# Tele-Rehabilitation; A Concept Analysis

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**Abstract:** *The rapid advancement of digital health technologies has significantly transformed healthcare delivery and expanded the use of remote healthcare services. Telerehabilitation has emerged as an important approach for providing rehabilitation services through information and communication technologies, enabling healthcare professionals to deliver assessment, intervention, monitoring, and patient education remotely. Despite its increasing adoption across healthcare systems, the concept of telerehabilitation remains inconsistently defined in the literature, leading to variability in its interpretation and implementation. Therefore, this study aimed to analyze and clarify the concept of telerehabilitation using the Walker and Avant concept analysis framework. A review of relevant literature addressing telerehabilitation, digital rehabilitation technologies, and remote rehabilitation services was conducted to identify the defining attributes, antecedents, consequences, and empirical referents of the concept. The analysis revealed five key defining attributes of telerehabilitation: remote delivery of rehabilitation services, the use of information and communication technologies, interaction between healthcare professionals and patients, monitoring and feedback mechanisms, and the implementation of structured therapeutic rehabilitation interventions. The findings also identified important antecedents, including technological infrastructure, access to digital devices, trained healthcare professionals, and institutional support, while the main consequences included improved access to rehabilitation services, enhanced patient engagement, and clinical outcomes comparable to traditional face-to-face rehabilitation. Clarifying the concept of telerehabilitation contributes to a stronger theoretical understanding of remote rehabilitation services and supports the development of standardized definitions and clinical frameworks that may guide future research and practice in rehabilitation sciences.*

**Keywords:** Telerehabilitation; Telehealth; Digital Rehabilitation; Concept Analysis; Rehabilitation Technology.

## 1. Introduction

The rapid advancement of digital technologies has significantly transformed the delivery of healthcare services worldwide. In particular, the integration of telecommunication technologies into healthcare systems has facilitated the development of telemedicine and telehealth services, enabling healthcare providers to deliver care remotely. These innovations have become increasingly important in improving access to healthcare services, especially for individuals living in remote areas, those with mobility limitations, and patients requiring continuous medical support. Within this context,

telerehabilitation has emerged as an important modality for delivering rehabilitation services at a distance. Telerehabilitation involves the use of information and communication technologies (ICT), such as videoconferencing platforms, wearable sensors, mobile applications, and remote monitoring systems, to provide rehabilitation assessment, intervention, supervision, and patient education remotely (Hill et al., 2025). This approach is increasingly used across multiple rehabilitation disciplines, including physical therapy, occupational therapy, and speech-language pathology.

Growing evidence supports the effectiveness of telerehabilitation in improving clinical and functional outcomes across a wide range of patient populations. Several systematic reviews and umbrella reviews have reported that telerehabilitation interventions can achieve outcomes comparable to traditional face-to-face rehabilitation in areas such as stroke recovery, musculoskeletal disorders, and exercise-based rehabilitation for older adults (Alwadai et al., 2024; Bargeri et al., 2024; Wicks et al., 2023). Furthermore, telerehabilitation has been shown to enhance healthcare accessibility, reduce travel burden, and improve continuity of rehabilitation services, particularly in contexts where access to in-person rehabilitation is limited (Seron et al., 2021; Vieira et al., 2023). Despite the expanding body of evidence supporting its use, the concept of telerehabilitation remains inconsistently defined within the literature. The term is frequently used to describe a broad range of remote rehabilitation approaches, including synchronous video-based therapy, asynchronous digital rehabilitation programs, telemonitoring systems, and sensor-based rehabilitation technologies (Ettefagh et al., 2024; Garofano et al., 2025). Such variability in usage has led to conceptual ambiguity regarding the essential characteristics, boundaries, and applications of telerehabilitation. Clarifying the concept of telerehabilitation is therefore essential to support theoretical development, guide clinical implementation, and promote consistency in research and practice. Concept analysis provides a systematic method for examining the defining attributes, antecedents, consequences, and empirical referents of a concept in order to establish a clearer conceptual understanding. Therefore, the aim of this paper is to analyze and clarify the concept of telerehabilitation using a structured concept analysis approach.

## 2. Methodology

### 2.1 Study Design

This study employed a concept analysis methodology to examine and clarify the concept of telerehabilitation. Concept analysis is a structured approach used to explore the meaning, characteristics, and boundaries of a concept within a specific field of knowledge. It allows researchers to identify the defining attributes, antecedents, consequences, and empirical referents of a concept, thereby improving conceptual clarity and facilitating its application in research and practice.Concept analysis is particularly useful in healthcare disciplines where emerging concepts are frequently used with varying interpretations and definitions across the literature. Given the rapid expansion of digital health technologies and the increasing adoption of telerehabilitation services, a systematic examination of the concept is necessary to ensure consistency in terminology and understanding.

### 2.2 Concept Analysis Framework

This study adopted the Walker and Avant concept analysis method, which is widely used in nursing and healthcare research for concept clarification. The method provides a systematic process consisting of eight sequential steps:

- Selecting the concept
- Determining the aims or purposes of the analysis
- Identifying all uses of the concept in the literature
- Determining the defining attributes
- Constructing a model case
- Identifying additional cases (borderline, related, and contrary cases)
- Identifying antecedents and consequences
- Defining empirical referents

This structured approach enables a comprehensive examination of the concept of telerehabilitation and facilitates the development of a clearer conceptual understanding that can support both research and clinical practice.

### 2.3 Literature Search Strategy

To explore the uses and meanings of the concept of telerehabilitation, a targeted literature review was conducted. Relevant articles were identified from the existing body of literature addressing telerehabilitation, telemedicine in rehabilitation, and digital rehabilitation technologies. The review focused primarily on systematic reviews, umbrella reviews, and meta-analyses, as these sources provide comprehensive syntheses of existing evidence related to telerehabilitation interventions and applications. Key studies examining the effectiveness, implementation, and technological aspects of telerehabilitation were included to capture the various ways in which the concept is used within the literature (Alwadai et al., 2024; Bargeri et al., 2024; Jaswal et al., 2024; Nicolas et al., 2024; Seron et al., 2021).Additionally, studies addressing technological developments in telerehabilitation systems and ethical considerations in remote rehabilitation services were reviewed to provide a broader understanding of the concept (Ettefagh et al., 2024; Garofano et al., 2025; Filleul et al., 2025).

### 2.4 Inclusion Criteria

The literature included in this concept analysis met the following criteria:

- Published peer-reviewed articles focusing on telerehabilitation or remote rehabilitation services.
- Studies examining clinical effectiveness, technological implementation, or conceptual definitions of telerehabilitation.
- Systematic reviews, umbrella reviews, meta-analyses, and relevant conceptual papers
- Articles published in English.
- Studies addressing telerehabilitation across different rehabilitation disciplines such as physical therapy, occupational therapy, and neurological rehabilitation.

These studies were examined to identify how the concept of telerehabilitation is defined, applied, and interpreted within the literature. The extracted information was then analyzed according to the steps of the Walker and Avant framework.

## 3. Uses of the Concept of Telerehabilitation

The concept of telerehabilitation has evolved significantly with the expansion of digital health technologies and telemedicine services. In general, telerehabilitation refers to the delivery of

rehabilitation services through information and communication technologies (ICT) that allow interaction between healthcare professionals and patients at a distance. The concept encompasses a broad range of activities, including remote assessment, therapeutic interventions, patient monitoring, consultation, and health education. In the rehabilitation sciences, telerehabilitation is most commonly applied within disciplines such as physical therapy, occupational therapy, and speech-language therapy. These services are delivered using digital communication platforms that allow therapists to guide rehabilitation exercises, monitor patient performance, and provide real-time feedback. For example, telerehabilitation has been widely implemented in neurological rehabilitation, particularly in stroke recovery programs where remote therapy sessions can support functional recovery and continuity of care (Alwadai et al., 2024). Similarly, telerehabilitation interventions have been applied to manage musculoskeletal disorders, where patients perform guided exercise programs under remote supervision from physiotherapists (Bargeri et al., 2024; Vieira et al., 2023).

