaviors, body systems or functions, activities and participation domains, and the environment. Outcomes concerning physiological/clinical functioning were most reported. The evidence regarding the symptoms-related interventions was mixed, but all showed promising outcomes compared with usual care or not. To sum up, this umbrella review reveals the lack of strong empirical evidence for the effectiveness of intervention addressing symptoms in older adults with multimorbidity. It highlights the need to evaluate the established approach of interventions further to support this population.

**Keywords:** chronic disease, multimorbidity, systematic review, signs and symptoms

## Introduction

As the global population continues to age, the prevalence of multimorbidity among older adults has become a significant public health concern.<sup>1</sup> Multimorbidity, also known as multiple chronic conditions, is defined as the co-existence of two or more chronic health conditions in one person and usually requires ongoing healthcare.<sup>2</sup> The epidemiological statistics of multimorbidity varied greatly based on the conditions considered in count,<sup>3</sup> this might be explained by the absence of consensus on the operational definitions of multimorbidity. For example, researchers utilized data from the Chinese Longitudinal Healthy Longevity Survey (CLHLS) to assess physical multimorbidity.<sup>4</sup> They considered a total of 19 chronic diseases, including conditions like hypertension, diabetes, heart disease, and stroke or CVD. Another study conducted in Australia investigated the occurrence of multimorbidity by examining 21 chronic health conditions such as arthritis, bowel disease, Crohn's disease, liver disease, and others.<sup>5</sup> Although it is possible to ascertain diverse variants of the term of multimorbidity across studies. These conditions can profoundly impact the quality of life of older adults,<sup>6</sup> as they often experience a range of symptoms that can be challenging to manage.<sup>7</sup>

Symptoms may refer to expressions of disturbed features in the body and mind by a patient.<sup>8</sup> Symptom science in the context of nursing principally focuses on ranges from understanding the etiology of diseases' symptoms and possible clusters to developing creative measures and interventions to lessen their negative impacts.<sup>9</sup> The management of symptoms in older adults with multimorbidity is a complex and multifaceted task because of the inconsistent definitions of multimorbidity and the challenges in examining various outcomes.<sup>10</sup> It requires a comprehensive understanding of the unique physiological, psychological, and social factors that influence symptom presentation and progression in multimorbid populations. The presence of multimorbidity often necessitates a holistic and integrated approach to care, where healthcare professionals must consider the interactions between different

conditions and their respective symptoms.<sup>11</sup> Also, healthcare professionals must focus on the individual needs and preferences of older adults, as well as the available resources and support systems in place.<sup>12</sup> Furthermore, older adults with multimorbidity may experience age-related physiological changes that can impact symptom presentation and response to treatment. For example, alterations in metabolism, organ function, and immune response can influence the pharmacokinetics and pharmacodynamics of medications used for symptom management.<sup>13,14</sup> These age-related changes may necessitate dosage adjustments or alternative treatment modalities to optimize symptom management.

In recent years, there has been a growing recognition of symptom-oriented interventions for older adults with multimorbidity. Tripp-Reimer et al<sup>15</sup> established the Integrated Model of Multimorbidity and Symptom Science model of connecting multimorbidity with symptom science, which incorporates three predominate domains (1) risk factors, which are based on the WHO's framework and contain individual and contextual factors; (2) interactions among symptoms, diseases, and treatments, highlighting the dynamic relationships between these elements; and (3) patient outcomes, which focus on patient-centered measures such as morbidity, mortality, functioning, well-being, burden related to multimorbidity, and optimizing self-care. The integrated model highlights the position of personalized care, recognizing that each person's experience of multimorbidity and associated symptoms is different. It also underlines the necessity for interdisciplinary collaboration in research and clinical practice, as well as the importance of patient-centered care in managing multimorbidity. According to this model, healthcare professionals are encouraged to document symptoms, monitor their changes over time, and consider symptom management when making healthcare decisions for individuals with multimorbidity.

