

Potential Increasing Trend in Schizophrenia Relapse Prevention in the Past 40 Years: A Bibliometric Analysis

Isymiarni Syarif¹, Hasnawati Amqam², Saidah Syamsuddin³, Veni Hadju⁴, Syamsiar Russeng⁵, Yusran Amir⁶

¹Department of Public Health, Doctoral Student Public Health Faculty, Hasanuddin University, Makassar, Indonesia; ²Department of Environmental Health, Public Health Faculty, Hasanuddin University, Makassar, Indonesia; ³Department of Psychiatry, Medical Faculty, Hasanuddin University, Makassar, Indonesia; ⁴Department of Nutrition, Public Health Faculty, Hasanuddin University, Makassar, Indonesia; ⁵Department of Occupational Safety and Health, Public Health Faculty, Hasanuddin University, Makassar, Indonesia; ⁶Department of Health Administration and Policy, Public Health Faculty, Hasanuddin University, Makassar, Indonesia

Objectives: Schizophrenia is an organic disease and a severe mental disorder with a relatively high risk of relapse. The rising rate of schizophrenia relapse has motivated researchers and academics to innovate and develop interventions aimed at relapse prevention. This bibliometric study sought to examine the publication trends in schizophrenia relapse prevention from 1973 to 2023, assess the contribution of international collaborations across various journals, identify the most influential authors and articles, and forecast future developments in this field.

Methods: The study included 683 articles obtained from the Scopus database, analyzed using VOSviewer software, and visualized with Tableau.

Results: Reports of schizophrenia relapse prevention strategies have increased significantly over the last 3 decades. However, fluctuations persist, as evidenced by the annual number of publications ranging from 25 to 40 within the past 5 years. Nevertheless, this increasing trend underscores the sustained interest in this area of research. Regarding contribution size, the United States produced the largest volume of publications on this subject. John M. Kane authored the most articles, while Stefan Leucht exhibited the highest h-index. Frequently used keywords in this field include “relapse AND schizophrenia” AND “prevention.”

Conclusions: These results represent an important reference for determining the current state of research on schizophrenia relapse prevention and future research directions.

Key words: Schizophrenia, Relapse, Prevention, Bibliometrics

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Corresponding author: Hasnawati Amqam
Department of Environmental Health, Public Health Faculty,
Hasanuddin University, 29 Jl. Perintis Kemerdekaan, Makassar 90242,
Indonesia

E-mail: hasnawati.amqam@unhas.ac.id

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INTRODUCTION

Schizophrenia represents a serious global mental health issue, with profound implications and complexities for those diagnosed and their caregivers [1,2]. The World Health Organization estimates that approximately 1 billion people worldwide, or 1 in 8 individuals, are living with a mental disorder [3]. In Indonesia, the incidence of severe mental disorders, including schizophrenia, rose from 1.3 cases to 7.0 cases per 1000 individuals in 2018 [4,5].

Schizophrenia is a chronic mental illness associated with

functional disability across social, cognitive, and emotional domains [6]. The impairment associated with schizophrenia hinders recovery [7], with recovery rates ranging from approximately 13.5% to 50.0% [8]. This low figure is also linked to the condition's comparatively high relapse rate. Recurrence rates of 28%, 43%, and 54% have been reported for the first, second, and third years of follow-up, respectively [8]. As previously reported, relapse rates for mental disorders are estimated to be 50%, 70%, and 100% during the first, second, and fifth years after hospital discharge [1,9-11]. Several factors, including medication adherence and family dynamics, influence the recurrence of mental disorders [12-14]. