

ARTICLE INFORMATION

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Digital interventions for adults with schizophrenia in clinical settings: A scoping review

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Abstract

Background: Schizophrenia is a severe mental disorder that substantially affects quality of life and is associated with frequent relapse and poor treatment adherence. Although pharmacological treatment remains the cornerstone of schizophrenia management, digital technology-based interventions have increasingly been explored as complementary approaches to improve clinical and psychosocial outcomes.

Purpose: To identify and map the types of digital technology-based interventions used for the management of schizophrenia among adults in clinical settings and to describe the role of nurses in their implementation.

Method: A scoping review design following the Arksey and O'Malley framework, refined by the Joanna Briggs Institute, and reported according to the PRISMA-ScR guidelines. Literature searches were conducted in PubMed, Scopus, and ScienceDirect using the Population–Concept–Context framework. Primary studies published in English or Indonesian between 2019 and 2026 were included. From 13,637 identified records, 17 studies met the eligibility criteria and were analysed using descriptive and narrative synthesis.

Results: The included studies evaluated various digital interventions, including mobile applications, web-based platforms, virtual reality, telehealth, videoconference-delivered cognitive behavioural therapy, and other digital technologies. Several studies reported improvements in psychotic symptoms, cognitive functioning, treatment adherence, patient engagement, and quality of life. However, some interventions showed limited or no statistically significant improvements in specific clinical outcomes, indicating variability in effectiveness across intervention types and study settings. Across the included studies, nurses were consistently identified as facilitators of digital intervention implementation through patient education, digital literacy support, monitoring, and coordination of care.

Conclusion: Current evidence suggests that digital technology-based interventions may support schizophrenia management in clinical settings, although their reported effectiveness varies across intervention modalities and outcomes. Further high-quality studies are needed to determine the most effective approaches and to support the integration of digital interventions into routine psychiatric nursing practice.

Keywords: Digital interventions; Health technology; Psychiatric nursing; Schizophrenia; Scoping review.

INTRODUCTION

Schizophrenia is one of the most severe mental disorders, affecting more than 24 million people worldwide, equivalent to approximately 1 in every 300 individuals (World Health Organization, 2022). In Indonesia, data from the 2018 Basic Health Research Survey (BHRS) reported a prevalence of severe mental disorders, including schizophrenia, of 7 per 1,000 population. In several major psychiatric

hospitals in Indonesia, such as Ghrasia Mental Hospital in Yogyakarta and Dr. Soeharto Heerdjan Psychiatric Hospital in Jakarta, schizophrenia remains the most frequently diagnosed condition among both inpatient and outpatient populations. A common clinical phenomenon among individuals with schizophrenia is the high rate of relapse and repeated hospitalization. A study conducted at Prof. Dr. Soerojo

Psychiatric Hospital in Magelang reported that more than 60% of patients experienced relapse within the previous year, while data from Lampung Provincial Psychiatric Hospital indicated that the average length of hospitalization for patients with schizophrenia was 27 days. Furthermore, treatment adherence remains suboptimal, with approximately 40–50% of patients demonstrating significant non-adherence, which directly contributes to increased rates of rehospitalization and reduced quality of life (Ghaemi, Sverdlov, van Dam, Campellone, & Gerwien, 2022).

Schizophrenia is characterized by hallucinations, delusions, cognitive impairments, and disorganization of thought, emotion, and behaviour, all of which substantially affect social functioning and individual productivity. The disorder typically emerges during late adolescence or early adulthood and often requires long-term multidisciplinary management (Kuhn, Maukel, & Tibubos, 2026). Within clinical settings, nurses play a central role as healthcare professionals who interact most frequently with patients. Their responsibilities include providing health education, monitoring symptoms, promoting medication adherence, and supporting holistic, patient-centred recovery. As frontline healthcare providers, nurses are uniquely positioned to implement interventions that enhance treatment adherence and improve patients' quality of life, making them essential contributors to the long-term management of schizophrenia. The burden of schizophrenia extends beyond the individual, generating substantial economic and social costs, including reduced workforce productivity and increased demand for long-term mental healthcare services. Consequently, schizophrenia is recognized as one of the most costly mental disorders worldwide (Chong, Teoh, Wu, Kotirum, Chiou, & Chaiyakunapruk, 2016). In addition, social stigma and limited access to adequate mental health services, particularly in low- and middle-income countries, continue to represent major barriers to optimal care (Thorncroft, Bakolis, Evans-Lacko, Gronholm, Henderson, Kohrt, & Sartorius, 2019).

