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# Effectiveness of Digital Health Interventions in Improving Medication Adherence Among Individuals with Schizophrenia: A Systematic Literature Review

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## Abstract

**Background:** Medication non-adherence remains a major challenge in the long-term management of schizophrenia and is associated with relapse, psychiatric hospitalization, poor clinical outcomes, and increased healthcare costs. Digital health interventions have emerged as promising strategies to improve medication adherence; however, the available evidence remains heterogeneous across intervention types and healthcare settings.

**Objective:** This systematic literature review aimed to synthesize and critically evaluate current evidence regarding the effectiveness of digital health interventions in improving medication adherence among individuals with schizophrenia and related severe mental illnesses.

**Methods:** A systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Electronic searches were performed in PubMed, Scopus, ScienceDirect, ProQuest, and Google Scholar for studies published between January 2022 and June 2026. Eligible studies evaluated digital health interventions designed to support medication adherence among individuals with schizophrenia or related severe mental illnesses. Methodological quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools, and findings were synthesized using a narrative thematic approach.

**Results:** The search identified 1,186 records, of which 20 studies met the eligibility criteria and were included in the review. The interventions included smartphone applications, mobile health (mHealth), telehealth, electronic medication monitoring systems, digital medicine systems, SMS reminders, and remote monitoring technologies. Overall, digital health interventions were associated with improved medication adherence, enhanced patient engagement, strengthened treatment monitoring, and better communication between patients and healthcare professionals. Nevertheless, the magnitude of these benefits varied according to intervention characteristics, study design, outcome measures, and healthcare settings. Common implementation barriers included limited digital literacy, inadequate technological infrastructure, and unequal internet access.

**Conclusion:** Digital health interventions demonstrate considerable potential to improve medication adherence among individuals with schizophrenia and may strengthen continuity of care in mental health services. However, the heterogeneity of the available evidence highlights the need for further high-quality implementation research and pragmatic randomized controlled trials to evaluate long-term effectiveness and support sustainable integration of digital health into routine nursing practice.

**Keywords:** Digital health; medication adherence; schizophrenia; mobile health; telehealth; systematic literature review

## INTRODUCTION

Schizophrenia is a severe mental disorder and a major global public health concern because it is associated with persistent disability, impaired social functioning, reduced productivity, and substantial economic burden on individuals, families, and healthcare systems. According to the World Health Organization (WHO), more than 24 million people worldwide are living with schizophrenia, and most require lifelong antipsychotic treatment to control symptoms, prevent relapse, and improve functional recovery (WHO, 2023). Despite advances in pharmacological treatment, maintaining long-term medication adherence remains one of the greatest challenges in schizophrenia management and continues to hinder recovery and continuity of care (1).

Medication adherence refers to the extent to which patients take medications according to recommendations agreed upon with healthcare professionals and is the preferred terminology because it emphasizes patient engagement and shared decision-making (2). In this review, the term medication adherence refers specifically to adherence to prescribed antipsychotic medications. Poor medication adherence affects approximately 40–60% of individuals with schizophrenia and is associated with an increased risk of relapse, symptom exacerbation, psychiatric hospitalization, suicide, poorer quality of life, and higher healthcare costs (3). Medication adherence is influenced by multiple factors, including limited insight into illness, adverse drug effects, cognitive impairment, mental health stigma, inadequate family support, barriers to healthcare access, and insufficient long-term follow-up (4). These challenges highlight the need for interventions that facilitate continuous monitoring, strengthen patient engagement, and support long-term adherence beyond conventional face-to-face care.

The rapid expansion of digital health technologies has created new opportunities to improve long-term schizophrenia management. Digital health interventions—including mobile health (mHealth) applications, telehealth, telepsychiatry, smartphone applications, electronic medication monitoring systems, SMS reminders, and remote patient monitoring platforms—enable continuous monitoring of medication use, improve communication between patients and healthcare professionals,

expand access to mental health services, and provide ongoing education and self-management support (5). Within nursing practice, these technologies may strengthen continuity of care, facilitate patient follow-up, improve care coordination, and enhance community-based mental health services, particularly for individuals with limited access to specialist psychiatric care.