With the global population aging, the number of older adults with multimorbidity is growing. This presents a significant challenge for healthcare systems worldwide. In addition, the complex nature of multimorbidity indicates that a one-size-fits-all approach to treatment needs refinement and improvement. By gaining a deeper understanding of the complexities surrounding symptom management in older adults with multimorbidity, we can work towards developing more tailored and effective approaches to care. As a result, we aimed to explore the current evidence and best practices of interventions addressing symptom-related outcomes among older adults with multimorbidity. We will examine various strategies and interventions that have been shown to be effective in alleviating symptoms and improving the outcomes for this population.

## Aims and Research Questions

This umbrella review aimed to summarize the existing systematic reviews focusing on interventions in addressing symptoms in older adults with multimorbidity. The specific research questions were:

1. What interventions are used to manage symptoms in older adults with multimorbidity?
2. In what healthcare aspects, contexts, and settings have studies of those interventions been conducted?
3. How have those interventions been examined regarding their health-related outcomes?

## Materials and Methods

### Design

An umbrella review is an overview of previous reviews.<sup>16</sup> We chose this Design in this study because (1) since the first publication of the Symptom Management Model,<sup>17</sup> researchers have applied this model across different settings and published a growing number of reviews; (2) an umbrella review helps to answer a broad question and can contribute to the development of further interventions and guidelines.<sup>18</sup>

The protocol for this study was registered on the Open Science Framework (<https://osf.io/6rx3k>). The methodology was developed based on the JBI Methodology for Umbrella Reviews.<sup>16</sup> We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement to enhance the transparency of reporting in this study.<sup>19</sup>

## Literature Search

An electronic search guided by the PICO (population, intervention, comparator, and outcomes) framework was conducted on October 4, 2023, and updated on Nov 28, 2023. Three databases were systematically searched: MEDLINE, CINAHL, and PsycINFO. The publication data was limited to 10 years to obtain the most recent evidence. In addition, the reference lists of included reviews were also searched. Table 1 reports the search concepts and terms of this review.

## Literature Management

Search results were imported into EndNote™ 21 for screening. After the check of duplicates, a two-step screening was conducted: titles and abstracts and full-text check. We included systematic reviews that evaluated symptom management in addressing multimorbidity among the older population. Two authors independently examined all potential reviews against the inclusion and exclusion criteria. Any disagreements were discussed and a third experienced researcher was available for assistance. Table 2 reports the inclusion and exclusion criteria of this review.

## Quality Assessment

We used JBI's critical appraisal tools for systematic review as an instrument to assess systematic reviews.<sup>20</sup> Any disagreements were discussed and a third experienced researcher was available for consultation. No review was excluded due to low quality.

**Table 1** Academic Search Approach

Search Concepts	Terms
Symptom intervention	Symptoms or signs or characteristics or presentation or symptomatology And interventions or strategies or best practices or treatment or therapy or program or management
Older adults	Older adults or elderly or geriatric or geriatrics or aging or senior or seniors or older people or aged 60 or 60+
Chronic health conditions	Multimorbidity, or multiple comorbidity, or multiple chronic conditions, disease
Literature reviews	Systematic review with or without a meta-analysis

**Table 2** Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Participants	Old adults (aged 60+) with multimorbidity.	Children, adolescents, and adults under the age of 60 years old.
Setting	All settings were included.	
Intervention	The intervention included understanding signs and symptoms of multimorbidity, monitoring symptoms, and self-care of symptoms.	The intervention is from a medical treatment aspect, such as drugs; Complementary medicine or therapy.
Outcomes	Health-related outcomes, cost-effectiveness, patient preferences	Outcomes from a medical treatment aspect; Outcomes solely on the economic aspect.
Design	Systematic reviews with or without a meta-analysis	Primary studies, commentaries, editorials, conference papers, etc.
Language	English or Chinese	Other than English or Chinese

## Data Collection

We extracted the following information with three designed tables: (1) general information including author and publication year, aim, setting and sample, multimorbidity of interest, designs of included studies, the timeframe of review, and key findings; (2) Intervention & outcomes information including the type of interventions, the outcome of interests, and quality of evidence; and (3) quality assessment information including quality appraisal method and results. Two authors extracted the above information independently and then compared their results. A third experienced researcher was available for consulting if necessary.

