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REVIEW ARTICLE

Exploring Rest Advice in Fatigue Interventions in Rehabilitation Among Adults With Long-Term Conditions: A Systematic Scoping Review of the Reporting of Rest in Randomized Controlled Trials

Check for updates

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Abstract

Objective: To explore how rest is described or included as part of rest advice in fatigue interventions within rehabilitation for adults with long-term conditions (LTC).

Data Sources: This scoping review identified fatigue interventions through PubMed, the Cumulative Index to Nursing and Allied Health Literature, the Allied and Complementary Medicine Database, and the Physiotherapy Evidence Database, from inception to July 2024.

Study Selection: Two independent reviewers screened and selected the articles. Studies were included if they: (1) involved adults with LTC, (2) used nonpharmacological fatigue interventions, (3) had fatigue as the primary outcome, and (4) were randomized controlled trials. Only randomized controlled trials that include rest advice in the interventions were selected.

Data Extraction: Extracted data included the first author's name, year of publication, country, type of LTC, intervention category, specific interventions, and how rest was reported in all interventions. Furthermore, rest was reported using the frequency, intensity, time, and type principle, focusing on the frequency, intensity, duration, and type of rest in the exercise interventions and key conclusions.

Data Synthesis: Results were summarized, tabulated, and reported descriptively. Out of 13,645 initial records, 56 studies were included in the review. Of the total interventions analyzed, 55.4% (31/56) were classified as physical activity interventions, 14.3% (8/56) as psychological interventions (eg, cognitive behavioral therapy), 12.5% (7/56) were identified as energy management strategies, 8.9% (5/56) as educational interventions, and 8.9% (5/56) as activity pacing strategies. A disparity was observed in the instruction of rest advice between exercise interventions and daily fatigue management strategies. Specifically, physical activity interventions tended to adopt a more prescriptive approach to rest, whereas rest in daily fatigue management strategies was primarily instructed through education on the importance of rest in daily life. Notably, the level of detail provided in reporting rest parameters was generally limited.

Conclusions: This review found insufficient reporting of rest, highlighting a significant gap and indicating the need for improved documentation and standardization of rest in fatigue interventions. Future research is necessary to better understand the role of rest in the rehabilitation of LTC.

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Fatigue is a multidimensional, persistent, and overwhelming sense of exhaustion and low energy that is disproportionate to recent

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activity and not alleviated by rest.[1-4] Fatigue is a debilitating symptom common in many long-term conditions (LTC) such as cancer, multiple sclerosis, long COVID, and inflammatory bowel diseases.[5-13] It can significantly impact individuals' psychological, cognitive, and physical functioning, thereby restricting their ability to perform daily tasks.[14,15] This limitation in daily living tasks is associated with reduced quality of life and increased morbidity and mortality.[16] Thus, potential interventions to reduce fatigue and increase participation in physical activity could be important for adults with LTC.[17] It has been suggested that the similarity in the presentation of fatigue across multiple conditions may warrant a transdiagnostic approach to treatment.[4,5,12,13,18,19] A scoping review of 52 systematic reviews investigating fatigue interventions for individuals with long-term physical health conditions revealed that pharmacological interventions did not consistently demonstrate significant efficacy in reducing fatigue.[4] In contrast, nonpharmacological interventions, including graded exercise and fatigue-specific psychological therapies, showed potential in mitigating fatigue symptoms.[4] However, the heterogeneity of the intervention components and the potential for publication bias limited the robustness of these findings.

In rehabilitation, activity pacing promotes a balanced approach to rest and activity, encouraging adults with LTC and with symptoms of fatigue to embrace an active lifestyle.[17] However, research on this promising therapeutic intervention is scarce, with existing studies yielding inconsistent results.[20-22] Additionally, a systematic review and meta-analysis on only a small number of available studies found no significant effects of activity pacing interventions on physical activity[23] and physical functioning[24] in adults with LTC. In a similar vein, graded exercise therapy gradually introduces activity, increasing intensity as patients felt able, following a structured plan with essential rest periods to prevent overexertion.[20,25] The results of this approach have been inconsistent in adults with LTC.[20,26] In addition to the small number of studies, one other possible reason that may account for the varying outcomes related to these methods could be that the focus of the included studies always lies on detailing and reporting on physical activity, whereas the equally important bouts of rest seem less specified. There seems to be a lack of understanding and effective implementation, particularly when it comes to integrating optimal periods of rest in interventions of adults with LTC and with symptoms of fatigue.

Rest is a fundamental concept in the rehabilitation sciences and health care.[27-31] It involves ceasing activity, reducing activity, or switching off from primary tasks to conserve energy and promote restoration.[30,32-35] This process may prevent fatigue, allows for the resumption of activities, and improves overall well-being.[30,36-38] A meta-synthesis of 15 studies on coping mechanisms in people with chronic fatigue revealed that obtaining sufficient rest was a commonly employed strategy for managing activity and fatigue.[38] Previous studies have indicated that persons with multiple sclerosis are able to maintain mobility despite fatigue by incorporating frequent rest breaks.[39-41] This finding suggests that resting during exercise could be an effective strategy for mitigating exercise-related fatigue, to engage in more physical activity than continuous exercise would permit.[39-41] Similar studies have highlighted the importance of rest in long COVID,[42,43] chronic heart failure,[44] and osteoarthritis.[21] Moreover, the concept of adequate rest and its importance has been well established in ergonomics and sports, associated with positive effects such as fatigue reduction, enhanced vigor, success of endurance and resistance training, and the prevention of overtraining injuries and burnout.[45-48] Given the potential impact of rest on health outcomes, it is imperative to consider rest as an important variable in nonpharmacological interventions in rehabilitation and health care settings, especially in those addressing fatigue and physical activity engagement for adults with LTC.

