Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 3 (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Assessing Exercise Scale Adherence in Musculoskeletal Rehabilitation: A Systematic Review of Available Scales

Gajalakshmi C[1], Soundararajan K[*2], Antony Leo Aseer P[3], Subbiah K[4], Prathibha D[5], Tamilarasi S[6]

[1,2,3,4,5,6] Sri Ramachandra Faculty of Physiotherapy, Sri Ramachandra Institute of Higher Education and Research (Deemed to be University) Porur-600116, Chennai, India.

Email ID: soundararajan.k@sriramachandra.edu.in

Cite this paper as: Gajalakshmi C, Soundararajan K, Antony Leo Aseer P, Subbiah K, Prathibha D, Tamilarasi S, (2025) Assessing Exercise Scale Adherence in Musculoskeletal Rehabilitation: A Systematic Review of Available Scales. *Journal of Neonatal Surgery*, 14 (3), 130-136.

ABSTRACT

Background: Exercise adherence is critical in musculoskeletal (MSK) rehabilitation to ensure effective recovery and functional improvement. Despite its significance, there is no standardized tool to measure adherence comprehensively across diverse MSK conditions.

Objective: To systematically identify, evaluate, and summaries available tools for measuring exercise adherence in MSK rehabilitation and assess their strength, limitations, and potential applications.

Methods: A systematic review was conducted using databases like PubMed, EMBASE, and Cochrane Library for studies published between 2000 and 2024. Studies were evaluated based on inclusion and exclusion criteria, focusing on tools specific to MSK rehabilitation.

Results: The review identified tools such as the Exercise Adherence Rating Scale (EARS) and the Adherence To Exercise for Musculoskeletal Pain Tool (ATEMPT). EARS emerged as highly effective, offering comprehensive adherence assessment with strong psychometric reliability.

Conclusion: Existing tools like EARS and ATEMPT provide valuable insights but require further refinement to enhance applicability across diverse populations and clinical contexts.

Keywords: *Exercise adherence Musculoskeletal rehabilitation, Adherence measurement tools, Rehabilitation outcomes,*

1. INTRODUCTION

Musculoskeletal disorders are a leading cause of disability worldwide, significantly impacting a large percentage of individuals' physical function and quality of life every year. Exercise therapy is a cornerstone of rehabilitation for these conditions, as it helps improve strength, mobility, and overall function [1]. However, the success of exercise-based interventions largely depends on patients 'adherence to prescribed exercise regimens. Exercise adherence refers to the extent to which patients engage in, follow, and maintain a prescribed exercise program [2]. Poor adherence can compromise rehabilitation outcomes, leading to prolonged recovery, increased healthcare costs, and diminished patient well-being. Given its importance, adherence to exercise has become pivotal to musculoskeletal rehabilitation research [3].

Pain, lack of enthusiasm, low self-efficacy, and access to healthcare services are some of the hurdles to exercise adherence. Understanding these characteristics is critical for developing successful adherence-enhancing strategies [4]. Healthcare professionals can help increase adherence by personalising fitness regimens, communicating clearly, and providing motivational support [5]. Adherence has been proven to improve through patient education, goal setting, and follow-up monitoring. [6]

Home exercise programs (HEPs) are beneficial for healing; however, almost half of injured people do not stick to their programs [7]. Despite the benefits of HEPs, up to 70% of injured patients do not follow them for a variety of reasons, including low levels of physical activity, feelings of despair, anxiety, helplessness, forgetfulness, discomfort during exercise, and low self-efficacy [8]. To aid in patients' recovery, this highlights the need for improved rehabilitation techniques. [9].

Pain reduction, increased mobility, patient healing, long-term functional advantages, and quality of life all depend on adherence, which is the extent to which patients follow the recommended therapeutic exercise program. Nonetheless, adherence is impacted by several patient, system, and environmental factors. A comprehensive approach is necessary to treat musculoskeletal issues, with exercise at its core (Wang et al. 2020). For the program to have the intended effect, patients must follow the workout regimen. Non-adherence could make healing take longer, put stress on the therapeutic relationship, and possibly compromise the study's findings. (Caulfield, Argent, and Daly, 2018) [10].