## Data Analysis

Given the heterogeneous definition of multimorbidity and mixed interventions analyzed in previous reviews, we adopted a narrative approach to systematically and transparently summarize past systematic evidence and to provide a text-based synthesis instead of a statistical analysis.<sup>21</sup>

## Results

Figure 1 illustrates a flow diagram of publication selection. We screened 126 citations and identified six potentially relevant full-text articles. Excluded articles were presented with reasons.

Table 3 reports the key characteristics of the included reviews. Six reviews were published between 2016 and 2010, with 72 studies involved (RCT: 52).<sup>22–27</sup> Most reviews did not limit their research settings, only two focused on home care.<sup>22,23</sup> All reviews aimed to examine a certain type of intervention for older adults with multimorbidity. Most reviews demonstrated their broad definition of multimorbidity and one focused on dementia and multimorbidity.<sup>25</sup> The most common conditions were diabetes, hypertension, respiratory diseases, and heart diseases.

Table 4 reports the summary of interventions and their outcomes. We used the International Classification of Health Interventions (ICHI) to categorize and report interventions in this review as the ICHI offers a standardized procedure for

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources

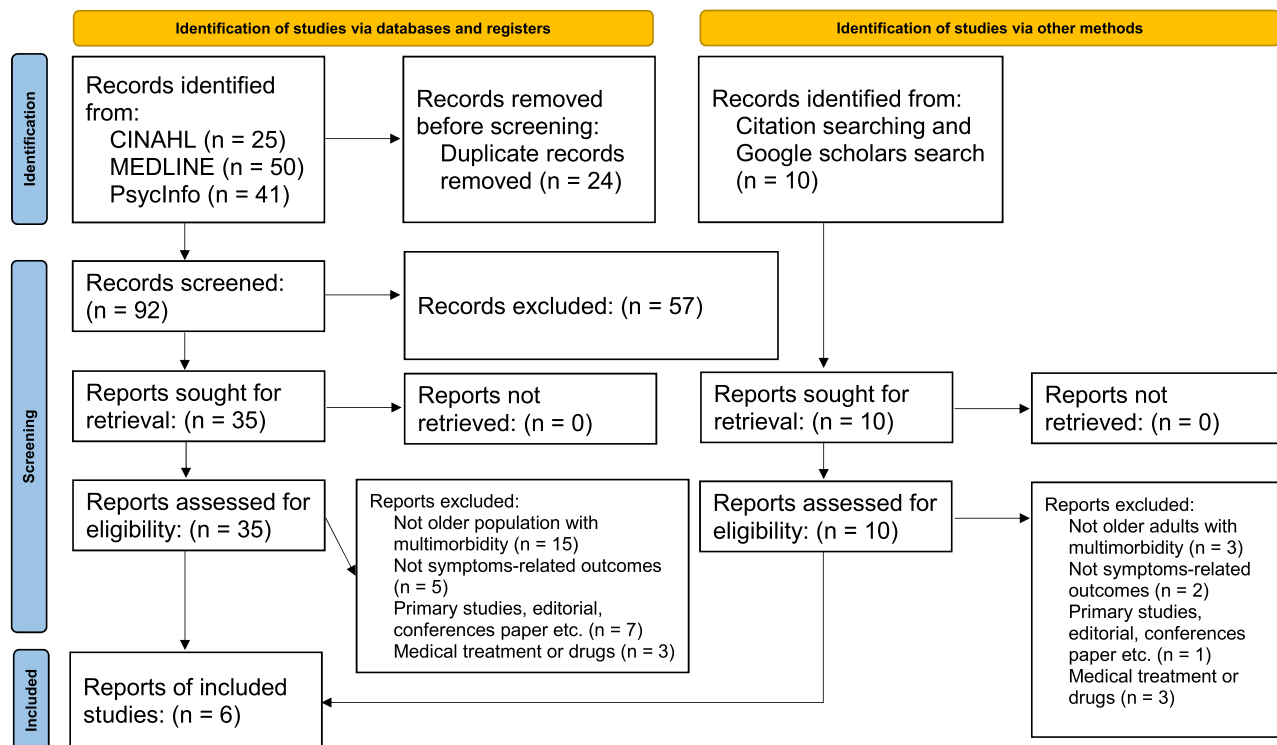


Figure 1 Flow diagram of publication selection.

**Table 3** Key Characteristics of Included Reviews

Citations	Aim	Setting & Sample	Multimorbidity	Year of Search, Studies Included	Key Findings	Quality Assessment
Crowe et al (2016) <sup>22</sup>	To evaluate the clinical effects of transdiagnostic health management interventions for older adults with multimorbidity.	Home care; 10,393 participants included; Participants had 2–7.1 conditions, mean ages range from 65–78.5 yr.	More than 1 long-term condition; Arthritis, Respiratory conditions, hypertension, and diabetes were common conditions.	From 1999 to 2014; RCTs (n = 5), open-label studies (n = 4), concurrent controlled cohort study (n = 1), case–control study (n = 1), and quasi-experimental study (n = 1).	Transdiagnostic health management interventions might be effective for older people with multimorbidity.	10
Kastner et al (2018) <sup>23</sup>	To evaluate the effects of interventions for managing multimorbidity in older adults.	Primary care (n = 8), home (n = 7), outpatient clinics (n = 5), hospitals (n = 3), and nursing homes (n = 2); 12,579 participants included, mean age 67.3 yr, range 61–86 yr.	Two and more high-burden chronic diseases; Diabetes, depression, heart failure, and COPD were common conditions.	From 1990 to 2017; RCTs (n = 15), cluster RCTs (n = 6), mixed-methods (n = 3), and uncontrolled (n = 1).	Care coordination interventions with one or a combination of interventions might be effective for older adults with multimorbidity.	10
Goehner et al (2019) <sup>24</sup>	To identify the effects of trained volunteers in supporting older adults with multimorbidity and present the characteristics of the volunteers for further practice.	Homecare following a hospital stay; 3379 participants included mean age = 77.0 yr, range 67.3–82.8 yr.	At least 1 chronic condition; Frail and cancer were common conditions.	From 2002 to 2017; RCTs (n = 5), clinical controlled trials (n = 2), pre-post study (n = 5).	The effects of trained volunteer-supporting programs for older adults with multimorbidity were inconsistent.	10
Parker et al (2020) <sup>25</sup>	To identify the effects of transitional care for older people living with dementia and multimorbidity, and their caregivers.	Setting unspecific; 1861 participants included mean age = 80 yr.	Dementia and multimorbidity.	From 2000 to 2018; RCTs (n = 8), quasi-experimental (n = 2), and case series studies (n = 1).	The implementation of transitional care coordination might help to reduce the impacts of older adults with multimorbidity.	9

(Continued)

Table 3 (Continued).

Citations	Aim	Setting & Sample	Multimorbidity	Year of Search, Studies Included	Key Findings	Quality Assessment
Kennedy et al (2021) <sup>26</sup>	To evaluate the effects of interventions led by community health workers on clinical outcomes in older adults with multimorbidity.	Setting unspecific; 2051 participants included, aged range 69–80 yr.	Having complex conditions such as multimorbidity, frailty, disability, or high utilization; Depression, anxiety, disability, hypertension, cardiovascular disease, and congestive heart failure were common conditions.	From inception to 2020; RCTs (n = 4), RCTS plus qualitative (n= 1), quasi-experimental (n = 3), quasi-experimental plus qualitative (n = 2).	Community health workers-led interventions might be effective for older adults with complex health needs.	9
Søgaard et al (2021) <sup>27</sup>	To evaluate the effects of patient engagement interventions for older patients with multimorbidity.	Setting unspecific; 8087 participants included. Mean age > 60 yr, range 60–84 years.	Two or more chronic diseases. Diabetes, hypotension, and heart disease were common conditions.	From inception to 2021; RCTs (n = 8), cohort (n= 3), quasi-experimental (n = 1).	Patient engagement intervention might be effective for older adults with multimorbidity.	10

**Note:** The included reviews were listed in chronological order.

**Table 4** Summary for the Interventions, Outcomes, and Quality of Evidence of Included Reviews

Citations	Interventions	Outcomes	Quality of Evidence
Crowe et al (2016) <sup>22</sup>	<ul style="list-style-type: none"> <li>Mixed interventions: chronic disease self-management programs (n = 3), home-based interventions (n = 2), community-based interventions (n = 4).</li> <li>Interventions on the environment: service level interventions (n = 3).</li> </ul>	<ul style="list-style-type: none"> <li>Functioning: self-rated health, exercise, IADL independence and FIM Total independence, ADL, mobility, disability, HRQoL, WHODAS-II, QoL, and work and social adjustment.</li> <li>Resource use: MD and/or ER visits, and hospital days, and hospital admission rate.</li> </ul>	<ul style="list-style-type: none"> <li>Health status: Low/moderate</li> <li>Functioning: Low</li> <li>Service utilization: Low</li> </ul>
Kastner et al (2018) <sup>23</sup>	<ul style="list-style-type: none"> <li>Mixed interventions: care coordination (n = 10), and information and health technology (n = 7).</li> </ul>	<ul style="list-style-type: none"> <li>Mortality/survival: mortality</li> <li>Physiological/clinical: depression, HbA1c, and SBP.</li> <li>Functioning: QoL and physical activities.</li> <li>Resource use: antidepressant use, mental health service use, and health care utilization.</li> </ul>	<ul style="list-style-type: none"> <li>Depression: Moderate</li> <li>HbA1c: Low/moderate</li> <li>Systolic blood pressure: Very Low</li> <li>Mortality: Moderate</li> <li>Mental health service: Moderate</li> </ul>
Goehner et al (2019) <sup>24</sup>	<ul style="list-style-type: none"> <li>Interventions on the body systems or functions: assistance with medication intake (n = 2).</li> <li>Mixed interventions: physical-cognitive activation (n = 5), and psychosocial-coordinative support (n = 5).</li> </ul>	<ul style="list-style-type: none"> <li>Physiological/clinical: anxiety, and colorectal symptoms.</li> <li>Functioning: QoL, physical functioning, and self-efficacy expectation.</li> <li>Resource use: use of service.</li> <li>Others: composite endpoints, knowledge, and behaviors, and support needs.</li> </ul>	/
Parker et al (2020) <sup>25</sup>	<ul style="list-style-type: none"> <li>Mixed interventions: support (n = 2), physical-cognitive activation (n = 4), psychosocial-domestic support (n = 1), and physical-cognitive activation plus social participation (n = 2).</li> </ul>	<ul style="list-style-type: none"> <li>Physiological/clinical: cognitive status, behavioral symptoms, and multimorbidity.</li> <li>Functioning: QoL, physical activities, mental health, and physical functioning.</li> </ul>	/
Kennedy et al (2021) <sup>26</sup>	<ul style="list-style-type: none"> <li>Interventions on the health-related behaviors: behavior change (n = 1).</li> <li>Interventions on the environment: workforce enhancement (n = 1).</li> <li>Mixed interventions: collaborative care (n = 1), health coaching (n = 2), psychosocial group exercise (n = 1), and peer support (n = 1).</li> </ul>	<ul style="list-style-type: none"> <li>Physiological/clinical: self-reported mood.</li> <li>Functioning: self-reported functioning, disability, physical performance, QoL, well-being, and physical activity.</li> <li>Adverse events: medication safety knowledge, attitudes, and behaviors.</li> <li>Others: self-care, and social support.</li> </ul>	/
Sogaard et al (2021) <sup>27</sup>	<ul style="list-style-type: none"> <li>Interventions on the health-related behaviors: psychosocial or behavioral approach (n = 9), and medication adherence intervention (n = 1).</li> <li>Interventions on the activities and participation domains: physical activity plus a psychosocial or behavior change (n = 2), and trained home support workers in self-management skills (n = 2).</li> <li>Mixed interventions: health coaching interventions (n = 2), primary care collaborative care team model (n = 1), and peer support program (n = 1).</li> </ul>	<ul style="list-style-type: none"> <li>Physiological/clinical: BMI, SBP, HbA1c, LDL, and mood.</li> <li>Functioning: functioning, self-rated health, QoL, well-being, and Ill-being.</li> <li>Resource use: use of service.</li> <li>Others: patient activation communication, and self-care.</li> </ul>	/

**Notes:** The included reviews were listed in chronological order.

**Abbreviations:** MD, Medical Doctor; ER, Emergency Room; ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; FIM, Functional Independence Measure; HRQoL, Health-related Quality of Life; WHODAS-II, World Health Organization Disability Assessment Schedule; QoL, Quality of Life; BMI, Body Mass Index; SBP, Systolic Blood Pressure; HbA1c, Hemoglobin A1c; LDL, Low-Density Lipoprotein.

collecting, combining, and analyzing health-related interventions.<sup>28</sup> According to ICHI, interventions of the included reviews were mixed and involved components of health-related behaviors, body systems or functions, activities and participation domains, and the environment.

We adopted the taxonomy for outcome classification to classify and report symptom-related outcomes that participants achieve through interventions in this review.<sup>29</sup> Outcomes concerning physiological/clinical functioning were most reported. Only two reviews have mentioned biochemical indicators.<sup>23,27</sup>

Table 5 reports the adopted quality appraisals of included reviews. Most used Grading of Recommendations, Assessment, Development and Evaluation (GRADE) or Cochrane Collaboration tools as an instrument. The included reviews reported mixed ratings of their reviewed studies. Several authors suggested their Results might be affected by the study quality.

Table 6 reports the methodological quality assessment of the included reviews. Overall, the quality of the included reviews was satisfactory as those reviews generally met most requirements of the checklist. The most important sources of possible risk of bias were the indication of review questions according to the JBI checklist.