Nonpharmacological interventions can be used either independently or in combination with other strategies to manage fatigue in adults with LTC.[4,49,50] These treatments primarily focus on self-management techniques, such as physical activity and psychosocial interventions.[50] Incorporation of rest in physical and psychosocial interventions may potentially help adults with LTC recharge energy, enabling them to sustain their involvement in activities over a long periods.[17,21,51] This continued engagement in activities has been related to reduce fatigue and enhance the quality of life for adults with LTC.[22,24,52] Another potential justification for advising rest in these interventions, especially those involving activity pacing and graded exercise, is to integrate scheduled rest periods into the daily routine as a preventive measure against worsening of symptoms such as fatigue and pain.[17,22] Furthermore, advising rest may serve the purpose of setting a starting point for activity levels, subsequently enabling a gradual and controlled self-paced increase in activity.[22,53] In people with multiple sclerosis, excessive exercise raises core body temperature, slowing the central nervous system activation and temporarily worsening symptoms.[54-56] Studies suggest that incorporating rest into interventions improves physical function by preventing excessive temperature rise, which exacerbates conduction issues in demyelinated nerve fibers.[40]

Taken together, this highlights the importance of including a focus on rest in the management of fatigue to improve performance, physical activity engagement, and overall health outcomes. Surprisingly, the concept of rest has not received the attention it deserves, particularly in the context of rehabilitation and fatigue interventions. Moreover, although most interventions focus on detailing and reporting physical activity, the concept of rest remains largely underdiscussed and underexplored. To the best of our knowledge, there are currently no reviews that examine rest advice within fatigue interventions for rehabilitation among adults with LTC. Consequently, we conducted a scoping review with the following objectives: (1) to identify nonpharmacological fatigue interventions that include rest advice for adults with LTC, (2) to investigate the potential impact of these interventions on reducing fatigue and increasing physical activity among adults with LTC, and (3) to analyze the reporting of rest advice within these interventions.

List of abbreviations:

FITT	**frequency intensity time, and type**
LTC	**long-term condition**

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Review[57] and the scoping review framework of Joana Briggs Institute were followed.[58] This scoping review protocol was not registered.

Inclusion and exclusion criteria

The Population, Interventions, Comparator, Outcome, Timing/duration of interventions, and Setting framework was used to

Table 1 Inclusion and exclusion criteria

PICOTS Framework	Inclusion Criteria	Exclusion Criteria
Population	• Adults (eg, 18 years and older) with LTC and symptoms of fatigue (eg, multiple sclerosis, osteoarthritis, cancer)	• LTC with no biological/underlying cause (eg, chronic fatigue syndrome, Fibromyalgia)
Intervention	• Nonpharmacological fatigue interventions (eg, physical activity and psychosocial interventions)	• Nutrition/dietary interventions • Pharmacological interventions • Acupuncture • Electrotherapy • Herbal medicine
Comparator	• Any comparator groups including those receiving usual or standard care and those on a waitlist control	• Nil
Outcome	• The primary outcome was self-reported fatigue scores using a validated measure • Secondary outcome was physical activity, assessed using both objective and self-reported measures	• Other outcomes
Timing	• Any duration	• Nil
Setting	• Any setting including hospitals, clinics, and community	• Nil
Design	• Randomized control trials	• Randomized controlled trials with no rest advice in the interventions • Nonrandomized controlled trials • Other study designs

Abbreviation: PICOTS, Population, Interventions, Comparator, Outcome, Timing/duration of interventions, and Setting.

develop the inclusion and exclusion criteria for this study.[59] Furthermore, the design of the included studies was restricted to randomized controlled trials. The comprehensive inclusion and exclusion criteria are elaborated in table 1.

Operational definitions

Rest advice: the term "rest advice'' is operationally defined to encompass both the guidance provided for managing fatigue in daily life and the instructions given to participants regarding rest during exercise interventions.

LTC was defined as conditions that require long-term and ongoing management.[4] For this review, we included only LTC with well-established, identifiable causes that have been scientifically studied and documented. Consequently, LTC with no known biological or underlying cause were excluded from the resulting studies.

Fatigue interventions: fatigue interventions refer to nonpharmacological strategies specifically designed to address fatigue. These interventions may focus on fatigue either as the sole primary outcome, as part of the primary outcomes, or are developed with the explicit intention of targeting fatigue in adults with LTC. Consequently, interventions that include fatigue as a secondary outcome were not classified as fatigue interventions in this context.

Daily fatigue management strategies: a strategy involving daily practices to reduce and regulate fatigue, ensuring optimal energy levels for daily functioning in persons with LTC. These practices were grouped as psychological interventions, energy conservation, activity pacing, and educational interventions.

Frequency, intensity, time, and type (FITT) principle: exercise and medication interventions have a well-established prescription recipe to ensure standardization and improve health outcomes. A particularly effective framework in this context is the FITT principle, which stands for FITT of exercises.[60] Consequently, we will use this concept to analyze and characterize rest advice provided in the included exercise interventions, which involves instructing a participant to rest by specifying the frequency (eg, how often), intensity (eg, level of reduction of activity during rest period, we categorized into 2 groups: active rest and passive rest), duration (eg, how long), and mode (eg, method or type of rest) as part of the interventions. Reporting and specifying these components of a rest advice may provide essential details for replication and facilitate the assessment of its potential impact within interventions.

Data sources and search strategies

Articles were searched using the following database: PubMed, Cumulative Index to Nursing and Allied Health Literature ultimate (via EBSCOhost), Allied and Complementary Medicine Database (via EBSCOhost), and Physiotherapy Evidence Database. The search was conducted and completed in July 2024. The databases were chosen because of their extensive indexing coverage of biomedical and allied health literature pertaining to nonpharmacological interventions and LTC.

To optimize the search strategy and precision, specific LTC (eg, stroke) were not specified. This approach aimed to reduce the likelihood of missing studies, particularly randomized controlled trials and interventions related to less recognized LTC or those focusing on specific conditions that did not explicitly use "long term condition" as a search keyword.[4,50] Additionally, truncations were used to find different variations of the keywords. Consequently, we specifically combined the concepts of fatigue, its management variants, and randomized controlled trials. Boolean operators "OR" and "AND" were used to achieve more precise results related to fatigue interventions and randomized trials.

From the resulting studies, we identified relevant physical activity interventions, psychological interventions, energy management strategies, activity pacing, and educational interventions that involved adults with LTC. Additionally, the content of these interventions was reviewed, and those that advised rest were included. Finally, the reference lists of some articles were searched in a snowball format to identify potential studies as well.[61,62] See supplemental appendix S1 for the search strategies for each database.

Selection of studies

The screening process was conducted in 2 stages. First, the titles and abstracts of the studies were reviewed by MA and DO. In the second stage, the same authors conducted a comprehensive full-text screening. Disagreements were resolved through discussion. A screening guide was employed to ensure that independent authors consistently applied the selection criteria.

Data extraction and data synthesis

Data extraction and charting were performed by MA. Extracted information included the first author's name, year of publication, country, type of LTC, intervention category, specific interventions, and how rest was reported in all interventions. We further used the FITT framework to report rest parameters in the exercise interventions. Other extracted information included outcome measure for primary and secondary outcomes, and summary of key conclusions on interested outcomes. The selection procedure was summarized using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses flowchart.[63] Additionally, results were summarized and reported descriptively (frequencies and percentages).

Results

Screening and characteristics of included studies

The search of the combined databases returned 13,645 articles. A total of 673 duplicates were removed. After the screening of titles and abstracts, 12,710 articles were excluded. Thus, 262 were assessed for eligibility, with 206 subsequently excluded. Common reasons for exclusion included interventions not recommending rest, fatigue not being the primary outcome, and wrong study population. Overall, 56 studies[21,26,39-41,64-113] were included (fig 1).

Most of the included studies (80%, n=45/56) were published after 2010. The sample sizes ranged from 11 to 333 participants. We identified 15 unique LTC, with the majority being multiple sclerosis, cancer, and stroke. Additionally, we identified 17 unique countries, with most of the included studies from Europe, America, and Asia.

Types of interventions for fatigue with rest advice

Of the total interventions analyzed, 55.4% (31/56) were classified as physical activity interventions, whereas 14.3% (8/56) were psychological interventions (eg, cognitive behavioral therapy). Additionally, 12.5% (7/56) were identified as energy management strategies, 8.9% (5/56) were categorized as educational interventions, and 8.9% (5/56) were classed as activity pacing interventions. These findings are summarized in table 2.

Potential impact of the interventions on fatigue in persons with LTC

Physical activity interventions

The effects of physical activity interventions in reducing fatigue in adults with LTC were reported in 31 studies.[39-41,65-71,74,76,81-83,85,86,90-93,96,97,99,100,102,103,105,107,110,112] Among these, 28 studies[39,40,65-71,74,76,82,83,86,90-93,96,97,99,100,102,103,105,107,110,112] demonstrated that physical activity significantly reduced fatigue in adults with LTC. In contrast, 3 studies[41,81,85] did not show significant group differences in reducing fatigue (table 2).

Daily fatigue management strategy

Psychological interventions

The effects of psychological interventions on fatigue reduction were examined in 10 studies.[72,77,86-88,89,95,101,102,109] Of these, 7 studies indicated that psychological interventions may effectively reduce fatigue in adults with LTC.[77,78,87,88,89,101,102] In contrast, 1 study did not identify a significant difference in fatigue levels between the intervention and control groups[86] (table 2).

Energy management

The effects of energy management strategies on fatigue reduction were reported in 7 studies.[73,80,84,94,108,111,113] Among these, 5 studies[73,80,84,94,108] demonstrated a reduction in fatigue. Conversely, 2 studies[111,113] found no significant differences between groups in fatigue reduction among adults with LTC.

Activity pacing interventions

The effects of activity pacing interventions on fatigue reduction were reported in 2 studies.[21,22] These studies provided preliminary evidence suggesting the potential benefits of such interventions in mitigating fatigue among adults with LTC. Both studies demonstrated outcomes aligned with the preferred direction, indicating a reduction in fatigue levels.[21,22] This finding highlights the promise of activity pacing as a feasible strategy for fatigue management in this population.

Educational interventions

The effects of educational interventions on fatigue reduction were reported in 5 studies.[75,82,100,104,106] Among these, 4 studies[82,100,104,106] demonstrated potential in reducing fatigue in individuals with LTC. However, 1 study[75] did not find a significant difference between the intervention and control groups.

Potential impact of the interventions on increasing physical activity in persons with LTC

Overall, the effects of interventions aimed at increasing physical activity among persons with LTC were reported in only 5 studies.[22,67,92,102,113] (table 2).

Two studies[67,92] investigated the effects of interventions aimed at increasing physical activity. These studies reported conflicting outcomes: one study[67] demonstrated an increase in physical activity, whereas the other did not find any significant effects.[92]

Additionally, 1 study[102] examining cognitive interventions reported on their effects on increasing physical activity. The