Several instruments and measures designed to evaluate exercise compliance are intended to capture the different facets of patient involvement [4].In musculoskeletal rehabilitation, one of the most urgent problems is accurately measuring exercise adherence. In the realm of evaluating exercise adherence, the Exercise Adherence Rating Scale, or EARS, is perhaps the most significant advancement. Examined in a variety of therapeutic settings, the EARS is a viable and reliable measure for evaluating adherence to a specific exercise program.[11] The significance of patient-reported metrics that take into consideration the varying subjective factors on adherence is emphasized.

Since programs like the Japanese version of the EARS were created to accommodate the linguistic and cultural requirements of Japanese patients, adherence scales are increasingly seen as cross-culturally relevant. This focuses on the idea of fostering equitable access to healthcare services and using culturally relevant adherence metrics in healthcare delivery [12]. The assessment and promotion of exercise adherence have also been greatly influenced by digital technology; gamification, real-time monitoring, and personalised feedback have all been shown to improve adherence among people with musculoskeletal problems. These strategies address common obstacles to adherence, like a lack of accountability or drive.[13].

However, there remain certain flaws. A systematic review by McLean et al. (2016) emphasized the need for clinically meaningful and useful tools and found flaws in the acceptability and quality of the current tools [14]. Bailey et al. (2018) pointed out that it is challenging to standardize methods of measurement because there is no agreement on a definition of adherence [15]. To fill this gap, recently created instruments like the ATTEMPT (Adherence to Exercise for Musculoskeletal Pain Tool) incorporate patient-centred elements and concentrate on clinically important outcomes [16]. Specifically designed to test adherence in patients with low back pain, tools such as the EXAS may be some condition-specific metrics that can increase the precision of adherence measurement.[17].

Finally, Osthoff et al. (2018) show that both individual outcomes and general healthcare practices depend on adherence to healthcare policies and procedures. Evidence-based recommendations such as those made by the European League Against Rheumatism (EULAR) about physical activity for individuals with musculoskeletal disorders can be developed with the use of adherence data. These recommendations stress how crucial an organised exercise program is for those with RA, spondyloarthritis, and osteoarthritis, among other illnesses [17]. To provide a more thorough picture of patient involvement in therapy, Picha et al. (2018) proposed in a systematic review that self-efficacy assessments be taken into account when evaluating adherence. The significance of age-specific measures is emphasised by the Adherence to Exercise Scale for Older Patients, which predicts adherence in older patients [20].

The objective of this systematic review is to increase our knowledge of adherence evaluation by combining data from several validated tools, spotting weaknesses in the existing techniques, and investigating novel ideas. Lastly, in line with contemporary rehabilitation techniques, the findings should help direct the creation and application of patient-centred, culturally relevant adherence measures as well as the future development of condition-specific measures.

2. METHODOLOGY

Study setting:

A systematic review was conducted in the following defined format and the study was registered in the open science framework.

Study environment A systematic review was done using the following established format, and the paper was registered in the open science framework DOI.

Identification of research question

The PICOTT(S) method proposed by Sackett et al. (21) was used in this systematic review to formulate a search strategy

P (Population) – Individuals undergoing musculoskeletal rehabilitation.

I (Intervention) – Exercise adherence assessment tools or scales

C (Comparator) – Not applicable

O (Outcomes) – Evaluation of available scales or measures for assessing exercise adherence

T (Time) – all studies from 2003 to 2024.

S (Study design) – systematic review

Data Sources & Search Strategy

A systematic search of the electronic databases listed below will be used to identify relevant studies: PubMed, Scopus, Web of Science, Physiotherapy Evidence Database (PEDro), and Cochrane Library. The **Boolean Search Strategy** was applied as required. Keywords were ‘‘exercise adherence’’ OR ‘‘exercise compliance’’, ‘‘musculoskeletal rehabilitation” OR ‘’rehabilitation’’, ‘‘measurement tools’’ OR "scales" and ‘‘assessment methods”. Manual reference checks of the listed studies were also conducted to find more pertinent papers.