Recent studies have reported promising findings regarding the effectiveness of digital health interventions in improving medication adherence among individuals with schizophrenia and other severe mental illnesses (6,7). However, the available evidence remains fragmented because studies differ considerably in intervention type, technology platform, intervention intensity, duration of follow-up, outcome measures, study design, and healthcare settings. Furthermore, although many studies have been conducted in hospitals, specialist psychiatric services, or mixed populations with severe mental illness, fewer have specifically examined the applicability of these interventions within community-based and primary healthcare settings (8,9). Consequently, the extent to which current evidence can inform routine nursing practice and primary mental healthcare remains uncertain.

Therefore, this systematic review aimed to synthesize and critically evaluate current evidence on digital health interventions that support medication adherence among individuals with schizophrenia and related severe mental illnesses across healthcare settings, with particular attention to their implications for primary and community mental healthcare. Specifically, this review sought to identify (1) the characteristics of populations receiving pharmacological treatment, (2) the types of digital health interventions used to support medication adherence, (3) the healthcare settings in which these interventions have been implemented, (4) their effects on medication adherence, patient engagement, communication with healthcare professionals, treatment monitoring, and continuity of care, and (5) the role of nurses and nursing management in implementing and sustaining digital health interventions. By synthesizing evidence from diverse healthcare settings, this review aims to provide practical recommendations for integrating evidence-based digital health interventions into routine

nursing practice while identifying priorities for future research.

## METHODS

### Study Design

This study employed a systematic literature review (SLR) to synthesize current evidence on the effectiveness of digital health interventions in improving medication adherence among individuals with schizophrenia and related severe mental illnesses. The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 Statement to ensure a transparent, systematic, and reproducible review process (10).

### Search Strategy

A comprehensive literature search was conducted in PubMed, Scopus, ScienceDirect, ProQuest, and Google Scholar. The search covered studies published between January 2022 and June 2026, reflecting the rapid development of digital health technologies in mental healthcare. All searches were completed on 20 June 2026.

The search strategy combined controlled vocabulary (Medical Subject Headings [MeSH], where applicable) and free-text keywords using Boolean operators (AND and OR) as follows:

("Digital Health" OR "Digital Health Technology" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "Telepsychiatry" OR "eHealth" OR "Mobile Application" OR "SMS Reminder" OR "Electronic Medication Monitoring" OR "Remote Monitoring")

AND

("Schizophrenia" OR "Psychotic Disorder" OR "Severe Mental Illness")

AND

("Medication Adherence" OR "Treatment Adherence" OR "Medication Compliance")

To maximize retrieval of relevant studies, additional concepts related to primary healthcare, community mental health, and nursing were considered during article screening rather than being included as mandatory search terms. The first 200 Google Scholar records, sorted by relevance, were screened to improve search reproducibility (11).

Reference lists of all included studies were also manually searched to identify additional eligible publications.

### Eligibility Criteria

Eligibility criteria were developed using the Population–Concept–Context (PCC) framework.

Studies were included if they:

- were published between 2022 and 2026;
- involved individuals diagnosed with schizophrenia or related severe mental illnesses receiving pharmacological treatment;
- evaluated digital health interventions, including mobile health (mHealth), telehealth, telepsychiatry, smartphone applications, SMS reminders, electronic medication monitoring systems, or other digital technologies;
- reported medication adherence as either a primary or secondary outcome;
- were conducted in healthcare settings such as primary healthcare, community mental health services, outpatient clinics, hospitals, or specialist psychiatric services; and
- were original peer-reviewed research articles published in English or Indonesian.

Studies were excluded if they:

- did not involve individuals with schizophrenia or related severe mental illnesses;
- did not evaluate digital health interventions;
- did not report medication adherence outcomes;
- were review articles, editorials, conference abstracts, letters, theses, dissertations, study protocols, or unpublished reports; or
- were duplicate publications.

### Study Selection

Study selection followed the PRISMA 2020 guidelines (10). Two reviewers independently screened titles, abstracts, and full-text articles according to the predefined eligibility criteria. Disagreements were resolved through discussion until consensus was achieved.

The database search identified 1,186 records. After removing 286 duplicate records, 900 articles remained for title and abstract screening. During this stage, 790 records were

excluded because they were not relevant to the review objectives, involved inappropriate populations, did not evaluate digital health interventions, did not report medication adherence outcomes, or represented publication types that did not meet the eligibility criteria.

Subsequently, 110 full-text articles were assessed for eligibility. Of these, 90 studies were excluded because they did not satisfy the predefined inclusion criteria, including studies with inappropriate populations, interventions, or outcomes, as well as publications that were not original research. Ultimately, 20 studies met all eligibility criteria and were included in the narrative synthesis. The complete study selection process is presented in Figure 1.