Another important use of the concept relates to technology-assisted rehabilitation systems. Advances in digital technologies have expanded the scope of telerehabilitation to include wearable sensors, motion capture systems, virtual reality platforms, and mobile health applications. These technologies enable remote monitoring of patient performance and facilitate more interactive rehabilitation experiences. For instance, motion sensor–based rehabilitation systems allow clinicians to track patient movements and provide feedback during remote exercise sessions (Garofano et al., 2025). Similarly, emerging lower-limb telerehabilitation systems integrate digital monitoring technologies to enhance rehabilitation outcomes and patient engagement (Ettefagh et al., 2024). Furthermore, telerehabilitation is frequently used as part of broader telehealth and telemedicine frameworks. In many healthcare systems, telerehabilitation represents a specialized application of telehealth focused specifically on rehabilitation services. This integration allows healthcare providers to deliver multidisciplinary rehabilitation programs remotely while maintaining communication between different healthcare professionals involved in patient care (Nicolas et al., 2024). Despite the growing use of telerehabilitation across healthcare systems, the concept remains inconsistently defined in the literature. Different studies use the term to describe a variety of remote rehabilitation modalities, ranging from synchronous video-based therapy sessions to asynchronous digital exercise programs and remote monitoring technologies. This variation in conceptual usage has led to inconsistencies in how telerehabilitation is understood and implemented in research and clinical practice (Hill et al., 2025; Jaswal et al., 2024).Consequently, examining the different uses of the concept provides an important foundation for identifying the defining attributes of telerehabilitation and clarifying its conceptual boundaries within rehabilitation science.

## 4. Defining Attributes of Telerehabilitation

Defining attributes represent the core characteristics that repeatedly appear in the literature and help distinguish a concept from related concepts. Identifying these attributes is a central step in concept analysis, as it allows researchers to clarify the essential features that must be present for a phenomenon to be considered an example of the concept.A review of the literature on telerehabilitation revealed several recurring characteristics that define the concept. These attributes reflect the essential components that differentiate telerehabilitation from traditional rehabilitation services and other forms of telehealth. Based on the reviewed literature, five primary defining attributes were identified.

### 4.1 Remote Delivery of Rehabilitation Services

One of the most fundamental attributes of telerehabilitation is the delivery of rehabilitation services at a distance. Unlike traditional rehabilitation, which requires direct face-to-face interaction between the therapist and the patient, telerehabilitation allows therapeutic services to be provided remotely through digital communication technologies. Remote service delivery enables patients to access rehabilitation interventions regardless of geographical barriers, mobility limitations, or transportation difficulties. This characteristic has been particularly important in expanding access to rehabilitation services in rural and underserved areas (Seron et al., 2021). In addition, remote rehabilitation delivery has been widely adopted to support continuity of care for individuals recovering from neurological conditions such as stroke (Alwadai et al., 2024).

### 4.2 Use of Information and Communication Technologies

Another essential attribute of telerehabilitation is the use of information and communication technologies (ICT) to facilitate the delivery of rehabilitation services. These technologies serve as the primary medium through which therapists and patients interact during remote rehabilitation sessions. Various technological tools are used in telerehabilitation, including videoconferencing platforms, mobile health applications, wearable sensors, and virtual reality systems. These technologies enable therapists to conduct remote assessments, guide therapeutic exercises, and monitor patient progress. Technological advancements have further expanded telerehabilitation capabilities through motion-tracking systems and sensor-based rehabilitation platforms (Ettefagh et al., 2024; Garofano et al., 2025).

### 4.3 Interaction Between Therapist and Patient

Effective interaction between healthcare professionals and patients represents another defining attribute of telerehabilitation. Although services are delivered remotely, telerehabilitation still involves active communication and therapeutic guidance from rehabilitation professionals. This interaction may occur synchronously, such as through live videoconferencing sessions, or asynchronously through digital platforms that allow therapists to review patient progress and provide feedback at a later time. Maintaining professional supervision and communication ensures that rehabilitation interventions remain individualized and clinically appropriate (Jaswal et al., 2024).

### 4.4 Monitoring and Feedback Mechanisms

Telerehabilitation also involves continuous monitoring of patient performance and provision of feedback during the rehabilitation process. Monitoring mechanisms allow therapists to track patient adherence, evaluate progress, and adjust rehabilitation programs as needed. Technological tools such as wearable sensors, motion capture systems, and telemonitoring platforms facilitate remote tracking of patient movements and rehabilitation performance. These monitoring systems enhance the quality of remote rehabilitation by enabling clinicians to maintain oversight of patient activities and therapeutic outcomes (van Westerhuis et al., 2024; Garofano et al., 2025).

### 4.5 Structured Therapeutic Rehabilitation Interventions

Finally, telerehabilitation includes structured therapeutic interventions designed to improve patient function and recovery. The primary goal of telerehabilitation remains consistent with traditional rehabilitation: restoring functional ability, improving mobility, reducing pain, and enhancing quality of life. These interventions may include therapeutic exercise programs, functional training, motor rehabilitation, and patient education. Research has demonstrated that structured telerehabilitation programs can produce significant improvements in patient outcomes across multiple conditions, including musculoskeletal disorders and age-related functional decline (Bargeri et al., 2024; Wicks et al., 2023).

## 5. Model Case

A model cases an example that includes all the defining attributes of the concept being analyzed. It provides a clear illustration of the concept in practice and demonstrates how its essential characteristics operate in a real-world context. Consider the following scenario:

A 65-year-old patient recovering from a stroke is referred to a physiotherapy program aimed at improving mobility and functional independence. Due to mobility limitations and long travel distances to the rehabilitation center, the patient is enrolled in a telerehabilitation program. The physiotherapist conducts rehabilitation sessions through a secure videoconferencing platform, where the patient performs guided therapeutic exercises at home. During each session, the therapist provides real-time instructions, observes the patient's movements, and corrects exercise performance through live interaction. The patient also wears a motion sensor device that tracks limb movements and transmits performance data to the therapist. Based on the collected data and visual observations, the therapist adjusts the rehabilitation program and provides continuous feedback to ensure correct exercise execution. In addition to live therapy sessions, the patient receives access to a mobile application containing instructional videos, exercise reminders, and progress tracking features. This digital platform allows the therapist to monitor adherence to the rehabilitation program and evaluate improvements in mobility over time. This example represents a model case of telerehabilitation because it includes all the defining attributes identified in the concept analysis. Rehabilitation services are delivered remotely through digital technologies, there is active interaction between the therapist and the patient, monitoring and feedback mechanisms are present through motion sensors and digital platforms, and the patient participates in structured therapeutic rehabilitation interventions designed to improve functional outcomes.

## 6. Additional Cases

In concept analysis, additional cases are used to further clarify the boundaries of the concept by illustrating examples that partially represent the concept, are related to it, or clearly contradict it. These cases help differentiate the concept from similar or opposing phenomena and strengthen the conceptual understanding of telerehabilitation.

### 6.1 Borderline Case

A borderline case contains some, but not all, of the defining attributes of the concept. For example, a patient with chronic low back pain receives a digital exercise program through a mobile health

application developed by a physiotherapy clinic. The application provides instructional videos demonstrating therapeutic exercises that the patient is expected to perform independently at home. Although the patient follows the program regularly, there is no real-time interaction with a physiotherapist and no direct monitoring of performance during exercise sessions. In this case, technology is used to support rehabilitation exercises, and the intervention is performed remotely. However, the absence of active interaction between the therapist and the patient, as well as the lack of monitoring and feedback mechanisms, means that this situation does not fully represent telerehabilitation. Instead, it reflects a partially related form of digital rehabilitation support.

### 6.2 Related Case

A related case refers to a situation that is conceptually similar but does not represent the concept itself. An example of a related case is the use of telehealth consultations for patients requiring medical advice regarding rehabilitation. In this situation, a patient schedules an online consultation with a healthcare provider to discuss rehabilitation progress, medication management, or recovery expectations. The consultation takes place through a videoconferencing platform, allowing the healthcare provider to offer guidance and answer questions. Although this scenario involves remote healthcare delivery using digital technologies, it does not necessarily include structured therapeutic rehabilitation interventions or continuous monitoring of patient performance. Therefore, it represents telehealth or telemedicine services, rather than telerehabilitation specifically (Hill et al., 2025).

### 6.3 Contrary Case

A contrary case represents a situation that clearly does not include the defining attributes of the concept. For instance, a patient recovering from knee surgery attends rehabilitation sessions at a hospital-based physiotherapy clinic. The physiotherapist performs physical assessments, supervises therapeutic exercises directly, and provides manual therapy techniques during each session. All interactions occur face-to-face within the clinical setting, and no digital communication technologies are used to deliver or monitor the rehabilitation process. This scenario represents traditional in-person rehabilitation, which contrasts with telerehabilitation because it lacks remote service delivery and the use of digital communication technologies.

## 7. Antecedents and Consequences of Telerehabilitation

In concept analysis, antecedents refer to events or conditions that must occur before the concept can take place, whereas consequences refer to the outcomes that occur as a result of the concept. Identifying antecedents and consequences helps clarify the contextual conditions necessary for the implementation of the concept and highlights the potential impact of its application in practice.

### 7.1 Antecedents of Telerehabilitation

Several conditions must exist before telerehabilitation can be successfully implemented. These antecedents primarily relate to technological infrastructure, healthcare system readiness, and user capabilities. One of the most fundamental antecedents is the availability of digital infrastructure and communication technologies. Telerehabilitation relies heavily on stable internet connectivity, digital communication platforms, and devices such as smartphones, computers, or wearable monitoring

technologies that enable remote interaction between healthcare providers and patients (Ettefagh et al., 2024). Another important antecedent is the availability of trained healthcare professionals capable of delivering rehabilitation services through digital platforms. Healthcare providers must possess the necessary technical skills and clinical competencies to adapt rehabilitation interventions to remote environments and effectively monitor patient progress through digital tools (van Westerhuis et al., 2024). Patient-related factors also represent essential antecedents for telerehabilitation. Patients must have access to appropriate technology, as well as the digital literacy required to use telecommunication platforms and rehabilitation applications. Without sufficient technological access or user competence, participation in telerehabilitation programs may be limited (Nicolas et al., 2024).Additionally, institutional and organizational support plays a critical role in enabling telerehabilitation services. Healthcare systems must establish regulatory frameworks, digital health policies, and clinical guidelines that support the integration of telerehabilitation into routine healthcare delivery (Filleul et al., 2025).

### 7.2 Consequences of Telerehabilitation

The implementation of telerehabilitation can result in several positive outcomes for patients, healthcare providers, and healthcare systems. One of the most widely reported consequences is improved access to rehabilitation services, particularly for individuals living in rural or underserved areas where rehabilitation services may be limited. By enabling remote service delivery, telerehabilitation reduces geographic barriers and facilitates timely access to care (Seron et al., 2021). Another important consequence is the potential for improved functional outcomes and patient recovery. Evidence from systematic reviews and meta-analyses indicates that telerehabilitation interventions can achieve clinical outcomes comparable to those of traditional face-to-face rehabilitation for various conditions, including stroke and musculoskeletal disorders (Alwadai et al., 2024; Bargeri et al., 2024).Telerehabilitation may also contribute to greater efficiency within healthcare systems. By reducing travel requirements, optimizing therapist time, and enabling remote monitoring of patient progress, telerehabilitation can support more efficient use of healthcare resources (Jaswal et al., 2024). Furthermore, telerehabilitation has been associated with improved patient engagement and adherence to rehabilitation programs. Digital tools such as mobile applications, wearable sensors, and remote monitoring platforms allow patients to track their progress and receive ongoing feedback, which may enhance motivation and participation in therapeutic activities (Garofano et al., 2025).Despite these benefits, some potential challenges have also been identified, including technological barriers, concerns related to data privacy, and ethical considerations associated with remote healthcare delivery (Filleul et al., 2025).

## 8. Empirical Referents of Telerehabilitation

Empirical referents are observable phenomena that demonstrate the existence of a concept in practice. In concept analysis, empirical referents provide measurable indicators that allow researchers and clinicians to identify and evaluate the presence of the concept within real-world settings. In the context of telerehabilitation, empirical referents include technological systems, clinical outcome measures, and indicators of patient participation that reflect the implementation of remote rehabilitation services. One of the primary empirical referents of telerehabilitation is the use of digital rehabilitation platforms that facilitate remote communication between therapists and patients. These platforms often include videoconferencing systems, mobile health applications, and digital interfaces that allow healthcare professionals to deliver rehabilitation sessions and monitor patient progress

remotely. The presence of such platforms within clinical rehabilitation programs is a clear indicator of telerehabilitation implementation (Nicolas et al., 2024).Another important empirical referent is the use of remote monitoring technologies. Wearable sensors, motion tracking systems, and telemonitoring tools enable clinicians to collect objective data regarding patient movements, exercise performance, and rehabilitation progress. These technologies support remote supervision and allow therapists to evaluate patient adherence to rehabilitation programs (Garofano et al., 2025; Ettefagh et al., 2024).

Clinical outcome measures also serve as empirical indicators of telerehabilitation effectiveness. Various standardized assessment tools are used to evaluate improvements in functional performance, mobility, pain levels, and quality of life following telerehabilitation interventions. Evidence from systematic reviews suggests that these outcomes can be comparable to those achieved through traditional face-to-face rehabilitation programs (Seron et al., 2021; Jaswal et al., 2024). In addition, patient engagement and adherence metrics represent important empirical referents of telerehabilitation. Digital platforms often include features that track patient participation in rehabilitation exercises, completion of therapy sessions, and interaction with rehabilitation applications. These indicators provide measurable evidence of patient involvement in telerehabilitation programs and help clinicians evaluate the success of remote rehabilitation interventions (Wicks et al., 2023).Overall, the presence of digital rehabilitation platforms, remote monitoring technologies, standardized clinical outcome measures, and patient engagement indicators collectively serve as empirical referents that demonstrate the practical implementation of telerehabilitation within healthcare systems.

## 9. Discussion

The present concept analysis aimed to clarify the concept of telerehabilitation by identifying its defining attributes, antecedents, consequences, and empirical referents using the Walker and Avant framework. The analysis revealed that telerehabilitation is characterized by several core attributes, including the remote delivery of rehabilitation services, the use of information and communication technologies, interaction between healthcare professionals and patients, monitoring and feedback mechanisms, and the provision of structured therapeutic rehabilitation interventions. These attributes collectively distinguish telerehabilitation from other forms of digital healthcare services such as telemedicine or general telehealth. The findings of this analysis are consistent with recent efforts in the literature to establish a clearer conceptual understanding of telerehabilitation. For example, Hill et al. (2025) highlighted the need for a consensus definition of telerehabilitation and emphasized its role as a specialized application of telehealth focused specifically on the delivery of rehabilitation services through digital communication technologies. Similarly, previous systematic reviews have demonstrated that telerehabilitation interventions can be effectively implemented across multiple rehabilitation disciplines, including neurological, musculoskeletal, and geriatric rehabilitation (Alwadai et al., 2024; Bargeri et al., 2024; Wicks et al., 2023).

Another important finding emerging from the analysis is the central role of technological innovations in shaping the development of telerehabilitation. Advances in digital health technologies, including wearable sensors, motion tracking systems, and mobile health platforms, have expanded the capabilities of telerehabilitation and enabled more interactive and personalized rehabilitation programs (Ettefagh et al., 2024; Garofano et al., 2025). These technologies allow clinicians to remotely monitor patient performance, provide real-time feedback, and adapt rehabilitation interventions based on patient progress. Despite these advancements, several challenges remain in

the implementation of telerehabilitation. Technological barriers, including limited internet access and digital literacy, may restrict participation for certain patient populations. In addition, ethical considerations related to data privacy, patient confidentiality, and equitable access to digital healthcare services continue to be important concerns in the expansion of telerehabilitation programs (Filleul et al., 2025). Clarifying the concept of telerehabilitation is therefore essential for both research and clinical practice. A clearer conceptual understanding can support the development of standardized definitions, improve the design of telerehabilitation interventions, and facilitate consistent reporting of research findings. Furthermore, conceptual clarity can help healthcare providers better integrate telerehabilitation into rehabilitation services and ensure that digital rehabilitation programs maintain high standards of quality and effectiveness.

## 10. Implications for Practice and Research

### 10.1 Implications for Clinical Practice

The clarification of the concept of telerehabilitation has important implications for clinical practice in rehabilitation sciences. Establishing a clearer conceptual understanding allows healthcare professionals to better integrate telerehabilitation into rehabilitation services while maintaining high standards of care. First, a well-defined concept of telerehabilitation can assist healthcare providers in designing structured and evidence-based remote rehabilitation programs. By recognizing the defining attributes of telerehabilitation such as remote service delivery, the use of digital technologies, therapist–patient interaction, and continuous monitoring clinicians can ensure that remote rehabilitation interventions maintain the essential components required for effective therapeutic outcomes. Second, conceptual clarity may support the development of clinical guidelines and standardized protocols for telerehabilitation implementation. As digital rehabilitation services continue to expand, healthcare organizations must establish consistent frameworks that guide the safe and effective delivery of telerehabilitation across different rehabilitation disciplines. Third, the integration of telerehabilitation into routine clinical practice can enhance accessibility to rehabilitation services, particularly for patients who experience barriers to attending in-person rehabilitation sessions. These barriers may include geographical distance, transportation limitations, or mobility impairments. The use of digital communication technologies enables healthcare professionals to provide rehabilitation services while improving continuity of care and patient engagement. Finally, understanding the core attributes of telerehabilitation can help clinicians select appropriate technological tools, such as telemonitoring systems, wearable sensors, and digital rehabilitation platforms, to support patient assessment, monitoring, and therapeutic intervention.

### 10.2 Implications for Future Research

The findings of this concept analysis also highlight several directions for future research in the field of telerehabilitation. First, further research is needed to develop standardized definitions and conceptual frameworks that can be consistently used across studies investigating telerehabilitation interventions. The variability in terminology and conceptual usage observed in the literature suggests a need for greater conceptual alignment among researchers. Second, future studies should continue to evaluate the clinical effectiveness of telerehabilitation interventions across different patient populations and rehabilitation conditions. While existing systematic reviews have demonstrated promising results, additional research is needed to explore long-term outcomes, cost-effectiveness,

and patient satisfaction associated with telerehabilitation programs. Third, technological innovation represents an important area for future investigation. Emerging technologies such as artificial intelligence, virtual reality, and advanced motion-tracking systems may further enhance the capabilities of telerehabilitation and improve patient engagement in remote rehabilitation programs. Finally, future research should also address ethical and accessibility considerations, including issues related to data privacy, digital equity, and the usability of technological platforms for diverse patient populations.

## 11. Conclusion

This concept analysis aimed to clarify the concept of telerehabilitation using the Walker and Avant framework. Through a systematic examination of the literature, the analysis identified the essential components that characterize telerehabilitation and distinguish it from related concepts such as telemedicine and general telehealth services. The findings revealed that telerehabilitation is defined by several key attributes, including the remote delivery of rehabilitation services, the use of information and communication technologies, active interaction between healthcare professionals and patients, monitoring and feedback mechanisms, and the implementation of structured therapeutic rehabilitation interventions. Together, these attributes form the conceptual foundation of telerehabilitation and highlight its role as a specialized form of digital healthcare focused on rehabilitation services. The analysis also identified several important antecedents necessary for the successful implementation of telerehabilitation, including digital infrastructure, technological accessibility, trained healthcare professionals, and institutional support. In turn, the consequences of telerehabilitation include improved access to rehabilitation services, enhanced patient engagement, and the potential for clinical outcomes comparable to traditional face-to-face rehabilitation. Clarifying the concept of telerehabilitation is essential for promoting consistency in research, improving clinical implementation, and supporting the development of standardized guidelines for remote rehabilitation services. As digital health technologies continue to evolve, telerehabilitation is expected to play an increasingly important role in expanding access to rehabilitation and enhancing healthcare delivery. Overall, a clearer conceptual understanding of telerehabilitation can support the advancement of rehabilitation science and facilitate the effective integration of digital technologies into rehabilitation practice.

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