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Mobile Health Applications in Supporting Self-Care for Parkinson's disease: A Scoping Review

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ABSTRACT

Parkinson's disease is one of the most common progressive neurological disorders, characterized by a wide range of motor and non-motor symptoms that negatively affect patients' quality of life. Due to the chronic nature of the disease and the need for continuous care, supporting patients' self-care is of particular importance. Mobile health applications, as one of the digital health technologies, can facilitate continuous symptom monitoring and enhance patients' self-management. This study aimed to investigate the role of mobile health applications in supporting self-care among patients with Parkinson's disease. This study was conducted as a scoping review based on the six-stage framework proposed by Arksey and O'Malley. A systematic search was performed in PubMed, Scopus, Google Scholar, SID, and Magiran databases from 2006 to January 1, 2026. After removing duplicates and screening titles, abstracts, and full texts according to the inclusion and exclusion criteria, 14 eligible studies were included in the final analysis. Data related to study characteristics, application types, and key findings were extracted and analyzed descriptively. The findings showed that mobile health applications were mainly used in three areas: symptom monitoring, improvement of self-management, and enhancement of patient-centered outcomes. The main features of these applications included symptom recording, medication reminders, home-based exercise programs, performance feedback, and communication with healthcare providers. The results of many studies indicated that the use of these applications was associated with increased physical activity, improved medication adherence, enhanced self-efficacy, reduction of some motor and non-motor symptoms, and improved quality of life. In addition, most patients and caregivers evaluated these tools as useful and user-friendly. However, technical problems, limited digital literacy, reduced motivation for long-term use, and heterogeneity of findings were reported as major challenges. Mobile health applications have considerable potential to support self-care among patients with Parkinson's disease and may contribute to improving the daily management of the disease. However, further clinical trials with larger sample sizes and longer follow-up periods are required to determine the definitive effectiveness of these tools.

Keywords: Digital Health, Self-Care, Self-Efficacy, Self-Management, Parkinson Disease

Introduction

Parkinson's disease (PD) is one of the most common progressive neurological disorders and is associated with a wide range of motor and non-motor symptoms that can substantially affect patients' quality of life [1]. The disease is primarily characterized by tremor, rigidity, and akinesia or bradykinesia, resulting from degeneration of dopaminergic neurons in the substantia nigra. Guideline-based treatment for Parkinson's disease mainly includes dopaminergic medications and is often complemented by supportive interventions such as physiotherapy and exercise therapy [2, 3].

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Although therapeutic advances have improved symptom control and increased life expectancy among patients, no definitive cure is currently available. Consequently, many patients continue to live with progressive symptoms that may significantly impair daily functioning and quality of life. The prevalence of Parkinson's disease has been reported to range from 5 to more than 35 per 1,000 population[4], and its prevalence increases with age, rising approximately five- to tenfold between the sixth and ninth decades of life [5]. Given population aging and projections indicating a substantial increase in the older adult population in Iran by 1430, the burden of Parkinson's disease is also expected to increase in the coming years [6]. Self-care in Parkinson's disease includes symptom monitoring, medication management, maintenance of physical activity, informed health-related decision-making, and adaptation to functional changes associated with disease progression.

Because Parkinson's disease has a considerable impact on patients' daily functioning and quality of life, supporting patients in performing self-care behaviors is particularly important. Self-care education and support are considered among the essential responsibilities of nurses, particularly rehabilitation nurses, because of their specialized knowledge and close interaction with individuals living with chronic neurological disorders. Through patient education, regular symptom monitoring, accurate assessment, promotion of self-efficacy, and strengthening adherence to treatment plans, nurses can play an important role in improving patients' self-management and overall disease management [7]. Patients with Parkinson's disease may experience barriers to ongoing access to in-person healthcare because of mobility limitations, fatigue, transportation difficulties, and the need for continuous monitoring of symptoms. In this context, mobile health applications may provide an accessible platform for ongoing self-care support [8]. Recent evidence also suggests that mobile technologies may contribute not only to symptom management but also to identifying disease-related biomarkers and monitoring neurological activity in Parkinson's disease [9]. The expanding use of smartphones and health-related mobile applications has created new opportunities for symptom monitoring, patient education, and self-management support in chronic diseases [9-11]. Within this context, digital health technologies have increasingly been recognized as innovative tools to facilitate self-care and improve chronic disease management [12]

Although multiple studies have investigated the use of digital health technologies in Parkinson's disease, much of the available evidence is based on earlier studies and may not fully reflect recent developments in this rapidly evolving field. In addition, previous studies have frequently addressed a broad range of digital technologies—including wearable sensors, telemedicine, artificial intelligence, and other digital tools—while the specific role of mobile health applications in supporting self-care among patients with Parkinson's disease has received less focused attention. Considering the rapid advancement of mobile health technologies and the increasing use of smartphone applications in chronic disease management, mapping and updating the available evidence in this area appears necessary.

Therefore, the present study was conducted as a scoping review based on the framework proposed by Arksey and O'Malley [13] to identify and map existing evidence regarding the role of mobile health applications in supporting self-care among patients with Parkinson's disease.

Materials and Methods

This study was conducted as a scoping review with the aim of comprehensively mapping the existing evidence on the role of mobile health applications in supporting self-care among patients with Parkinson's disease. The design and conduct of the review were based on the six-stage methodological framework proposed by Arksey and O'Malley [13], including identifying the research question, identifying relevant studies, study selection, charting the data, collating, summarizing and reporting the results, and, where appropriate, consultation with experts. The reporting of this review was also guided by the PRISMA Extension for Scoping Reviews (PRISMA-ScR). (Figure 1)

The main research question was formulated as follows: "What types of mobile health applications have been developed and evaluated to support self-care among patients with Parkinson's disease, and what outcomes have been reported regarding their use?". The unit of analysis in this review included all published studies addressing mobile health applications related to self-care in patients with Parkinson's disease. The literature search was conducted for studies published between 2006 and January 1, 2026. The year 2006 was selected as the starting point because it coincided with the expansion of smartphone technology and the increasing development of mobile health applications. The search was performed in the following electronic databases: PubMed, Scopus, Google Scholar, SID, and Magiran. To retrieve relevant studies, combinations of keywords and controlled vocabulary related to "mobile applications," "mHealth," and "Parkinson disease" were used with the Boolean operators AND and OR.

The complete search strategy is presented in Table 1. Although searches were also conducted in SID and Magiran, no eligible studies from these databases met the inclusion criteria and were included in the final review.

The inclusion criteria consisted of studies published in Persian or English; studies published between 2006 and 2026; primary studies including randomized clinical trials, cohort studies, and before-and-after studies; and studies specifically focused on mobile health applications in Parkinson's disease.

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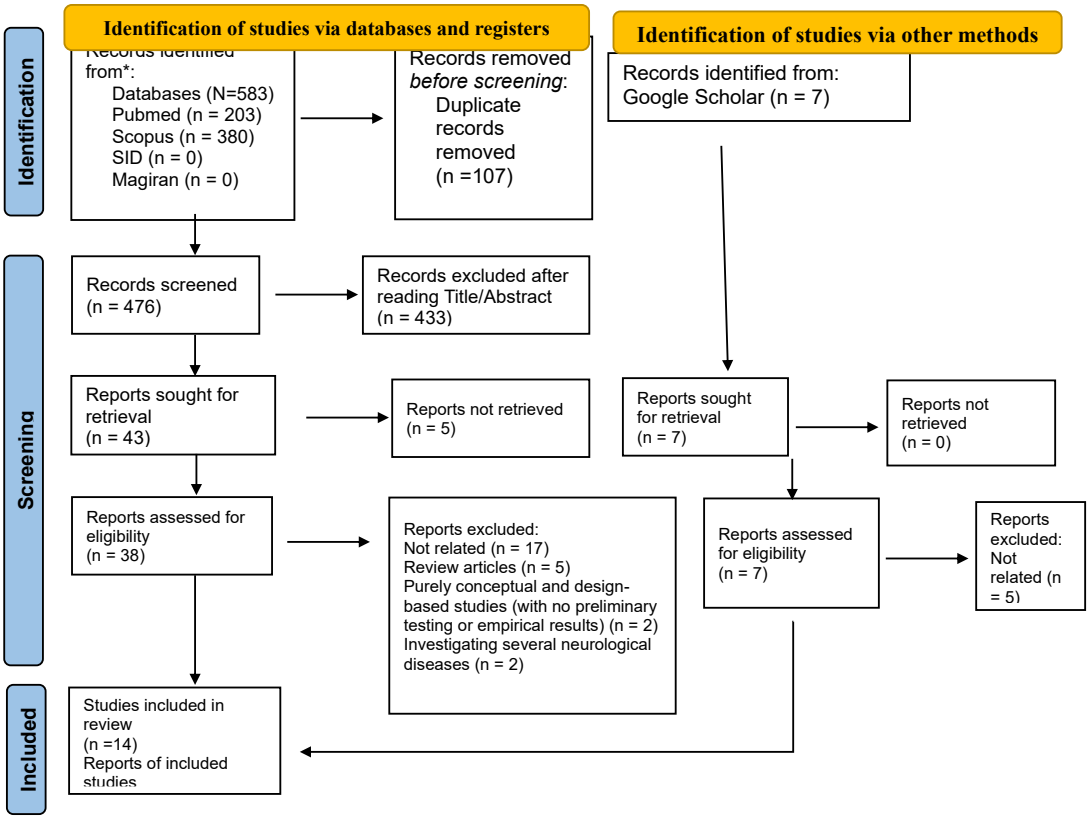

Flowchart 1: Study selection and screening process

Exclusion criteria included review articles, meta-analyses, letters to the editor, conceptual papers, studies describing application development without practical evaluation, and studies that examined multiple neurological disorders without reporting Parkinson's disease findings separately. The study selection process was conducted in three stages: removal of duplicate records, title and abstract screening, and full-text review. Two reviewers independently performed the screening process. In cases of disagreement, the final decision was made through discussion with a third reviewer. At the end of the screening process, 14 eligible studies were included for data extraction.

Data from the selected studies were extracted using a standardized data extraction form developed in Microsoft Excel. Before final use, the extraction form was pilot-tested on a small number of studies and revised where necessary. Extracted data included author name(s), year of publication, country of study, study design, application characteristics, area of application, reported outcomes, and the challenges and limitations described in each study.

Data analysis was conducted descriptively. Findings were summarized through thematic categorization using a qualitative content analysis approach. In addition, descriptive indicators including frequency and percentage were used to summarize study characteristics according to publication year, country of origin, and study design. Microsoft Excel was also used for organizing, categorizing, and managing the extracted data. The complete search strategy presented in Table 1.

Results

A total of 590 records published between 2006 and 2026 were identified through searches of five databases, including PubMed, Scopus, Google Scholar, SID, and Magiran. After removing duplicate and irrelevant records, 483 studies remained for title and abstract screening. Subsequently, 45 full-text articles were assessed for eligibility based on the inclusion criteria.

Finally, 14 studies met the eligibility criteria and were included in the scoping review. The complete process of study identification, screening, and selection is presented in Figure 1. The characteristics and main findings of the included studies are summarized in Table 2.

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Table 1. Search Strategy

Database	Search Strategy
Pubmed	("Mobile Applications"[Mesh] OR Application, Mobile[tiab] OR Applications, Mobile[tiab] OR Mobile Application[tiab] OR Mobile Apps[tiab] OR App, Mobile[tiab] OR Mobile App[tiab] OR Portable Electronic Apps[tiab] OR App, Portable Electronic[tiab] OR Electronic App, Portable[tiab] OR Portable Electronic App[tiab] OR Portable Electronic Applications[tiab] OR Application, Portable Electronic[tiab] OR Electronic Application, Portable[tiab] OR Portable Electronic Application[tiab] OR Portable Software Apps[tiab] OR App, Portable Software[tiab] OR Portable Software App[tiab] OR Software App, Portable OR Portable Software Applications[tiab] OR Application, Portable Software[tiab] OR Portable Software Application[tiab] OR Software Application, Portable[tiab] OR Smartphone Apps[tiab] OR App, Smartphone[tiab] OR Apps, Smartphone[tiab] OR Smartphone App[tiab]) AND ("Parkinson Disease"[Mesh] OR Idiopathic Parkinson Disease[tiab] OR Idiopathic Parkinson's Disease[tiab] OR Lewy Body Parkinson Disease[tiab] OR Lewy Body Parkinson's Disease[tiab] OR Paralysis Agitans[tiab] OR Parkinson Disease, Idiopathic[tiab] OR Parkinson's Disease[tiab] OR Parkinson's Disease, Idiopathic[tiab] OR Parkinson's Disease, Lewy Body[tiab] OR Primary Parkinsonism[tiab] OR Parkinsonism, Primary[tiab])
Scopus	(TITLE-ABS-KEY("Mobile Applications" OR "Application, Mobile" OR "Applications, Mobile" OR "Mobile Application" OR "Mobile Apps" OR "App, Mobile" OR "Mobile App" OR "Portable Electronic Apps" OR "App, Portable Electronic" OR "Electronic App, Portable" OR "Portable Electronic App" OR "Portable Electronic Applications" OR "Application, Portable Electronic" OR "Electronic Application, Portable" OR "Portable Electronic Application" OR "Portable Software Apps" OR "App, Portable Software" OR "Portable Software App" OR "Software App, Portable" OR "Portable Software Applications" OR "Application, Portable Software" OR "Portable Software Application" OR "Software Application, Portable" OR "Smartphone Apps" OR "App, Smartphone" OR "Apps, Smartphone" OR "Smartphone App")) AND(TITLE-ABS-KEY ("Parkinson Disease" OR "Idiopathic Parkinson Disease" OR "Idiopathic Parkinson's Disease" OR "Lewy Body Parkinson Disease" OR "Lewy Body Parkinson's Disease" OR "Paralysis Agitans" OR "Parkinson Disease, Idiopathic" OR "Parkinson's Disease" OR "Parkinson's Disease, Idiopathic" OR "Parkinson's Disease, Lewy Body" OR "Primary Parkinsonism" OR "Parkinsonism, Primary"))