### Quality Assessment

Methodological quality was independently assessed by two reviewers using the appropriate Joanna Briggs Institute (JBI) Critical Appraisal Tools according to each study design, including randomized controlled trials, quasi-experimental studies, cohort studies, cross-sectional studies, and mixed-methods studies (12).

Quality appraisal evaluated participant selection, validity and reliability of outcome measurements, management of confounding variables, completeness of follow-up, appropriateness of statistical analyses, and potential sources of bias. Any disagreements between reviewers were resolved through discussion until consensus was achieved.

In accordance with JBI recommendations, no overall numerical quality score was calculated because methodological quality was assessed using a domain-based approach rather than quantitative scoring. The appraisal findings were incorporated into the interpretation of the review findings, and detailed results are presented in Supplementary Table 1.

### Data Synthesis

Data were synthesized using a narrative thematic synthesis approach. The synthesis consisted of four stages: (1) familiarization with the included studies, (2) systematic coding of study findings, (3) development of descriptive and analytical themes, and (4) comparison of similarities and differences across studies.

Five overarching themes emerged from the synthesis:

1. effectiveness of digital health interventions in improving medication adherence;
2. patient engagement in treatment and self-management;
3. access to mental healthcare services;
4. treatment monitoring and continuity of care; and
5. implications for nursing practice and community mental healthcare.

The methodological quality of the included studies was considered throughout the synthesis to ensure that conclusions reflected the strength and consistency of the available evidence.

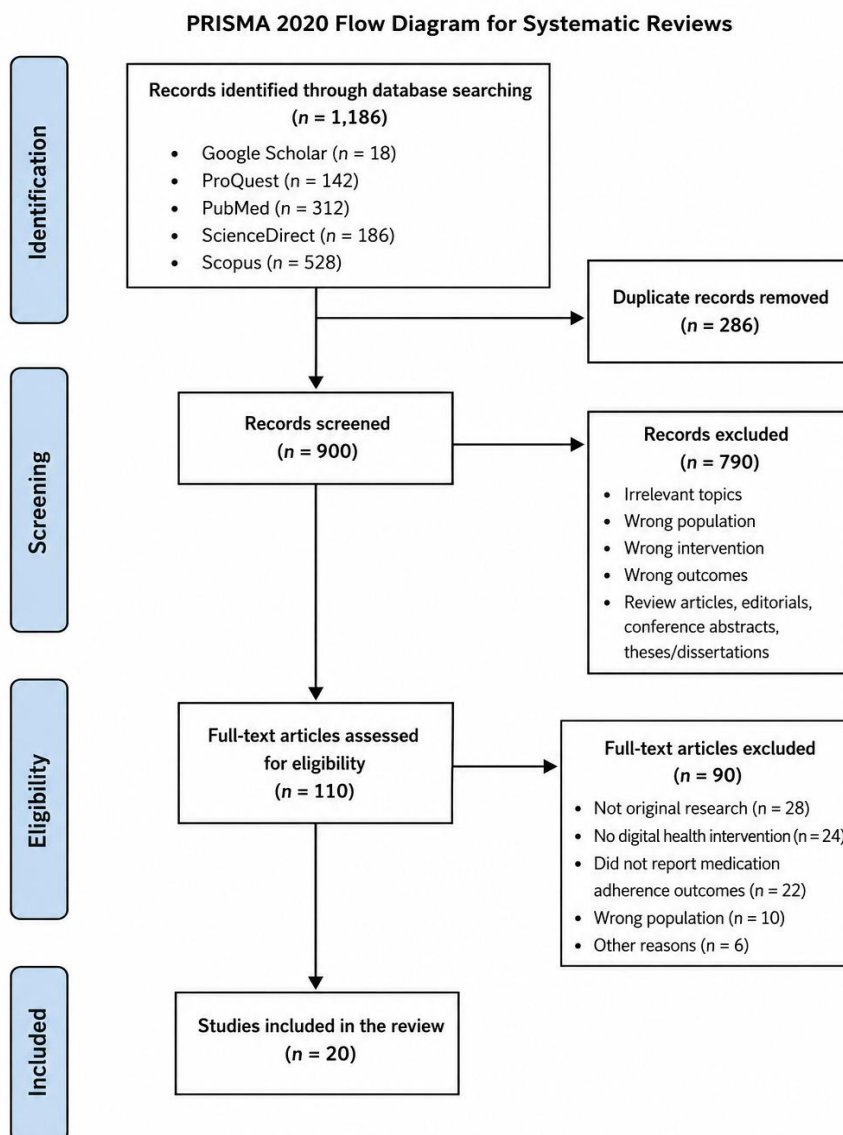


Figure 1. PRISMA 2020 flow diagram of study selection process.