**Table 5** Summary of Quality Appraisal of Included Reviews

Citations	Quality Appraisal Methods	Quality Appraisal Results
Crowe et al (2016) <sup>22</sup>	Effective Practice and Organization of Care Methods, Grading of Recommendations, Assessment, Development and Evaluation (GRADE)	Two studies had a low risk of bias; Four studies had an unclear risk of bias; Six studies had a high risk of bias.
Kastner et al (2018) <sup>23</sup>	Cochrane Risk of Bias tool, Mixed Methods Appraisal Tool, and GRADEPro.	Most had a low risk of bias for random-sequence generation, blinding of outcome assessors, incomplete or selective reporting of outcomes, and other biases. There was an unclear risk of bias for allocation sequence and blinding of patients or personnel in half of the studies. Two studies were found to have a high risk of bias for blinding of participants and personnel.
Goehner et al (2019) <sup>24</sup>	Cochrane Risk of Bias Tool for randomized trials and the Acrobat-NRSI for non-randomized trials	Selection bias (LRB: 3, URB: 4, HRB: 2), performance bias (LRB: 2, URB: 0, HRB: 5), detection bias (LRB: 3, URB: 1, HRB: 3), attrition bias, (LRB: 2, URB: 2, HRB: 2), reporting bias (LRB: 2, URB: 6, HRB: 0), and other bias (LRB: 2, URB: 5, HRB: 1).
Parker et al (2020) <sup>25</sup>	Joanna Briggs Institute's critical appraisal tools	Quality score for RCT: (11/13: 2, 7/13: 2, 8/13: 3, 9/13: 2, 10/13) Quality score for quasi-experimental: (7/9, 3/9) Quality score for case series: (1)
Kennedy et al (2021) <sup>26</sup>	The Revised Cochrane Risk-of-Bias; the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool	ROB (L: 1, M: 1, H: 1), EPHPP (W: 2, M: 2)
Sogaard et al (2021) <sup>27</sup>	GRADE, ROBINS-I, Cochrane Collaboration's tool	Risk of bias (LRB: 3, MRB: 9, HRB: 0), imprecision (HRB: 6, MRB: 3, VL: 1, U: 2), inconsistency (L: 0, M: 1, H: 9, U: 2), indirectness (L: 1, Very L: 2, M: 2, H: 7), publication bias (M: 2, U: 1, H: 9)

**Note:** The included reviews were listed in chronological order.

**Abbreviations:** LRB, Low risk of bias; MRB, Moderate risk of bias; HRB, High risk of bias; URB, Unclear risk of bias; L, Low; M, Moderate; H, High; U, Unclear; W, Weak; VL, Very Low.



**Table 6** Methodological Quality Assessment by JBI Critical Appraisal Checklist

Publication	1	2	3	4	5	6	7	8	9	10	11
Crowe et al (2016) <sup>22</sup>	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Kastner et al (2018) <sup>23</sup>	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Goehner et al (2019) <sup>24</sup>	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Parker et al (2020) <sup>25</sup>	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Kennedy et al (2021) <sup>26</sup>	N	Y	Y	Y	Y	Y	Y	U	Y	Y	Y
Søgaard et al (2021) <sup>27</sup>	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

**Note:** The included reviews were listed in chronological order.

**Abbreviations:** Y, Yes; N, No; U, Unclear.

## Discussion

This umbrella review has presented an overview of evidence for intervention addressing symptoms across settings in older adults with multimorbidity. The evidence regarding the symptoms-related interventions was mixed, but all showed promising outcomes compared with usual care or not. These interventions have positive effects on such as self-reported health status, clinical indicators, and health service use, and may also improve knowledge, attitude, and behaviors.

Older adults are considered at greater risk of vulnerability.<sup>30</sup> The longer one lives, the more likely one is to be diagnosed with multimorbidity. Compared with an earlier overview of the management of multimorbidity,<sup>31</sup> our study outlines the paucity of interventions designed to manage multimorbidity in aging populations, especially in the area of symptoms. Petrillo and Ritchie<sup>10</sup> indicated that inconsistent definitions of multimorbidity and variety in outcome measurement were two major challenges of symptom management for multimorbidity. There were a range of terminologies and definitions were used to identify multimorbidity.<sup>32</sup> Due to the complex nature of multimorbidity, older adults with multimorbidity often have various healthcare needs, making it challenging to examine their symptoms across different clinical settings. In this review, our focus was on interventions that specifically address symptoms. However, the literature covers a wide range of outcomes, including but not limited to measures of function, QoL, and mood indicators such as anxiety and depression. Selecting appropriate and valid outcome measures for symptoms is crucial as it directly impacts the effectiveness of the corresponding intervention. Unfortunately, there is a lack of standardization in both the measurement and reporting of symptom-related outcomes in clinical trials related to multimorbidity. This lack of standardization hinders efforts to synthesize evidence and may contribute to observed heterogeneity and bias, caused by factors like challenges in data collection, variations in instruments used, and differences in the length of follow-up. The validity and feasibility of measuring symptoms can significantly impact the validity of the evidence base and potentially limit its applicability in real-world settings. Also, previous researchers have indicated the gap between disease-focused care and patients' needs-oriented care in the multimorbid population.<sup>33</sup> Guidelines developed by NICE (National Institute for Health and Care Excellence) suggest that the implementation of effective care for people with multimorbidity requires tailored plans based on a personalized assessment.<sup>34</sup>