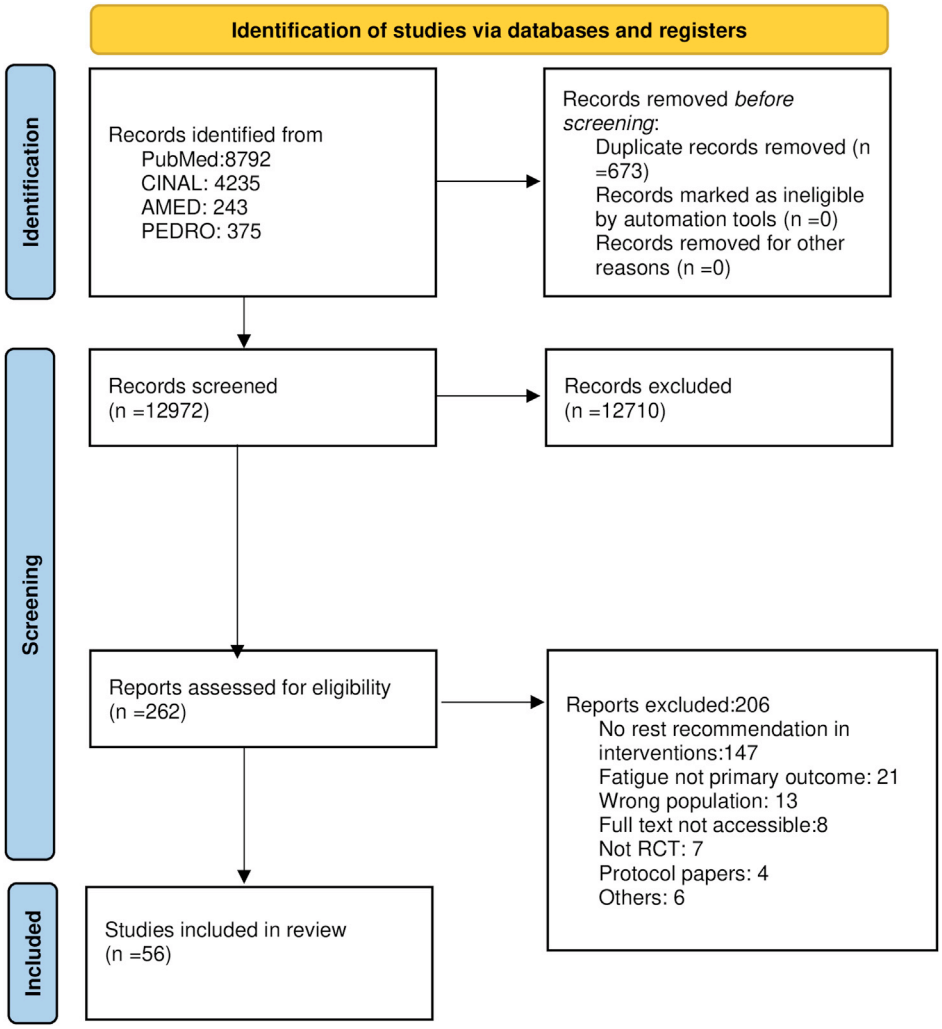


Fig 1 PRISMA flowchart for study screening and selection.

results indicated that the intervention led to an increase in physical activity.

Moreover, 1 study[113] investigating energy conservation strategies assessed their effects on increasing physical activity. The findings indicated that the intervention did not result in an increase in activity participation.

Furthermore, 1 study[22] investigating the effects of activity pacing on increasing physical activity found that the intervention had potential to enhance physical activity levels in adults with multiple sclerosis.

Reporting and instruction of rest advice in the fatigue intervention for persons with LTC

Rest component in physical activity interventions

Rest as a component of exercise interventions was primarily identified within the context of physical activity. A total of 31 studies[39-41,65-71,74,76,81-83,85,86,90-93,96,97,99,100,102,103,105,107,110,112] reported on this aspect. The "active ingredient" of rest in exercise interventions was described using the frequency, intensity, duration, and type of rest parameters. It is important to note that among the frequently reported rest variables (ie, frequency, duration, and type of rest) in exercise interventions, only 11 studies[39-41,69-71,79,81,83,98,103] included at least 2 rest prescription variables in their exercise protocols, whereas 20 studies[26,64,65,68,74,76,82,85,87,90-93,96,97,99,105,107,110,112] reported at most 1 rest prescription variable (table 2).

Frequency of rest

The review found that only 3 studies[71,90,98] specified the frequency of rest. For example, Oncu et al[90] examined the short-term effects of aerobic exercise on fatigue in patients with postpolio syndrome. During the training period, the walking duration was gradually increased based on the participants' tolerance, with a maximum limit of 30 minutes. Participants were permitted up to 3 rest periods per set to manage fatigue and ensure safety. Similar rest periods and frequency were incorporated into Dardin et al's[71] study involving persons with primary Sjögren's syndrome (table 2).

Intensity of rest

Ten studies reported on the intensity of rest[39-41,69,70,79,81,83,98,103] Among these, 2 studies reported on active rest,[98,103] and 8 studies reported on passive rest[39-41,69,70,79,81,83] (table 2).

Duration of rest

The review found that 23 of the physical activity interventions[26,39-41,64,65,68,69,71,79,81,83,85,91-93,97,98,103,105,107,110,112] specified the duration of rest, which ranged from 30 seconds to

Table 2 Characteristics of included studies and content of rest advice in the intervention

						Reporting of Rest in Exercise Interventions Using the FITT Framework				
Study ID	Year	Long-Term Condition	Intervention Category	Specific Interventions	How Rest Was Reported in All Interventions	Frequency of Rest	Intensity of Rest	Duration of Rest	Type of Rest	Key Conclusion on Fatigue or Physical Activity
Abonie et al (UK)[22]	2020	Multiple sclerosis	Pacing	Tailored activity pacing	Participants were advised to have a consistent pattern between activity and rest	X	X	X	X	Activity pacing increase activity level but not fatigue severity
Adams et al (Canada)[103]	2018	Cancer	Physical activity	Exercise training	Participants advised to have 3 min of active rest interval	X	Active	3 min	Active rest	Exercise training reduced cancer-related fatigue
Ahmadi et al (Iran)[110]	2013	Multiple sclerosis	Physical activity	Yoga-based exercises	Participants were advised to rest between poses for 30 s to 1 min	X	X	30 s-1 min	X	Fatigue improved in the yoga-based exercises
Austin et al (US)[111]	1996	Systemic lupus erythematosus	Energy management	Energy conservation education	Participants were advised to prioritize rest	X	X	X	X	There were improvements in fatigue in both groups
Bilek et al (Türkiye)[112]	2022	Multiple sclerosis	Physical activity	Aerobic exercises	Participants were given 2 min rest between sets	X	X	2 min	X	The aerobic exercise revealed significant changes fatigue in patients with multiple sclerosis
Blikman et al (The Netherlands)[113]	2017	Multiple sclerosis	Energy management	Energy conservation education	Participants were educated on the importance of rest, using rest to relieve fatigue, and breaking down negative attitudes toward rest	X	X	X	X	Energy conservation education did not reduce fatigue and restricted participation
Bourke et al (UK)[64]	2011	Cancer	Physical activity	Home-based exercises	Patients were advised to rest for 30-90 s between sets of resistance exercises	X	X	30-90 s	X	There was significant reduction in fatigue among the participants
Cakıt et al (Türkiye)[65]	2010	Multiple sclerosis	Physical activity	Cycling progressive resistance training	Patients were advised to rest for 2 min	X	X	2 min	X	The intervention improved fatigue in patients with multiple sclerosis
Cetin et al (Türkiye)[66]	2020	Scleroderma	Physical activity	Tai Chi exercises	Participants were advised to rest at any time during the exercises	X	X	X	X	Tai Chi exercises had positive impact on fatigue
Chang et al (Taiwan)[67]	2010	Chronic kidney disease	Physical activity	Leg ergometry exercises	Participants advised to rest tired during the exercises	X	X	X	X	Fatigue improved and physical activity increased among the participants
Chen et al (China)[68]	2021	Cancer	Physical activity	Tai Chi and resistance training	Participants were advised to rest for 3 min after each set	X	X	3 min	X	Tai Chi and resistance training reduce fatigue among the participants
Chuang et al (Taiwan)[69]	2017	Cancer	Physical activity	Qigong exercises	Participants advised to for 3-5 min	X	Passive	3-5 min	Standing, relaxing, and arms on waist	Qigong exercises can reduce fatigue intensity and interference
Cohen et al (US)[70]	2021	Cancer	Physical activity and psychoeducation	Aerobic exercises and relaxation	Participants were advised to have 20 min quiet seated rest	X	Passive	20 min	Quiet seated rest	Combined aerobic and relaxation training reduce perceived fatigue
Dardin et al (Brazil)[71]	2022	Primary Sjögren's syndrome	Physical activity	Resistance exercises	Patients were advised to rest for 1 min between sets	3 times	X	1 min	X	Resistance training was effective at reducing perceived fatigue among the participants
Evers et al (The Netherlands)[72]	2002	Rheumatoid arthritis	Psychological	Cognitive behavioral therapy	Participants were advised to plan daily activity and take time off	X	X	X	X	Intervention reduced fatigue in patients with high-risk rheumatoid arthritis