Table 2. Main characteristics and key findings of studies included in the scoping review on mobile health applications supporting self-care in Parkinson's disease

Author	Year	Title	Country	Study design	Application name	Self-care domain / Main function	Target outcome(s)	Key findings
Lee et al. (14)	2025	Effect of the Yon PD App on the Management of Self-Care in People With Parkinson Disease: Randomized Controlled Trial	South Korea	Randomized controlled trial (RCT)	Yon PD	Self-care management; symptom monitoring	Self-care behaviors; symptom monitoring; satisfaction	Improved self-care in maintenance and symptom-monitoring dimensions; moderate-to-high satisfaction; declining use over time and some technical issues reported
Bhalala et al. (15)	2025	PARKA AI: A Sensor-Integrated Mobile Application for Parkinson's Disease Monitoring and Self-Management	Canada	Developmental study	PARKA AI	Monitoring and self-management	Symptom monitoring; self-management	Artificial intelligence and sensor-based monitoring supported self-management; further clinical validation recommended
Lee et al. (16)	2024	A Mobile App for Comprehensive Symptom Management in People With Parkinson's Disease: A Pilot Usability Study	South Korea	Pilot quasi-experimental study	Yon PD	Comprehensive symptom management	Self-efficacy; medication adherence; usability	Improved self-efficacy and medication adherence; high satisfaction; fatigue and low digital literacy were reported as barriers
Alves et al. (17)	2024	MoveONParkinson: developing a personalized motivational solution for Parkinson's disease management	Portugal	Cross-sectional study	MoveONParkinson	Exercise support and motivation	Motivation; exercise engagement	Increased motivation, accessible exercise guidance, and personalization; further refinement in design and patient training needed