Traditionally, schizophrenia management has focused primarily on pharmacological treatment using first- and second-generation antipsychotic medications. Although these treatments are effective in reducing positive symptoms such as hallucinations and delusions, they are often less successful in

addressing negative and cognitive symptoms, including apathy, social withdrawal, and attentional deficits. Moreover, medication side effects and limited awareness of the importance of long-term treatment further contribute to poor treatment adherence among patients with schizophrenia (Kidd, Feldcamp, Adler, Kaleis, Wang, Vichnevetski, & Voineskos, 2019). These challenges highlight a significant gap in clinical practice and underscore the need for more flexible and integrated approaches. In response to these challenges, digital technology-based interventions have increasingly been developed to support schizophrenia management. Digital interventions, including mobile health (mHealth) applications, web-based therapies, and virtual reality (VR) technologies, have demonstrated potential in enhancing patient engagement, improving psychotic symptoms, and enabling real-time monitoring and therapeutic support (Freeman, Reeve, Robinson, Ehlers, Clark, Spanlang, & Slater, 2017; Torous, Bucci, Bell, Kessing, Faurholt-Jepsen, Whelan, & Firth, 2021). The COVID-19 pandemic further accelerated the adoption of these technologies due to restricted face-to-face interactions and the growing demand for accessible and continuous mental healthcare services (Wind, Rijkeboer, Andersson, & Riper, 2020). Despite promising preliminary findings, the literature on digital interventions for individuals with schizophrenia remains fragmented, heterogeneous in form, and insufficiently mapped, particularly within clinical practice settings. The absence of a comprehensive synthesis limits the broader evidence-based integration of digital technologies into mental health services. Therefore, an important question remains regarding the extent to which digital interventions have been developed and implemented in clinical practice for individuals with schizophrenia, as well as their effectiveness and implementation contexts (Anderson, Howarth, Vainre, Humphrey, Jones, & Ford, 2020).

RESEARCH METHOD

A scoping review design to identify and map the existing evidence on digital technology-based interventions for the management of schizophrenia among adults in clinical settings. The review followed the methodological framework proposed by Arksey and O'Malley and further refined by the Joanna Briggs Institute (JBI), while the reporting adhered to the

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Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR). The review question was developed using the Population–Concept–Context (PCC) framework, in which the population comprised adults diagnosed with schizophrenia, the concept focused on non-pharmacological digital technology-based interventions, and the context included clinical settings such as hospitals, mental health centers, and other healthcare facilities. A systematic literature search was conducted in PubMed, Scopus, and ScienceDirect using combinations of keywords related to digital interventions ("digital technology-based intervention," "digital health intervention," "technology-based therapy," and "e-therapy") and clinical settings ("clinical setting," "healthcare setting," "mental health clinic," and "clinical practice") with the Boolean operators AND and OR. Eligible evidence sources were limited to primary research studies, including randomized controlled trials, quasi-experimental studies, cohort studies, cross-sectional studies, mixed-methods studies, and qualitative studies. Studies were included if they: (1) involved adults diagnosed with schizophrenia; (2) evaluated non-pharmacological digital technology-based interventions; (3) reported outcomes related to symptom management, patient engagement,

treatment adherence, or intervention effectiveness in clinical settings; (4) were published in English or Indonesian; (5) were available as full-text articles; and (6) were published between 2019 and 2026. Review articles, systematic reviews, meta-analyses, conference abstracts, editorials, study protocols, and studies focusing exclusively on pharmacological interventions, non-adult populations, or insufficient outcome data were excluded.

Study selection consisted of title screening, abstract screening, and full-text assessment according to the predefined eligibility criteria. The selection process was documented using the PRISMA-ScR flow diagram to ensure transparency and reproducibility. Data were extracted using a standardized charting form that included author, publication year, study design, study setting, participant characteristics, type of digital intervention, outcome measures, key findings, and study limitations. The extracted data were analysed descriptively and synthesized narratively to summarize the characteristics, implementation, and reported outcomes of digital technology-based interventions for schizophrenia management in clinical settings. The findings are presented in summary tables and narrative synthesis.

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RESEARCH RESULTS

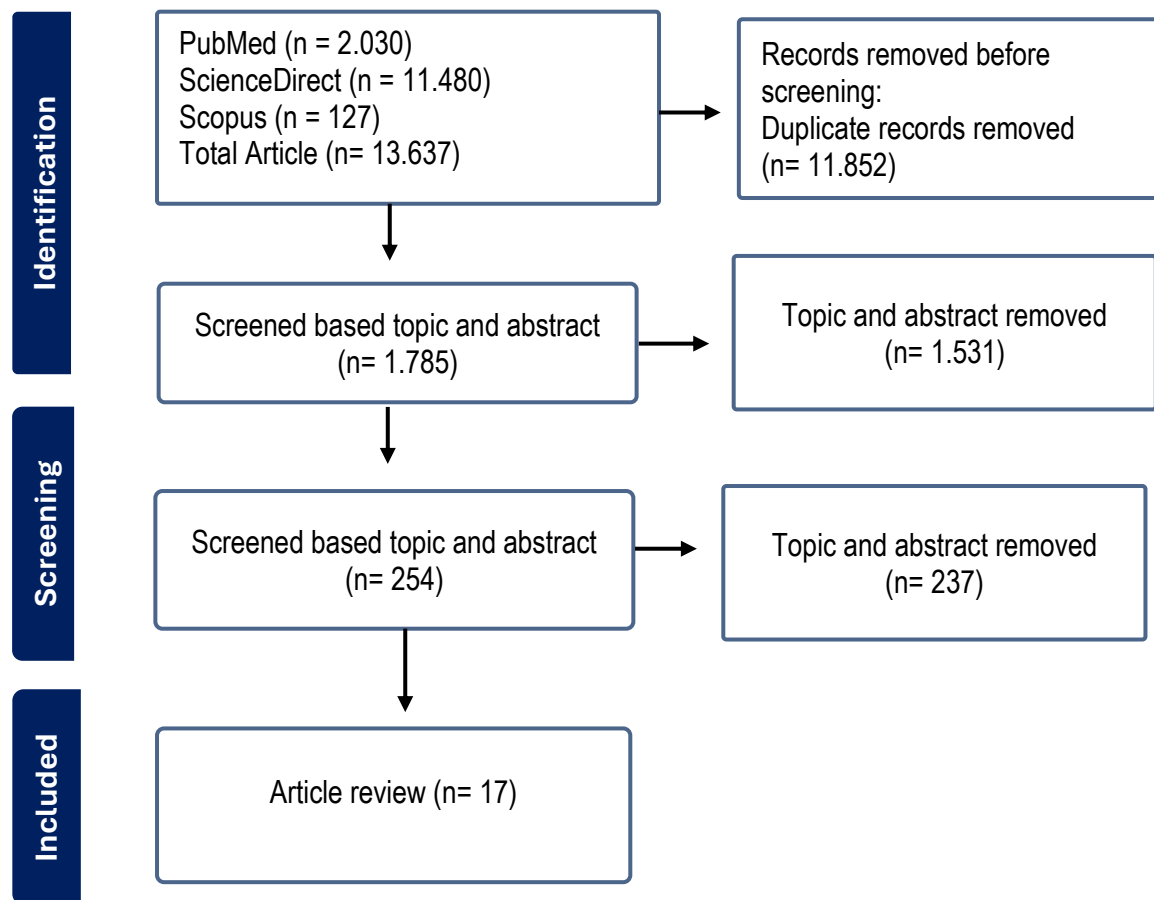


Figure 1. Diagram Prisma Flow

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Table 1. Article Review

(Author, Year) (Country)	Purpose	Method	Results
(Bucci et al., 2024) (UK)	To evaluate the effectiveness and safety of Actissist in reducing symptoms of early psychosis.	Parallel-group RCT in early psychosis.	No significant group differences; both improved PANSS.
(Böge et al., 2025) (Germany)	To assess the feasibility, acceptability, and preliminary clinical outcomes of the DICE intervention.	Single-arm pilot.	High engagement/adherence; improved coping.
(Arnautovska et al., 2025) (Multiple countries)	To evaluate the efficacy of self-led and human-supported digital health interventions for schizophrenia.	Systematic review/meta-analysis (26 RCTs).	No overall significant effects; human-supported better.
(Torous et al., 2021) (USA)	To discuss advances and challenges in digital psychiatry for schizophrenia.	Narrative review.	Improved monitoring, adherence, engagement.
(Lal et al., 2024) (Canada)	To examine the feasibility, acceptability, and safety of Horyzons-Canada.	Mixed-method feasibility.	Feasible; outcomes pending.
(Au-Yeung et al., 2025) (Canada)	To evaluate Action-Based Cognitive Remediation and Metacognitive Training.	Hybrid trial.	High acceptability and engagement.

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(Ghaemi et al., 2022) (USA)	To evaluate PEAR-004 as an adjunctive treatment for schizophrenia.	RCT.	Trend toward symptom reduction; high adherence.
(Vass et al., 2024) (Hungary)	To explore the acceptability and feasibility of VR-based AVATAR therapy.	Case series.	Reduced hallucinations; improved coping.
(Kidd et al., 2019) (Canada)	To evaluate the feasibility of the App4Independence (A4i).	RCT.	Useful reminders and monitoring.
(Luther et al., 2020) (USA)	To examine the use of personal technologies in schizophrenia treatment.	Scoping review.	Improved adherence and QoL.
(Kuhn et al., 2026) (Germany)	To determine whether telemedical nursing improves quality of life.	RCT.	No QoL gain; high satisfaction.
(Wang et al., 2022) (China)	To evaluate the effects of a virtual reality serious-game training program on cognitive function.	RCT.	Improved working memory/executive function.
(Raje et al., 2025) (USA & India)	To design smartphone-based cognitive assessments for schizophrenia.	Mixed methods.	High acceptability.
(Becker et al., 2024) (Germany)	To compare videogame training with e-book reading.	RCT.	Improved attention and wellbeing.

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(Nahum et al., 2021) (Israel)	To evaluate the effectiveness of SocialVille online social cognition training.	Double-blind multisite RCT.	Improved social cognition.
(Hua et al., 2024) (China)	To evaluate the effectiveness of IBT-SC02 for cognitive impairment.	RCT.	Improved cognition.
(Katsushima et al., 2025) (Japan)	To evaluate videoconference-based cognitive behavioral therapy for schizophrenia.	Pilot RCT.	Reduced PANSS; well accepted.

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DISCUSSION

This scoping review aimed to identify the types, effectiveness, and influencing factors of digital interventions for the management of schizophrenia among adults in clinical settings. Based on the analysis of 17 primary studies, digital interventions for schizophrenia were found to vary substantially in both format and intended purpose. Common intervention modalities included mobile applications such as PEAR-004, Actissist, and A4i, which functioned as symptom-monitoring tools, treatment reminders, and self-guided cognitive behavioral therapy (CBT) platforms; virtual reality technologies such as AVATAR Therapy and serious games designed to facilitate social skills training and hallucination management; videoconference-based CBT (vCBTp) to expand access to psychotherapy services; and online social learning platforms such as SocialVille and Horyzons-Canada that employed gamification strategies to strengthen social and coping skills (Au-Yeung, Thai, Best, Bowie, Guimond, Lavigne, & Raucher-Chéné, 2025).

Most studies employed randomized controlled trial (RCT) designs, indicating relatively strong methodological rigor. Nevertheless, intervention effectiveness varied considerably across studies. Significant improvements in cognitive functioning among participants receiving the IBT-SC02 intervention (Hua, Wang, He, Sun, Xu, Zhang, & Ji, 2024). No significant differences between intervention and control groups in their evaluation of Actissist (Bucci, Berry, Ainsworth, Berry, Edge, Eisner, & Haddock, 2024). These findings suggest that intervention success depends not only on the technology itself but also on intervention design, implementation duration, and patient-specific characteristics (El Abdellati, De Picker, & Morrens, 2020).

The identified digital interventions can be broadly categorized into four groups: (1) mHealth applications for symptom monitoring and self-management; (2) virtual reality interventions for social simulation and attention training; (3) telepsychotherapy, including videoconference-based CBT; and (4) online social learning platforms. The effectiveness of these interventions appears to be influenced by several key determinants. Intervention duration emerged as a critical factor, with programs lasting fewer than eight weeks generally demonstrating limited clinical

effectiveness. User engagement was also a strong predictor of positive outcomes, as greater participation in digital interventions was associated with improved treatment results (Böge, Bergmann, Hahne, Emde, Cartner, Bell, & Thomas, 2025).

Furthermore, blended-care approaches that integrated digital technologies with human support from nurses, therapists, or other healthcare professionals demonstrated superior outcomes compared with fully automated interventions. The value of professional support in sustaining patient engagement. Personalization of intervention content according to individual patient needs was also associated with greater acceptance and effectiveness (Arnautovska, Trott, Vitangcol, Milton, Brown, Warren, & Siskind, 2025). Conversely, limited access to technology and low digital literacy levels represented major barriers to implementation, particularly among individuals with schizophrenia who often experience cognitive impairments and socioeconomic challenges (Katsushima, Nakamura, Shiko, Hanaoka, & Shimizu, 2025).