(*continued on next page*)

Table 2 (*Continued*)

Study ID	Year	Long-Term Condition	Intervention Category	Specific Interventions	How Rest Was Reported in All Interventions	Reporting of Rest in Exercise Interventions Using the FITT Framework				Key Conclusion on Fatigue or Physical Activity
						Frequency of Rest	Intensity of Rest	Duration of Rest	Type of Rest	
Fateh et al (Iran)[73]	2022	Amyotrophic lateral sclerosis	Energy management	Energy conservation education	Participants were advised to incorporate adequate rest, plan rest, and adjust rest during the day	X	X	X	X	Energy conservation strategies could lead to better fatigue management
Gervasoni et al (Italy)[74]	2019	Multiple sclerosis	Physical activity	Arm cycling	Participants were advised to alternate the exercises with short periods of rest	X	X	X	X	The program reduces self-reported fatigue
Ghahari et al (Australia)[75]	2010	Multiple sclerosis/ Parkinson	Education	Education	Participants were educated on importance of rest	X	X	X	X	The impact of fatigue improved in both groups
Hebert et al (US)[76]	2011	Multiple sclerosis	Physical activity	Vestibular exercises	Participants were advised to incorporate daily rest intervals	X	X	X	X	Vestibular exercises significantly reduced fatigue impact
Hewlett et al (UK)[77]	2019	Rheumatoid arthritis	Psychological	Cognitive behavioral therapy	Participants were advised to keep rest diaries and getting better rest	X	X	X	X	Intervention had effects in reducing fatigue
Hewlett et al (UK)[78]	2011	Rheumatoid arthritis	Psychological	Cognitive behavioral therapy	Participants were advised to keep rest diaries and getting better rest	X	X	X	X	Intervention fatigue self-management in RA improved fatigue impact
Hojan et al (Poland)[79]	2016	Cancer	Physical activity	General physical exercises	Participants had 5 min of relaxation period	X	Passive	5 min	Relaxation	There was significant reduction in fatigue among the participants
Jalon et al (UK)[80]	2012	Multiple sclerosis	Energy conservation	Energy conservation education	Participants were advised to plan rest and pace activities	X		X	X	The finding showed trend toward improving fatigue in the patients
Karpatkin et al (US)[39]	2016	Multiple sclerosis	Physical activity	Intermittent exercises	2 min rest periods during which participants sat in a standard wheelchair without performing any other activities	X	Passive	2 min	Sitting with no activity	No difference was found in fatigue measured with visual analogue scale fatigue However, fatigue improve in those measured with fatigue severity scale
Karpatkin et al (US)[41]	2022	Multiple sclerosis	Physical activity	Intermittent exercises	Participants were advised to alternate 30 s of seated rest with walking	X	Passive	30 s	Sitting	No difference in visual analogue scale fatigue scores between the 2 conditions
Karpatkin et al (US)[40]	2015	Multiple sclerosis	Physical activity	Intermittent exercises	Participants were advised to take 2 min seated rest between each increment	X	Passive	2 min	Seated rests	Intermittent exercises enabled the participants to walk more distance with less fatigue
Krese et al (US)[81]	2020	Traumatic brain injuries	Physical activity	Yoga-based exercises	Participants advised to rest 4-5 min in seated position and relaxing environment	X	Passive	4-5 min	Sitting in a relaxing environment	Fatigue did not significantly change between the interventions
Kröz et al (Germany)[82]	2017	Cancer	Education	Eurythmy therapy	Participants were advised to include 15 min rest	X	X	15 min	X	Reduced cancer-related fatigue
Lopes-Souza et al (Brazil)[83]	2021	Systemic lupus erythematosus	Physical activity	Whole-body vibration exercises	Participants advised to interspersed with 30 s passive rest	X	Passive	30 s	Passive rest	Whole-body vibration may be useful to reduce fatigue

(*continued on next page*)

Table 2 (*Continued*)