Study selection:

Following database searches, Mendeley's desktop was used to check for duplicate citations in the gathered citations. All paper titles and abstracts were independently checked by two reviewers in the first round. Full-text evaluation is the second step, and additional articles were separated to meet the study's goals. The unanimity and consistency of the studies that were part of the systematic review were finalized by a third expert reviewer who also cross-checked.

Data from the chosen research was gathered using a data extraction table, which included the authors' year, title, and highlights. The reviewers cross-checked the data entries to ensure accuracy. Lastly, an experienced reviewer examined the data table. The data extraction process was followed by a descriptive synthesis of the gathered articles. Overall, this must describe the evidence that is currently available and point out any gaps in the body of current literature. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework was employed to systematically identify, screen, and include eligible studies. The process involved:(Fig.1.)

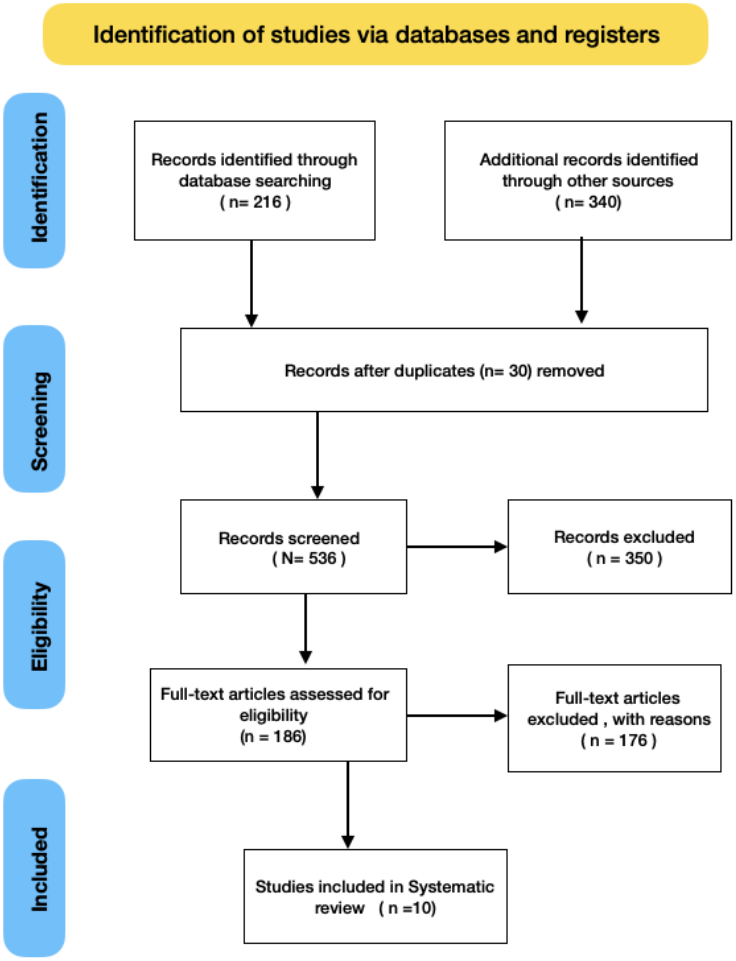

Fig.1. PRISMA flowchart of the study selection process

Inclusion Criteria:

Studies focusing on the development, validation, and application of exercise adherence measurement tools in musculoskeletal rehabilitation. Articles published in peer-reviewed journals. Studies conducted in English. Quantitative, qualitative, or mixed-methods research concluded in this study.

Exclusion Criteria:

All duplicate studies and those unrelated to musculoskeletal rehabilitation were excluded. Conference abstracts, editorials, or commentaries without full data were also excluded. Non-English publications were excluded as well.

3. RESULTS

The characteristics of the included studies in this scoping review are shown in Fig. 1. Following study selection, the 10 most relevant studies are included in the systematic review and described in Table 1.