Kastner et al<sup>35</sup> synthesized and classified three types of theory-based interventions to explain multimorbidity management: (1) care coordination interventions, (2) illness prioritization, and (3) self-management. We found that most previous reviews focused on behavior change and psychosocial support, primarily referring to disease management. Only two reviews mentioned care-coordinated intervention. This inconsistency might be explained by the diversity in research aims and authors' expertise. For example, Goehner, Kricheldorf and Bitzer<sup>24</sup> presented the interventions delivered by trained volunteers while other reviews mainly included interventions provided by healthcare professionals. To tackle the complex needs of people with multimorbidity, integrated care, also known as coordinated care, comprehensive care, which incorporates health assessment, treatment, management, rehabilitation, and so on, should be

advocated.<sup>36</sup> Thus, we suggest that further research values the significance of integrated care from many different settings in clarifying the best clinical pathways given its potential of caring for multimorbid populations.

Despite the variety of included reviews in types of interventions, the implementer of intervention, and outcomes, all showed promising impacts. QoL, physical functioning, and moods in terms of anxiety and depression were considered as predominant outcomes that multimorbidity negatively affects.<sup>37–40</sup> In line with the results from a large cross-sectional study, which showed old adults with multimorbidity might report more symptoms of psychological distress. Our study suggested the significance of mental health among older adults with multimorbidity. In addition, those outcomes summarized in each review also reflect the components of the intervention offered. Given the variety of interventions identified and the overall quality of evidence, further studies are needed to strengthen these findings.

This umbrella review identified several knowledge gaps in multimorbid outcomes in the context of aging. First, there was a dearth of attention on the symptom burden, referring to the subjective, quantifiable burden on patients.<sup>41</sup> Evidence shows that people with multimorbidity face challenges concerning their symptoms, which is a substantial burden for them,<sup>7</sup> and the association between symptom burden and functional status in individuals with multimorbidity was significant.<sup>42</sup> Also, out of the important domains of outcomes, no specific interventions for morbidity and mortality were identified, suggesting a lack of long-term effectiveness of interventions within multimorbidity research. Furthermore, after a categorization of the interventions retrieved, we found that still there was a substantial gap in interventions addressing basic needs, including social care and support services, and interventions that enhance societal contribution.

This umbrella review had limitations. We used terms such as symptoms and signs to search past reviews that focus on symptom-based intervention. The search terms were intentionally broad, so some reviews outlining “health communication between healthcare professionals and patients” and “shared decision-making” might have been excluded. Next, interventions for symptom management are diverse, especially in the area of multimorbidity. The timeframe was limited to the last 10 years to offer a most recent summary of evidence, but reviews published before were not considered. The number of databases searched in this umbrella review was also limited as we had a healthcare emphasis. We narratively categorized certain types of interventions described across reviews based on their research questions. This might have prevented us from comparing those interventions and making Conclusions regarding the effects of those interventions.

## Conclusion

This review aims to improve the current understanding and offer insights that can guide clinical practice and policy decisions, ultimately enhancing the well-being of older adults who have multimorbidity. The findings of this study suggest that interventions for symptom management show promise, but the empirical evidence supporting them is limited. It is recommended that future research should emphasize the need for larger and more rigorous trials and develop guidelines for assessing and reporting outcomes related to multimorbidity. By using standardized definitions, protocols for exposures and outcomes, and statistical analyses, the potential biases can be minimized, leading to more reliable and trustworthy literature in this area.

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## Disclosure

The authors report no conflicts of interest in this work.

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