Study ID	Year	Long-Term Condition	Intervention Category	Specific Interventions	How Rest Was Reported in All Interventions	Reporting of Rest in Exercise Interventions Using the FITT Framework: Frequency of Rest	Intensity of Rest	Duration of Rest	Type of Rest	Key Conclusion on Fatigue or Physical Activity
Mathiowetz et al (US)[84]	2005	Multiple sclerosis	Energy conservation management	Energy conservation education	Participants were advised on importance of incorporating rest throughout the day	X	X	X	X	Energy conservation education had significant effects on reducing fatigue
Maurer et al (Germany)[85]	2018	Multiple sclerosis	Physical activity	Resistance and endurance exercises	Participants were advised to have a resting period of 1-2 min between sets	X	X	1-2 min	X	No direct significant differences in fatigue were seen between the groups
Mead et al (UK)[86]	2022	Stroke	Psychological	Cognitive behavioral therapy	Participants were advised to balance activity and rest	X	X	X	X	There was no significant difference between the groups with regard to fatigue
Metin et al (Türkiye)[87]	2019	Cancer	Psychological	Relaxation and mindfulness	Participants were advised rest [sit in silent room] before each session	X	Passive	X	Quiet seated rest	Fatigue reduced significantly after relaxation and mindfulness
Moss-Morris et al (UK)[88]	2012	Multiple sclerosis	Psychological	Cognitive behavioral therapy	Participants were advised to take a break to allow thee to rest during sessions and keep rest diaries	X	X	X	X	The data suggested that Cognitive behavioral therapy may be a clinical and effective treatment for multiple sclerosis fatigue
Murphy et al (US)[21]	2010	Osteoarthritis	Pacing	Tailored activity pacing	Participants were to alternate activity with rest before symptom exacerbation	X	X	X	X	Activity pacing lessened fatigue interference and trend toward fatigue severity
Nguyen et al (Australia)[89]	2019	Stroke	Psychological	Cognitive behavioral therapy	Participants were advised to pace activities with optimal periods of rest breaks	X	X	X	X	Fatigue reduced significantly following cognitive behavioral therapy
Oncu et al (Türkiye)[90]	2009	Postpolio syndrome	Physical activity	Flexibility and aerobic exercises	Participants were advised to have rest periods	3 times	X	X	X	Exercise training reduced fatigue
Ozkul et al (Türkiye)[91]	2020	Multiple sclerosis	Physical activity	Virtual reality Pilates exercises	Participants were advised to have 10 min of rest after exercises	X	X	10 min	X	Fatigue severity improved in the exercise group
Pagola et al (Spain)[92]	2020	Cancer	Physical activity	Aerobic and resistance exercise	A rest period of 2 min between sets and 30 s between exercises	X	X	2 min	X	Intervention tends to improve fatigue perception and no significant increase in physical activity
Poort et al (The Netherlands)[26]	2020	Cancer	Physical activity	Graded exercise therapy	Participants were advised to take 15 min break during the training sessions	X		15 min	X	After the intervention patients reported lower fatigue, but results were not significant
Prieto-Gómez et al (Spain)[93]	2022	Cancer	Physical activity	Aerobic and resistance exercise	Participants advised to have 1 min resting period after 8-10 reps	X		1 min	X	Therapeutic exercise reduced perceived fatigue
Sadeghi et al (Iran)[94]	2016	Cancer	Energy management	Energy conservation education	Participants were educated on the importance of rest, incorporating rest and planning of rest periods	X	X	X	X	Energy conservation educations appear to reduce cancer-related fatigue

(*continued on next page*)

Table 2 (*Continued*)

Study ID	Year	Long-Term Condition	Intervention Category	Specific Interventions	How Rest Was Reported in All Interventions	Reporting of Rest in Exercise Interventions Using the FITT Framework: Frequency of Rest	Intensity of Rest	Duration of Rest	Type of Rest	Key Conclusion on Fatigue or Physical Activity
Sandler et al (Australia)[95]	2017	Cancer	Psychological	Cognitive behavioral therapy	Participants were advised to plan activity with rest breaks	X	X	X	X	Intervention was more effective in reducing fatigue than simple education. No significant difference was found in change scores between groups
Şenışık et al (Türkiye)[96]	2022	Cancer	Physical activity	resistance exercises	Participants were advised to have short rest when needed	X	X	X	X	Resistance training was effective at reducing perceived fatigue among the participants
Steindorf et al (Germany)[97]	2014	Cancer	Physical activity	resistance exercises	Participants were advised to rest for 1 min between set	X	X	1 min	X	The program improved self-reported fatigue
Sveaas et al (Norway)[98]	2020	Spondylarthritis	Physical activity	Cardiorespiratory exercises	Participants had 3 min of active rest	4 times	Active	3 min	Active rest	The exercise had beneficial effects on fatigue
Tarakci et al (Türkiye)[99]	2013	Multiple sclerosis	Physical activity	General physical exercises	Participants were advised to rest when tired	X	X	X	X	Fatigue severity reduced in favor of the exercise group
Thomas et al (UK)[100]	2013	Multiple sclerosis	Education	Education	Participants were educated on incorporating rest periods, balancing activity with rest	X	X	X	X	The intervention improved fatigue in patients with multiple sclerosis
Van Kessel et al (New Zealand)[101]	2008	Multiple sclerosis	Psychological	Cognitive behavioral therapy	Participants were encouraged to improve levels of resting and activity	X	X	X	X	Intervention appears to be clinically effective treatments for fatigue in patients with multiple sclerosis
Voet et al (The Netherlands)[102]	2014	Muscular dystrophy	Psychological	Cognitive behavioral therapy	Participants were advised to balance rest and activity to prevent bursts of activity	X	X	X	X	Intervention can reduce and increase physical activity in patients with muscular dystrophy
Wang et al (Taiwan)[104]	2016	Chronic heart failure	Education	Supportive education	Participants advised to balance each activity with rest	X	X	X	X	Supportive education reduced fatigue in persons with chronic heart failure
Yağlı et al (Türkiye)[105]	2015	Cancer	Physical activity	Yoga-based exercises	Participants were advised to rest between poses for 30 s to 1 min	X	X	30 s -1 min	X	Fatigue improved in the yoga-based exercises
Yates et al (Australia)[106]	2005	Cancer	Education	Education	Participants were educated on importance of rest in fatigue reduction	X	X	X	X	Psychoeducation had short effects on fatigue
Yoon et al (South Korea)[107]	2020	Stroke	Physical activity	Core stabilization exercises	Participants were advised to rest for 2 min for each session	X	X	2 min	X	Intervention was more effective in reducing fatigue in patients with stroke
Yuen et al (US)[108]	2006	Cancer	Energy management	Energy conservation	Participants provided guidance on appropriate short periods	X	X	X	X	There was partial support for energy conservation strategy to reduce fatigue in patients with cancer
Zedlitz et al (The Netherlands)[109]	2011	Stroke	Psychological	Cognitive behavioral therapy	Educated on incorporating rest into daily activities	X	X	X	X	Reduced persistent fatigue

CBT; Cognitve Behavioral Therapy, VAS-F: Visual Analogue Scale-Fatigue.