## RESULTS

### Study Selection

The literature search identified 1,186 records from five electronic databases: Google Scholar (n = 18), ProQuest (n = 142), PubMed (n = 312), ScienceDirect (n = 186), and Scopus (n = 528). After removing 286 duplicate records, 900 articles remained for title and abstract screening.

During the screening stage, 790 records were excluded because they did not meet the eligibility criteria. The remaining 110 full-text articles were assessed for eligibility. Of these, 90 studies were

excluded because they did not satisfy the predefined inclusion criteria, including inappropriate study populations, absence of digital health interventions, failure to report medication adherence outcomes, or publication types that were not original research. Ultimately, 20 studies were included in the final narrative synthesis. The study selection process is presented in Figure 1.

### Methodological Quality

The methodological quality of the 20 included studies was assessed using the appropriate

Joanna Briggs Institute (JBI) Critical Appraisal Tools according to each study design. Overall, the included studies demonstrated acceptable methodological quality, with most reporting clearly defined participant selection criteria, well-described interventions, valid outcome measurements, and appropriate statistical analyses.

Nevertheless, several studies presented methodological limitations, including relatively small sample sizes, short follow-up periods, and potential risks of selection or attrition bias. Detailed results of the critical appraisal are presented in Supplementary Table 1.

### **Characteristics of Included Studies**

The 20 included studies were conducted across various healthcare settings, including hospitals, outpatient psychiatric clinics, community mental health services, and primary healthcare facilities. The studies evaluated a wide range of digital health interventions designed to improve medication adherence among individuals with schizophrenia and related severe mental illnesses.

The interventions included mobile health (mHealth) applications, smartphone-based adherence applications, telehealth, telepsychiatry, electronic medication monitoring systems, digital medicine systems, sensor-based monitoring technologies, SMS reminders, and remote patient monitoring platforms. Although intervention characteristics varied considerably, all studies evaluated the potential of digital technologies to support medication adherence during long-term antipsychotic treatment.

### **Effects of Digital Health Interventions on Medication Adherence**

Most included studies reported that digital health interventions were associated with improved medication adherence, enhanced treatment monitoring, and greater patient engagement in medication management.

Several smartphone-based interventions demonstrated significant improvements in adherence by providing medication reminders, self-management support, and educational features. For example, Chen (13) reported that a smartphone application improved medication adherence while also enhancing cognitive outcomes among individuals with schizophrenia. Similarly, Al Dameery (14) found that mobile

application-based interventions promoted adherence to antipsychotic medication through reminder systems and patient self-management functions. In addition, (15) demonstrated that smartphone-assisted nursing interventions increased patient participation in medication management and follow-up care.

Digital monitoring technologies also showed favorable results. Gonzales (16) reported that digital medicine systems enabled real-time monitoring of medication use and strengthened patient engagement. Likewise, Saba and Montes (17,18) found that sensor-based monitoring technologies facilitated the early identification of medication non-adherence, allowing healthcare professionals to intervene promptly.

Although the magnitude of the reported benefits differed across intervention types and study designs, the overall evidence consistently indicated that digital health interventions have the potential to improve medication adherence and strengthen communication between patients and healthcare professionals.

### **Barriers to Digital Health Implementation**

Despite generally positive findings, several studies identified challenges that may limit the successful implementation of digital health interventions. Frequently reported barriers included limited digital literacy, unequal access to internet services, insufficient technological infrastructure, and inadequate technical support for users. These implementation challenges may reduce the effectiveness and sustainability of digital health interventions, particularly in community-based and resource-limited settings.

### **Summary of Findings**

Overall, the evidence suggests that digital health interventions represent a promising strategy for improving medication adherence among individuals with schizophrenia. Beyond supporting medication-taking behavior, these technologies may enhance patient engagement, facilitate treatment monitoring, strengthen communication with healthcare professionals, and support continuity of care. However, successful implementation requires adequate technological infrastructure, digital literacy, and organizational support to maximize their effectiveness in nursing practice and community mental healthcare.