AUTHOR AND YEAR	COUNTRY	TOPIC	HIGHLIGHTS
Holden et al. (2014)	*UK*	Recommendations for exercise adherence measures in musculoskeletal settings: a systematic review and consensus meeting.	The study emphasised the lack of standardised metrics for exercise adherence in musculoskeletal settings and suggested building strong instruments for consistent assessment.
McLean et al. (2016)	UK	Quality and acceptability of measures of exercise adherence in musculoskeletal settings: a systematic review.	Existing adherence assessments have been found to have shortcomings, and methods that mix clinical relevance with usability are needed.
Newman-Beinart et al. (2017)	UK	The development and initial psychometric evaluation of a measure assessing adherence to prescribed exercise: the Exercise Adherence Rating Scale (EARS).	Introduced EARS, a validated measure for monitoring exercise adherence, emphasising its potential use in physiotherapy settings.
Osthoff et al. (2018)	*Europe*	Effects of exercise and physical activity promotion: meta-analysis informing the 2018 EULAR recommendations for physical activity in people with rheumatoid arthritis, spondyloarthritis, and hip/knee osteoarthritis.	The health advantages of exercise adherence were reinforced, with links to improved outcomes in rheumatologic and osteoarthritic disorders.

AUTHOR AND YEAR	COUNTRY	TOPIC	HIGHLIGHTS
Bailey et al. (2018)	UK	Defining adherence to therapeutic exercise for musculoskeletal pain: a systematic review.	Examined the complexities of adherence behaviours, emphasising the importance of exact definitions for improved measurement accuracy.
Arensman et al. (2020)	Netherlands	Measuring exercise adherence in patients with low back pain: development, validity, and reliability of the EXercise Adherence Scale (EXAS).	Introduced EXAS, a dependable tool designed specifically for low back pain sufferers, confirming its specificity and effectiveness.
Naqvi et al. (2020)	Pakistan	Development and validation of the General Rehabilitation Adherence Scale **(GRAS)** in patients attending physical therapy clinics for musculoskeletal disorders	The GRAS is a reliable and valid instrument for measuring adherence and to improve rehabilitation protocols in patients with musculoskeletal disorders.
Takasaki et al. (2021)	Japan	Development and validity assessment of a Japanese version of the Exercise Adherence Rating Scale in participants with musculoskeletal disorders.	Validated the EARS for Japanese populations, demonstrating its cultural flexibility and emphasising the need for localised versions of adherence instruments.
Zhang et al. (2022)	China	Digital rehabilitation programs improve therapeutic exercise adherence for patients with musculoskeletal conditions: a systematic review with meta-analysis.	Digital interventions promote adherence to therapeutic exercises, providing scalable rehabilitation options.
Arensman et al. (2020)	Netherlands	Measuring exercise adherence in patients with low back pain: development, validity, and reliability of the EXercise Adherence Scale (EXAS).	Introduced EXAS, a dependable tool designed specifically for low back pain sufferers, confirming its specificity and effectiveness.

Many measures for evaluating exercise adherence in musculoskeletal rehabilitation were identified by the systematic investigation. Some of the most popular instruments were the Adherence to Exercise for Musculoskeletal Pain Tool (ATEMPT), the Exercise Adherence Rating Scale (EARS), and its Japanese counterpart, the EXercise Adherence Scale (EXAS). There were slight differences in the validity, reliability, and clinical utility of each instrument. To capture patient-reported adherence behaviour, for example, EARS became a well-validated tool with strong psychometrics [11]. Also, in a non-Western setting, the Japanese version of the EARS attained excellent reliability and validity by incorporating cultural adaptability as a necessary component [12]. The effectiveness of digital rehabilitation programs in overcoming common challenges such as motivation and accountability has also been demonstrated by systematic reviews and meta-analyses [13]. Additionally, EXAS and ATEMPT tools have also demonstrated the potential for condition-specific and patient-centred approaches to measuring adherence. The most notable aspect of the ATEMPT was its emphasis on clinically significant results, which helped bridge the gap between adherence evaluation and treatment objectives [16].