5 minutes. For example, Cohen et al[70] conducted a study to assess the acute effects of aerobic exercise on fatigue in women with breast cancer. The exercise sessions involved moderate-intensity stationary cycling, and participants were instructed to include a 20-minute period of quiet seated rest. Similarly, Karpatkin et al[41] advised participants in their intermittent exercise protocol to walk on a treadmill at their individual speed for 30 seconds, followed by a 30-second rest period while seated on a chair placed on the treadmill (table 2).

Type/mode of rest

Ten studies[39-41,69,70,79,81,83,98,103] on physical activity interventions instructed on the type or mode of rest. The commonly instructed modes of resting included sitting, active rest, and passive rest. A study investigated the effects of physical activity interventions on fatigue in individuals with axial spondylarthritis, where the exercise was performed on a treadmill or cycle ergometer at high intensity, followed by 3 minutes of active resting at 70% of maximal heart rate, repeated 4 times.[98] Similar studies incorporated a seated mode of rest in their interventions.[39-41]

Rest in daily fatigue management strategy

The interventions identified in this study as part of a daily fatigue management strategy include energy management, cognitive interventions, activity pacing, and educational interventions. A total of 25 studies[22,72,73,75,77,78,80,82,84,86,87,88,89,94,95,100-102,104,106,108,109,111,113] reported utilizing these strategies. Among these, rest was predominantly presented to participants through educational components, focusing on the prioritization and importance of rest in daily life,[72,73,80,94,108,113] planning and integration of adequate rest into daily routines[27,72,89,95,101,106,109], as well as the balancing of rest and activity throughout the day.[22,72,89,95,109] For example, Sadeghi et al[94] conducted a study examining the effects of energy conservation strategies on cancer-related fatigue and health-promoting lifestyles in 135 breast cancer survivors. Participants were instructed to incorporate rest into their daily routines, emphasizing the importance of balancing rest periods with self-care, productivity, and leisure activities through careful planning.[94] Similarly, in a sample of 32 individuals with knee and hip osteoarthritis, participants were instructed to alternate between activity and rest before the onset of symptom exacerbation.[21] The detailed results are presented in table 2.

Type of rest and type of diagnosis

Eleven studies[39-41,69,70,79,81,83,87,98,103] instructed on the type of rest (ie, seated rest, active, and relaxation rest) and specific populations categorized by diagnosis. Among these, 5 studies focused on populations with cancer,[69,70,79,87,103] 5 on individuals with neurological conditions (eg, Multiple sclerosis, Systemic lupus erythematosus, Traumatic brain injuries),[39-41,81,83] and 1 on an individual with spondylarthritis.[98] The interventions predominantly consisted of physical activity strategies, with findings indicating that all interventions demonstrated potential for reducing fatigue across this diverse range of populations. The findings suggest that the type of rest employed across these populations encompassing active rest, relaxation, and sitting varied considerably (table 2). This variability suggests that the type of rest may not be strongly associated with or influenced by the specific diagnosis highlighting a broader applicability of rest strategies across diverse clinical populations.

Type of rest and type of tasks

Additionally, among the reported types of rest, 7 studies[39,41,70,79,81,98,103] indicated that participants were predominantly advised to rest from aerobic exercises, which involve moderate to high-intensity physical activity. Other tasks from which participants were advised to rest included yoga and qigong exercises, which are characterized by their low-impact, meditative, and mindful movement practices[69,81] (table 2). The findings of these studies demonstrated the potential to reduce fatigue in individuals with LTC.

Discussion

This review is the first to examine rest advice in nonpharmacological fatigue interventions for adults with LTC in randomized controlled trials. We have overviewed the types of fatigue interventions that report rest advice and impact on fatigue and physical activity participation in rehabilitation. Furthermore, this review evaluated how rest advice was reported within these interventions. Our analysis revealed that most interventions incorporating rest advice in the rehabilitation of adults with LTC were primarily focused on physical activity, cognitive strategies, energy conservation, activity pacing, and education. Although some interventions demonstrate efficacy in reducing fatigue and enhancing physical activity behavior among adults with LTC, others exhibit no significant improvements in these outcomes. A key finding was the stark difference in the reporting and instruction of rest advice across interventions type (eg, physical activity, activity pacing, and energy management). Regardless of the type of intervention, there was a notable lack of detailed reporting and instruction on rest content within fatigue interventions. This highlights the need for more thorough documentation and standardization in studies of both physical activity and daily fatigue management interventions.