**Table 1. Characteristics of Included Studies**

| No. | Author (Year)          | Study Design                    | Setting                         | Population/Sample                                              | Digital Health Intervention                 | Primary Outcome                   | Main Findings                                                                                                                        |
|-----|------------------------|---------------------------------|---------------------------------|----------------------------------------------------------------|---------------------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Chen et al. (2023)     | Randomized Controlled Trial     | Outpatient psychiatric clinic   | 105 individuals with schizophrenia                             | <b>MedAdhere</b> smartphone application     | Medication adherence              | Improved medication adherence (94.72%), reduced psychotic symptoms, and enhanced cognitive function compared with the control group. |
| 2   | Dameery et al. (2023)  | Quasi-experimental study        | Outpatient mental health clinic | 51 individuals with schizophrenia and schizoaffective disorder | <b>MyTherapy</b> mobile application         | Medication adherence              | Significantly improved medication adherence and supported daily medication self-management.                                          |
| 3   | Tan et al. (2024)      | Prospective intervention study  | Psychiatric outpatient service  | Individuals with schizophrenia spectrum disorders              | <b>SuperMD</b> mobile application           | Medication adherence; PANSS score | Improved medication adherence and reduced symptom severity.                                                                          |
| 4   | Sudjai et al. (2024)   | Randomized Controlled Trial     | Psychiatric outpatient clinic   | 84 individuals with schizophrenia                              | <b>Kin Ya Kan Na</b> smartphone application | Medication adherence              | Significantly improved medication adherence and achieved high patient satisfaction.                                                  |
| 5   | Zhou et al. (2025)     | Randomized Clinical Trial       | Mental health services          | Individuals with severe mental illness                         | Digital Medication System                   | Medication adherence              | Real-time monitoring and automated reminders significantly improved medication adherence.                                            |
| 6   | Gonzales et al. (2022) | Prospective observational study | Veterans' healthcare services   | Veterans with serious mental illness                           | Digital Medicine System                     | Medication adherence              | Enabled real-time monitoring and increased patient engagement in treatment.                                                          |
| 7   | Richey et al. (2022)   | Observational study             | Community mental health service | Individuals with severe mental illness                         | Digital sensor monitoring                   | Medication adherence              | Facilitated objective adherence monitoring and early identification of medication non-adherence.                                     |

| No. | Author (Year)        | Study Design                              | Setting                          | Population/Sample                  | Digital Health Intervention                               | Primary Outcome                                         | Main Findings                                                                                                          |
|-----|----------------------|-------------------------------------------|----------------------------------|------------------------------------|-----------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 8   | Saba et al. (2022)   | Cross-sectional study                     | Psychiatric outpatient clinic    | 100 individuals with schizophrenia | Not applicable                                            | Medication adherence                                    | Family support, illness insight, and healthcare access were significantly associated with medication adherence.        |
| 9   | Zhang et al. (2026)  | Mixed-methods randomized controlled trial | Community mental health services | 70 individuals with schizophrenia  | <b>Healing Town</b> digital psychoeducational application | Medication adherence; drug attitude; social functioning | Improved medication adherence, treatment attitudes, and social functioning after six months.                           |
| 10  | Sudjai et al. (2023) | Feasibility study (Pretest–Posttest)      | Psychiatric outpatient clinic    | 10 individuals with schizophrenia  | <b>Kin Ya Kan Na</b> smartphone application               | Medication adherence; usability; satisfaction           | Demonstrated excellent usability, high satisfaction, and significantly improved medication adherence after four weeks. |

## DISCUSSION

This systematic review synthesized evidence from 20 primary studies evaluating digital health interventions designed to improve medication adherence among individuals with schizophrenia and related severe mental illnesses. Overall, the findings indicate that digital health interventions—including smartphone applications, mobile health (mHealth), telehealth, electronic medication monitoring systems, and digital medicine technologies—have the potential to improve medication adherence, strengthen patient engagement, and enhance treatment monitoring. Although the magnitude of these effects varied across studies, the overall evidence supports the integration of digital health into long-term schizophrenia management.

Smartphone-based interventions were the most frequently investigated and consistently demonstrated positive effects on medication adherence. Most applications incorporated multiple functions, including medication reminders, psychoeducation, symptom monitoring, and self-management support. These features are likely to improve adherence by reducing unintentional missed doses, reinforcing treatment routines, and promoting patients' active participation in their own care. Several studies also reported improvements in symptom control and cognitive outcomes alongside better medication adherence, suggesting that digital interventions may contribute not only to adherence but also to broader clinical recovery. Nevertheless, differences in adherence measurement instruments and intervention characteristics prevented direct comparison of effect sizes across studies (3,19).