Despite the many advancements, there are still many restrictions. Due to the absence of standardisation in many instruments, there was too much choice regarding quality, acceptability, or widespread clinical use [14]. According to Bailey et al. (2018), the development and use of evaluation tools were further hindered by the absence of a universally recognised definition of adherence. Many methods may not completely capture psychological characteristics, but self-efficacy, in particular, is a powerful predictor of adherence [19].

4. DISCUSSION

In musculoskeletal rehabilitation, this study demonstrates the need for accurate, consistent, and contextually relevant exercise adherence metrics. Tools like EARS and its Japanese version demonstrate cultural flexibility and patient-reported outcomes. Further enhancement and validation are necessary due to the tool's diversity in applicability to different people and settings. Digital rehabilitation programs with gamification elements, personalized feedback, and real-time monitoring adhere to current healthcare trends. Digital integration into adherence testing can help remove barriers, particularly for individuals who do not participate in traditional rehabilitation programs. EARS, EXAS, and ATEMPT are examples of precise equipment that may be customized for particular patient groups to enhance adherence assessment. These tools increase accuracy and give doctors useful data. Comparisons and standardization pose challenges due to variations in tool quality and definition of conformance. For older individuals, the AESOP instrument incorporates psychological elements, offering a deeper understanding of adherence dynamics. Self-efficacy measures can be integrated into adherence tools to assist physicians in addressing both physical and psychological barriers to adherence.

5. CONCLUSION

The study centres on the development of patient-focused, condition-specific, and socially adaptive metrics of exercise adherence for musculoskeletal rehabilitation. EARS, EXAS, and ATEMPT are a few examples of tools that have shown potential in gathering adherence behaviours and guiding therapeutic practice. Digital rehabilitation programs are also improving adherence through novel ways. However, gaps in standards, quality, and psychological characteristics persist. Addressing these problems necessitates the refinement of existing tools, the creation of new ones, for condition-specific and the establishment of a widely understood definition of adherence. Future research should concentrate on combining self-efficacy assessments and developing tools across multiple demographics.

REFERENCES

[1] Sluijs, E. M., Kok, G. J., & van der Zee, J. (1993). Correlates of exercise compliance in physical therapy. Physical Therapy, 73(11), 771–782.

[2] Bassett, S. F. (2003). The assessment of patient adherence to physiotherapy rehabilitation. New Zealand Journal of Physiotherapy, 31(2), 60-66.

[3] Brewer, B. W., Cornelius, A. E., Van Raalte, J. L., & Petitpas, A. J. (2003). Adherence to sport injury rehabilitation programs: An integrated psycho-social approach. Physical Therapy in Sport, 4(2), 84-96.

[4] Holden, M. A., Haywood, K. L., Potia, T. A., Gee, M., & McLean, S. (2014). Recommendations for exercise adherence measures in musculoskeletal settings: A systematic review. Journal of Rehabilitation Medicine, 46(8), 676-686.

[5] Rhodes, R. E., & de Bruijn, G. J. (2017). How big is the physical activity intention-behaviour gap? A meta-analysis. Patient Education and Counseling, 100(7), 1134-1142. Link

[6] Hall, A. M., et al. (2012). Promoting physical activity adherence in musculoskeletal pain: A systematic review. British Journal of Sports Medicine, 46(6), 451-457.

[7] Essey, R., Geraghty, A. W., Kirby, S., & Yardley, L. (2017). Predictors of adherence to home-based physical therapies: A systematic review. Disability and Rehabilitation, 39(6), 519–534.

https://doi.org/10.3109/09638288.2016.1153160

[8] Jack, K., McLean, S. M., Moffett, J. K., & Gardiner, E. (2010). Barriers to treatment adherence in physiotherapy outpatient clinics: A systematic review. Manual Therapy, 15(3), 220–228. https://doi.org/10.1016/j.math.2009.12.004

[9] Kolt, G. S., & McEvoy, J. F. (2003). Adherence to rehabilitation in patients with low back pain. Manual Therapy, 8(2), 110–116.