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Ahn et al.(18)	2024	Increasing exercise with a mobile app in people with Parkinson's disease: a pilot study	South Korea	Pilot pre–post interventional study	Not reported	Physical activity support	Physical activity; quality of life	Increased physical activity and improved quality of life; high satisfaction and no adverse effects reported
Putzolu et al. (19)	2023	Home-based exercise training by using a smartphone app in patients with Parkinson's disease: a feasibility study	Italy	Pre–post interventional study	Parkinson Rehab	Home-based exercise	Physical activity; balance; motor symptoms	Improved physical activity, balance, and motor symptoms; high adherence and acceptability
Lützow et al. (20)	2023	The effects of an individualized smartphone-based exercise program on self-defined motor tasks in Parkinson's disease: a long-term feasibility study	Germany	Pre–post interventional study	PatientConcept	Personalized exercise management	Activities of daily living; motor symptoms; quality of life	Improved daily functioning and some motor symptoms; no statistically significant change in some quality-of-life outcomes
Khachian et al. (21)	2023	The Effectiveness of Self-Management Education Based on the Mobile Application on the Quality of Life of People with Parkinson's Disease	Iran	Pre–post interventional study	ParkinSeven	Self-management education	Quality of life; emotional well-being	Significant improvement in quality of life, particularly in psychological and emotional domains
Gassner et al. (22)	2022	The Effects of an Individualized Smartphone-Based Exercise Program on Self-defined Motor Tasks in Parkinson Disease: Pilot Interventional Study	Germany	Pilot pre–post interventional study	PatientConcept	Individualized exercise	Motor performance; safety	Improved motor performance in daily activities; high acceptance and safety
Kim et al. (23)	2021	Exercise Management Using a Mobile App in Patients With Parkinsonism: Prospective, Open-Label, Single-Arm Pilot Study	South Korea	Prospective open-label pilot study	Not reported	Exercise management	Exercise participation; sedentary behavior; quality of life	Increased exercise participation, reduced sedentary behavior, and improved quality of life
Theis et al. (24)	2020	Perceived Self-efficacy in Parkinson's Disease Through Mobile Health Monitoring	Germany	Cross-sectional study	PCompanion	Health monitoring	Self-efficacy; disease awareness	Increased awareness and perceived control over disease; psychological factors influenced technology acceptance
Kan et al. (25)	2018	Demo: STOP: A Smartphone-based game for Parkinson's disease medication adherence	Finland	Pilot study	STOP	Medication adherence	Daily monitoring; medication adherence	High usability for daily monitoring and medication reminders; increased engagement in self-care
Tsiouris et al. (26)	2017	PD-Manager: An mHealth platform for Parkinson's disease patient management	Multinational (Greece-led)	Developmental pilot study	PD_Manager	Disease monitoring and management	Motor symptoms; medication adherence	Accurate monitoring of motor symptoms and medication adherence through sensor-based technologies
Kim et al. (27)	2015	Development of Tablet Device App for Parkinson's Disease Patients' Continuous Self-Monitoring and Management	United States	Pilot study	MD Journal	Continuous monitoring and self-management	Symptom recording; medication management; communication	Improved symptom recording, medication management, and communication with the healthcare team; some design limitations were reported

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Table 2 presents the key characteristics and findings of the studies included in this scoping review. The selected studies were published between 2015 and 2025 and were primarily conducted in Asian and European countries. In terms of study design, the majority were pilot and pre-post interventional studies, with only one study conducted as a randomized controlled trial (RCT). The findings revealed that mobile health (mHealth) applications were mainly designed to monitor symptoms, support self-management, promote physical activity, improve medication adherence, and facilitate communication with the healthcare team.

In most studies, the use of these applications was associated with improved self-efficacy, increased physical activity, improvement in certain motor symptoms, and enhanced quality of life; furthermore, most patients reported high levels of satisfaction and acceptance regarding these tools.

However, technical issues, limited digital literacy, declining engagement in long-term use, and methodological heterogeneity were among the most significant reported challenges. Overall, the available evidence suggests that mHealth applications can serve as effective supportive tools for self-care in patients with Parkinson's disease, although more robust and long-term studies are necessary to confirm their efficacy.

Discussion

This scoping review synthesized the current evidence regarding the use of mobile health (mHealth) applications for self-care support among patients with Parkinson's disease and demonstrated that these technologies have primarily been implemented across three interrelated domains: symptom monitoring, enhancement of self-management capacity, and improvement of patient-centered outcomes.

Collectively, these findings indicate that mHealth applications may serve as a valuable adjunct to conventional Parkinson's disease management by facilitating continuous monitoring, supporting self-care behaviors, and extending care beyond routine clinical encounters. This observation aligns with emerging evidence in digital health suggesting that, particularly in chronic disease management and in contexts characterized by limited access to specialized services, mobile applications can complement routine care by promoting self-management and reducing gaps in care delivery [28, 29].

Within the studies included in this review, applications incorporating symptom tracking, medication reminders, exercise guidance, and real-time feedback were consistently associated with improved patient engagement in day-to-day disease management [14, 16, 19, 21, 23, 27]. Similar patterns have also been reported across other chronic and inflammatory conditions, reinforcing the broader role of digital health interventions as supportive tools for chronic disease self-management [29].

Across the reviewed studies, mHealth interventions were frequently associated with improvements in self-efficacy, medication adherence, physical activity, motor performance, and—in some cases—health-related quality of life. These findings suggest that mobile applications function not merely as passive monitoring platforms but as interactive behavioral tools capable of influencing health-related decision-making and daily disease-management behaviors.

By promoting self-monitoring, providing structured feedback, and facilitating adherence to treatment routines, these applications may contribute to behavior change processes that are particularly relevant in Parkinson's disease, where sustained engagement in medication management, mobility-related activities, and symptom awareness remains central to long-term outcomes [14, 16, 18, 21, 23, 27].

Recent evidence further supports this interpretation and highlights the capacity of digital health interventions to reinforce lifestyle modification and strengthen disease monitoring when integrated with standard clinical care [28]. From a theoretical and mechanistic perspective, the observed benefits may be explained through pathways involving enhanced patient empowerment and behavioral self-regulation.

Mobile health applications appear to strengthen self-efficacy by increasing patients' awareness of symptom fluctuations, improving perceived control over disease-related challenges, and facilitating active participation in treatment decisions. These mechanisms are especially relevant in Parkinson's disease, where disease progression and symptom variability often require frequent adjustment of self-care strategies.

Studies emphasizing continuous monitoring and active interaction between patients and the digital platform reported particularly favorable outcomes in self-efficacy and treatment engagement [17, 24]. Moreover, reminder systems and real-time feedback may reinforce medication-taking behaviors and reduce sedentary patterns, thereby supporting both adherence and functional mobility [19, 23]. These findings are consistent with broader behavioral science literature suggesting that digital feedback systems can positively influence adherence through reinforcement, monitoring, and habit formation.

Acceptability and usability emerged as another important dimension. Across most included studies, patients and caregivers perceived mHealth applications as practical, accessible, and beneficial. User-friendly interfaces, individualized exercise plans, and flexible access through mobile devices were repeatedly identified as facilitators of adoption and engagement [17, 20, 22]. However, acceptability should be interpreted cautiously.

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While general attitudes toward digital interventions were favorable, sustained engagement appeared to be influenced by patients' informational needs, perceived relevance of app content, and the availability of individualized support for selecting and using appropriate digital tools [5].

This finding is particularly important for Parkinson's disease, given the progressive nature of the condition and the potential presence of cognitive, motor, and functional limitations that may influence technology use over time. Accordingly, technical usability alone may not be sufficient to ensure long-term adherence; sustained effectiveness likely depends on whether interventions are responsive to users' changing clinical and psychosocial needs.

Several barriers were also identified, including technical difficulties, limited digital literacy, declining motivation with prolonged use, and user fatigue [24, 26, 27]. These barriers highlight that successful implementation of mHealth interventions requires more than technological functionality. In Parkinson's disease, where tremor, bradykinesia, cognitive impairment, and fatigue may interfere with routine interaction with digital devices, usability considerations must be closely aligned with disease-specific functional capabilities. This emphasizes the importance of user-centered design approaches and adaptive technologies tailored to the physical and cognitive profiles of individuals living with Parkinson's disease.

An important observation from this review is that improvements in behavioral and functional outcomes were not consistently accompanied by statistically significant changes in clinical endpoints or quality-of-life measures [20, 22]. Several explanations may account for this discrepancy. First, many interventions were of relatively short duration, potentially limiting the ability to detect clinically meaningful change in a progressive neurological disorder. Second, sample sizes were frequently modest, reducing statistical power. Third, substantial heterogeneity existed across interventions, outcome measures, and study objectives, limiting comparability and synthesis. These methodological limitations remain a recurrent challenge in digital health research and underscore the need for more standardized intervention frameworks and outcome reporting in future Parkinson's disease studies.

Psychological factors also appear to represent an important contextual determinant of digital intervention effectiveness. Evidence from the reviewed studies suggests that depressive symptoms may negatively affect both technology acceptance and self-efficacy, thereby influencing engagement with digital interventions and potentially attenuating clinical benefit [20, 24].

This observation is clinically meaningful, as depression is common in Parkinson's disease and may influence motivation, perceived capability, and adherence to self-management strategies. Future interventions may therefore benefit from integrating psychological support or adaptive engagement strategies to address emotional and motivational barriers alongside physical symptom management. Taken together, the evidence synthesized in this review indicates that mHealth applications have meaningful potential to support self-care among individuals with Parkinson's disease. However, despite encouraging short-term findings, the current evidence base remains heterogeneous and insufficient to establish the long-term sustainability and clinical significance of these interventions with certainty. Greater methodological rigor and stronger longitudinal evidence are required before broad implementation can be recommended at scale.

Conclusion

The findings of this scoping review showed that mobile health (mHealth) applications for patients with Parkinson's disease have mainly been used in three key areas: symptom monitoring, enhancement of self-management, and improvement of patient-centered outcomes. These findings suggest that such tools can play a complementary role in the management of chronic diseases and in facilitating continuous care. This result is consistent with recent evidence in the field of digital health, indicating that under conditions of limited specialized resources, health applications can be used as a complement to usual care by supporting self-management and bridging gaps in care [28, 29]. In this regard, the included studies showed that these applications, through features such as symptom logging, medication reminders, and the provision of performance feedback, facilitate improved patient engagement in self-care [14, 16, 19, 21, 23, 27]. Studies in other chronic/inflammatory diseases also show that health applications can be effective in supporting self-management and compensating for limited access to specialized care [29].

In most studies, the use of mobile health (mHealth) applications was associated with improvements in outcomes such as self-efficacy, medication adherence, physical activity, motor function, and quality of life. These results suggest that these technologies are not merely data-recording tools; rather, by enhancing self-monitoring, providing feedback, and structuring daily behaviors, they can play a role in promoting health-related behavioral change [14, 16, 18, 21, 23, 27]. In this context, evidence from 2025 underscores that digital health applications can facilitate the implementation of lifestyle modifications and support improved disease monitoring and management in conjunction with standard care [28].

From a mechanistic perspective, mobile health applications appear to enhance self-efficacy by increasing patients' awareness of their disease status, strengthening their sense of control, and improving motivation to adhere to treatment. This effect has been

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particularly prominent in studies emphasizing continuous monitoring and patient interaction with the system [17, 24]. In addition, some studies have shown that continuous feedback and medication reminders play an important role in improving treatment adherence and reducing sedentary behaviors [19, 23].

In terms of acceptability, most patients and caregivers have evaluated these applications as practical, easy to use, and beneficial. Factors such as user-friendly design, the ability to personalize exercises, and ease of access have been identified as key determinants of acceptance [17, 20, 22].

Recent studies further suggest that, although the overall level of acceptance of these tools is generally favorable, many patients still seek additional information and personalized guidance for selecting and using appropriate applications; this issue may, in turn, influence sustained use and real-world effectiveness [5]. Nevertheless, challenges such as technical problems, limited digital literacy, reduced motivation during long-term use, and user fatigue have also been reported in some studies [24, 26, 27]. These findings indicate that the success of digital interventions depends not only on technical design but also on patients' cognitive and functional characteristics.

In several studies, although improvements were observed in functional and behavioral outcomes, changes in clinical indicators and quality of life were not always statistically significant [20, 22]. This may be attributable to the short duration of interventions, limited sample sizes, and heterogeneity in assessment tools. In addition, variation in application types and intervention objectives has constrained direct comparison across studies.

On the other hand, some findings suggest that psychological factors such as depression may influence both technology acceptance and intervention effectiveness. In particular, the negative association of depression with technology acceptance and self-efficacy highlights the importance of considering patients' psychological status when designing digital interventions (20).

Generally, the evidence from this review suggests that mobile health applications can play an important role in promoting self-care and supporting patients with Parkinson's disease; however, stronger evidence is still needed to confirm their sustained and clinically meaningful effects.

This scoping review indicates that mobile health (mHealth) applications constitute a promising, feasible, and scalable strategy for supporting self-care among patients with Parkinson's disease. The available evidence suggests that these digital interventions may contribute meaningfully to symptom monitoring, medication adherence, physical activity promotion, and the day-to-day management of the disease. However, despite these encouraging findings, the current body of evidence remains constrained by methodological heterogeneity, variability in intervention characteristics, and the paucity of long-term clinical trials. Accordingly, future research should prioritize well-designed randomized controlled trials with larger sample sizes and extended follow-up periods to determine the sustained and clinically meaningful effectiveness of these tools.

Furthermore, there is a clear need for the development of personalized, user-centered interventions that integrate psychological support and address important barriers to engagement, including limited digital literacy and user fatigue. Ultimately, the successful translation of mHealth interventions into clinical practice will require a multidisciplinary approach involving clinicians, technology developers, and patients to ensure that these tools are not only effective but also acceptable, accessible, and seamlessly integrated into routine Parkinson's disease care.

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