Digital medication monitoring systems provided additional benefits by enabling objective assessment of medication-taking behavior. Unlike conventional self-report methods, sensor-based monitoring and digital medicine systems allowed healthcare professionals to identify missed doses in real time and intervene promptly. These findings suggest that digital monitoring technologies may strengthen continuity of care through earlier detection of non-adherence and more timely clinical decision-making. Such systems may be particularly valuable for individuals at high risk of relapse, where delayed recognition of medication discontinuation may lead to psychiatric hospitalization or symptom exacerbation (20,21).

Despite these encouraging findings, the effectiveness of digital health interventions was influenced by considerable heterogeneity across studies. Variations in intervention components, duration of follow-up, patient characteristics, outcome measures, digital literacy, family involvement, and healthcare infrastructure likely contributed to differences in reported effectiveness. Furthermore, most included studies evaluated relatively short-term interventions, limiting conclusions regarding sustained medication adherence, relapse prevention, and long-term clinical outcomes. These findings suggest that digital health should be considered as a complementary strategy rather than a universal solution, with implementation tailored to patient needs and local healthcare contexts.

The findings have important implications for nursing practice, particularly in community mental health and primary healthcare services. Digital health interventions may support nurses in monitoring medication adherence, providing medication reminders, delivering psychoeducation, and conducting remote follow-up. By facilitating continuous communication between patients and healthcare professionals, these technologies may strengthen continuity of care while enabling earlier identification of individuals requiring additional support. Successful implementation, however, requires adequate digital infrastructure, patient and provider digital literacy, organizational support, and clear clinical protocols. Attention should also be given to ethical considerations, including informed consent, data privacy, confidentiality, and secure management of electronic health information.

Several limitations of the available evidence should be acknowledged. First, substantial heterogeneity in intervention types, outcome measures, and study designs precluded quantitative meta-analysis. Second, most studies were conducted in specialist psychiatric or outpatient settings, limiting the generalizability of the findings to primary healthcare and community mental health services. Third, relatively few studies evaluated implementation outcomes such as feasibility, acceptability, cost-effectiveness, digital literacy support, or long-term sustainability. Finally, the predominance of short follow-up periods restricts understanding of the long-term effects of digital health interventions on medication adherence, relapse prevention, and healthcare utilization.

Future research should prioritize well-designed pragmatic randomized controlled trials with longer follow-up periods and standardized measures of medication adherence. Greater attention should also be directed toward implementation research evaluating the feasibility, scalability, and cost-effectiveness of digital health interventions within routine nursing practice and primary healthcare. Such evidence will be essential for informing sustainable integration of digital technologies into community-based mental health services.

## CONCLUSION

This systematic review demonstrates that digital health interventions have considerable potential to improve medication adherence among individuals with schizophrenia and related severe mental illnesses. Across the included studies, interventions such as smartphone applications, mobile health (mHealth), telehealth, digital medication systems, and electronic monitoring technologies consistently supported medication management by enhancing treatment adherence, patient engagement, treatment monitoring, and communication with healthcare professionals. These findings suggest that digital health can serve as a valuable complement to conventional mental healthcare, particularly in supporting long-term management of schizophrenia.

Despite these promising findings, the available evidence remains heterogeneous in terms of intervention characteristics, study design, outcome measures, and healthcare settings. Consequently, further high-quality evidence is required before definitive conclusions regarding the comparative effectiveness of specific digital health interventions can be established.

For nursing practice, digital health interventions offer opportunities to strengthen continuity of care through remote monitoring, medication reminders, psychoeducation, and timely follow-up, particularly within community mental health and primary healthcare services. Future research should prioritize pragmatic randomized controlled trials and implementation studies with longer follow-up periods to evaluate long-term medication adherence, relapse prevention, quality of life, cost-effectiveness, and sustainable integration of digital health into routine nursing practice.

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## Author Contributions

HAQ : Conceptualization, Methodology, Literature Search, Study Selection, Data Extraction, Quality Assessment, Formal Analysis, Writing – Original Draft, Writing – Review & Editing.

## Conflict of Interest

The author declares that there are no conflicts of interest regarding the publication of this manuscript.

## Data Availability Statement

The data supporting the findings of this study are available within the article. Additional information related to the systematic review process is available from the corresponding author upon reasonable request.

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