The scoping review revealed that rest advice in fatigue interventions for adults with LTC primarily consists of physical activity, psychological interventions, energy conservation, activity pacing, and education. Analysis of the studies involving physical activity interventions indicated mixed outcomes in terms of their effectiveness in reducing fatigue. Likewise, studies involving psychological interventions, energy conservation, activity pacing, and education produced inconsistent results regarding their impact on alleviating fatigue in LTC populations. Advising rest in physical activity and daily fatigue management strategies could be important for restoring energy and supporting recovery.[45-48] Incorporating rest strategies within interventions may enable sustained activity engagement, facilitates a gradual increase in intensity, and acts as a preventive measure against symptom exacerbation, such as fatigue and pain, when incorporated into structured exercises and daily self-management routine practices.[17,21,22,24,51-53] Furthermore, it is important to highlight that despite the inconsistency of the evidence regarding the impact of fatigue interventions on reducing fatigue, a substantial proportion of the literature leans toward affirming the beneficial effects of such interventions. For instance, voting-counting shows that most studies reported and demonstrated that fatigue interventions significantly reduced fatigue in persons with LTC, whereas only a few did not show improvement. These findings are consistent with previous reviews systematic review and meta-analyses where some reported favorable outcome of fatigue interventions, indicating a correlation

between engagement in fatigue interventions (eg, physical activity) and fatigue reduction,[4,52,114-116] whereas others studies failed to demonstrate any significant effects of physical activity on fatigue.[117,118] However, our scoping review only included fatigue interventions that reported rest advice in the interventions, which indicates that even though not specified in detail, rest was seen as part of the intervention. Regarding the effects of fatigue interventions on increasing physical activity participation in this population, limited studies have reported clearly and consistently on this variable. Taken together, the limited evidence regarding nonpharmacological interventions aimed at reducing fatigue, and the limited number of studies that have addressed variables related to physical activity and rest, highlight the need for more rigorous randomized controlled trials.

An important finding was the significant disparity in reporting rest advice between exercise interventions and daily fatigue management strategies. It is important to note that rest in exercise interventions is most often instructed in terms of its duration, type, and occasionally its frequency. This format is not unexpected, as exercise interventions commonly follow the FITT framework. The FITT framework is used to structure key elements of the intervention, providing clarity and consistency in reporting. More importantly, we found that only a few studies (eg, 11/31 studies) reported at least 2 of these rest prescription variables in their exercise protocols, suggesting that although rest is included in the interventions, it is not given significant emphasis as to what good quality and quantity of rest actually looks like. Conversely, rest in daily fatigue management strategies was primarily instructed through education on importance of rest in daily life. Additionally, these interventions also focused on planning and integrating adequate rest into routines, while balancing rest and activity throughout the day. This suggests that the advising of rest in daily fatigue management strategies reflects the individualized, specific, and context-dependent nature of rest in daily life rather than offering a one-size-fits-all hence detailed instructions of rest parameters were not observed in these studies. Overall, there was sparse reporting of rest in both exercise interventions protocols and fatigue management strategies. One possible reason for the absence of detailed directions on rest in many fatigue interventions may stem from lack of understanding of how to implement rest effectively in daily life. Additionally, it may be that rest was advised during the intervention but was not reported or documented, thereby limiting the replication of these interventions for similar populations in different contexts, as well as making it difficult to undertake a synthesis of data exploring the optimal quality and quantity of rest. Another plausible explanation is that interventionists or rehabilitation professionals may assume that individuals inherently know how to rest and therefore telling participant to incorporate rest is enough. However, this assumption may not always be true, as anecdotal evidence indicates that people naturally find it difficult to rest.[37]

Taken together, most of the interventions provide limited guidance on how participants should rest in nonpharmacological fatigue interventions and the guidance on frequency, duration, and mode of rest remain limited. It is important to note that advising someone to rest without further specification may lead to activity avoidance,[119,120] which has negative connotations and implications for health outcomes, especially for persons with LTC.[121] Adequate rest has been shown to offer physiological and psychological benefits,[27,30,46,48,122-124] which is also the underpinning principle of activity pacing interventions.[5,9] However, limited specific information on rest advice in most interventions does not allow for the evaluation of its potential role, or to provide further recommendations on what appropriate rest would look like in terms of quality and quantity. Therefore, more research is essential to better understand how rest should be effectively integrated into fatigue and physical activity management programs to optimize outcomes for individuals, particularly those with LTC. Furthermore, in the context of health interventions, understanding rest and its implementation in rehabilitation among researchers, health care professionals, and persons with LTC may warrant attention in future studies. With the recent technological advancements in wearable technology, such as accelerometers,[125,126] there is an opportunity to enhance the reporting of rest and physical activity in rehabilitation interventions (eg, activity pacing). This would enable a more nuanced understanding of the role of rest in rehabilitation, guiding the development of personalized interventions that ensure rest and physical activity are appropriately balanced for each individual, thereby contributing to more effective and tailored rehabilitation strategies.

Study limitations

This scoping review has some limitations that should be considered when interpreting the results. First, our analysis only included studies whose intervention explicitly advised rest. However, some interventions may have recommended both rest and activity without providing detailed descriptions, which may therefore have been missed in this analysis. Second, although we aimed to assess the potential impact of the interventions on reducing fatigue and increasing physical activity, the absence of a formal risk of bias assessment may potentially introduce uncertainty regarding the methodological rigor and variability of the included studies. It is important to note, however, that scoping reviews typically do not involve detailed risk of bias evaluations, as their primary purpose is to map the available evidence and identify gaps in research rather than to provide definitive conclusions on intervention effectiveness.[58] Third, the review identified a limited number of studies on types of rest and a lack of data on different types of fatigue. Consequently, matching the type of rest with the corresponding type of fatigue proved challenging. Therefore, we recommend that future research and interventions systematically report on these variables to better understand their relationships in rehabilitation contexts. Nevertheless, this scoping review, which adhered to internationally recommended standards,[57,58] is the first of its kind to consolidate all interventions that include rest advice to reduce fatigue and increase physical activity participation in adults with LTC. Therefore, the identified gap may provide guidance for future studies.

Conclusion

The review found that most fatigue interventions in LTC rehabilitation that include rest advice primarily focus on physical activity, psychological interventions, energy conservation, activity pacing, and education, with varying results in reducing fatigue and increasing physical activity. Additionally, the review identified insufficient reporting of rest advice in these interventions, highlighting the need for more detailed documentation and standardization of rest in future studies. Future research should carefully and consistently include and describe rest, in addition to physical activity, to enhance the development and efficacy of rehabilitation strategies for managing fatigue in adults with LTC.

Keywords

Fatigue management; Health; Long-term conditions; Physical activity; Quality of life; Rehabilitation; Rest

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Data availability

The data supporting the findings of this study are available within the manuscript.

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