[10] Argent, R., Daly, A., & Caulfield, B. (2018). Patient involvement with Home-Based Exercise Programs: Can connected health interventions influence adherence? JMIR Mhealth and Uhealth, 6(3), e47. https://doi.org/10.2196/mhealth.8518

[11] Newman-Beinart NA, Norton S, Dowling D, Gavriloff D, Vari C, Weinman JA, et al. The development and initial psychometric evaluation of a measure assessing adherence to prescribed exercise: the Exercise Adherence Rating Scale (EARS). Physiotherapy. 2017 Jun;103(2):180–5.

[12] Takasaki H, Kawazoe S, Miki T, Chiba H, Godfrey E. Development and validity assessment of a Japanese version of the Exercise Adherence Rating Scale in participants with musculoskeletal disorders. Health and Quality of Life Outcomes. 2021 Jun 24;19(1).

[13] Zhang ZY, Tian L, He K, Xu L, Wang XQ, Huang L, et al. Digital rehabilitation programs improve therapeutic exercise adherence for patients with musculoskeletal conditions: a systematic review with meta-analysis. Journal of Orthopaedic & Sports Physical Therapy. 2022 Aug 12;52(11):1–36.

[14] McLean S, Holden MA, Potia T, Gee M, Mallett R, Bhanbhro S, et al. Quality and acceptability of measures of exercise adherence in musculoskeletal settings: a systematic review. Rheumatology. 2016 Dec 24;kew422.

[15] Bailey DL, Holden MA, Foster NE, Quicke JG, Haywood KL, Bishop A. Defining adherence to therapeutic exercise for musculoskeletal pain: a systematic review. British J o u r n a l o f S p o r t s M e d I c i n e . 2 0 1 8 J u n 6;bjsports-2017-098742.

[16] Bailey, D. L., Bishop, A., McCray, G., Foster, N. E., & Holden, M. A. (2024). A new measure of exercise adherence: the ATEMPT (Adherence To Exercise for Musculoskeletal Pain Tool). British Journal of Sports Medicine, 58(2), 73-80.

[17] Arensman RM, Geelen RH, Koppenaal T, Veenhof C, Pisters MF. Measuring exercise adherence in patients with low back pain: development, validity, and reliability of the EXercise Adherence Scale (EXAS). Physiotherapy Theory and Practice. 2020 Sep 15;1–10.

[18] Osthoff, A R., Juhl, C B., Knittle, K., Dagfinrud, H., Hurkmans, E., Braun, J., Schoones, J W., Vlieland, T P M V., & Niedermann, K. (2018, December 1). Effects of exercise and physical activity promotion: meta-analysis informing the 2018 EULAR recommendations for physical activity in people with rheumatoid arthritis, spondyloarthritis and hip/knee osteoarthritis. BMJ, 4(2), e 0 0 0 7 1 3 - e 0 0 0 7 1 3 . h t t p s : / / d o i . o r g / 1 0 . 1 1 3 6 / rmdopen-2018-000713

[19] Picha KJ, Jochimsen KN, Heebner NR, Abt JP, Usher EL, Capilouto G, Uhl TL. Measurements of self-efficacy in musculoskeletal rehabilitation: A systematic review. Musculoskeletal Care. 2018 Dec;16(4):471-488. doi: 10.1002/msc.1362. Epub 2018 Sep 20. PMID: 30238607; PMCID: PMC7944995.

[20] Hardage J, Peel C, Morris D, Graham C, Brown C, Foushee HR, Braswell J. Adherence to Exercise Scale for Older Patients (AESOP): a measure for predicting exercise adherence in older adults after discharge from home health physical therapy. J Geriatr Phys Ther. 2007;30(2):69-78. doi: 10.1519/00139143-200708000-00006. PMID: 18171490.

[21] Sackett D, Richardson W, Rosenberg W, Haynes R. Evidence-Based Medicine: How to Practice and Teach EBM. London: Churchill Livingstone; 1997. 63. Sasai K, Saito T, Akagi S, Kato I, Ogawa R. Cervical curvature after laminoplasty for spondylotic myelopathy--involvement of yellow ligament, semispinalis cervicis muscle, and nuchal ligament. J Spinal Disord. 2000;13:26-30.