Overall, digital interventions demonstrated promising potential for improving cognitive functioning, quality of life, and medication adherence. Improvements in cognitive outcomes (Wang, Kou, Meng, & Yu, 2022). Documented enhancements in quality of life. Fisher et al. reported positive effects on medication adherence. However, despite these encouraging findings, evidence regarding effectiveness remains inconsistent (Nahum, Lee, Fisher, Green, Hooker, Ventura, & Vinogradov, 2021). Common methodological limitations included small sample sizes, inadequate control groups, short follow-up periods, and substantial heterogeneity in participant characteristics and intervention modalities. Consequently, the current evidence does not support a universal conclusion regarding the effectiveness of digital interventions for schizophrenia. Nevertheless, these interventions represent a promising avenue for enhancing schizophrenia management when appropriately designed and implemented (Lal, Gleeson, D'Alfonso, Lepage, Joobor, Lee, & Alvarez-Jimenez, 2024).

The relationship between digital interventions and health literacy is particularly important within the context of schizophrenia care. Health literacy, especially digital health literacy, serves as a

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fundamental prerequisite for the successful implementation of technology-based interventions. Digital applications should be accompanied by structured education and training to ensure effective use by patients. Low levels of digital literacy among individuals with severe mental illness may limit the potential benefits of technological innovations (Becker, Fischer, Kühn, & Gallinat, 2024; Raje, Rozatkar, Mehta, Shrivastava, Bondre, Ahmad, & Choudhary, 2025).

In this regard, co-design approaches, such as those used in the FOCUS and EMPOWER interventions, have demonstrated effectiveness in enhancing user engagement and clinical outcomes. Healthcare professionals, particularly nurses, play a pivotal role in bridging digital literacy gaps. Nurses can function as facilitators who not only guide patients in using digital technologies but also foster therapeutic relationships that enhance confidence, motivation, and engagement with digital health resources. Therefore, health literacy should be viewed not only as a prerequisite for successful digital intervention implementation but also as an important outcome that can be developed through active nursing support within clinical practice (Löchner, Carlbring, Schuller, Torous, & Sander, 2025).

This review addresses a highly relevant and contemporary topic, namely the application of digital technologies in schizophrenia management, which has become increasingly important in response to advancements in healthcare technology and the growing demand for remote mental health services (Sohal, 2024). The review employed a systematic methodology based on established scoping review guidelines and drew evidence from reputable databases, including PubMed, Scopus, and ScienceDirect. Furthermore, it encompassed a broad range of digital interventions, from mobile applications to virtual reality therapies, thereby providing a comprehensive overview of current developments in the field. The findings also offer practical implications for psychiatric nursing and mental health practice by highlighting innovative technology-supported approaches to care (Luther, Fischer, Johnson-Kwochka, Minor, Holden, Lapish, & Salyers, 2020).

Several limitations should be acknowledged. Considerable heterogeneity in study designs, intervention types, and outcome measures limited the

ability to draw generalized conclusions (Vass, Gerlinger, Egervári, Kilencz, Csukly, Hermán, & Simon, 2024). Many included studies had relatively small sample sizes and short intervention durations, restricting the assessment of long-term effectiveness. In addition, some studies lacked rigorous evaluation methodologies. Challenges related to technology accessibility and digital literacy among patients with schizophrenia may also affect the real-world implementation of these interventions. Finally, the predominance of studies conducted in high-income countries may limit the transferability of findings to low- and middle-income settings, including Indonesia (Ramdini, Koernia, & Antari, 2022).

CONCLUSION

Digital technology-based interventions, including mobile health applications, web-based therapies, virtual reality, and videoconference-based psychotherapy, show promising potential for improving schizophrenia management. These interventions have been associated with reductions in psychotic symptoms, improvements in cognitive function, enhanced medication adherence, and better quality of life. However, their effectiveness remains inconsistent across studies and is influenced by patient engagement, intervention duration, personalization, and the integration of professional support. Nurses play a pivotal role in facilitating the implementation of digital interventions by promoting patient engagement, providing education, strengthening digital health literacy, and supporting sustained technology use. Future research should focus on large-scale, high-quality studies with longer follow-up periods to establish the long-term effectiveness, feasibility, and sustainability of digital interventions in schizophrenia care.

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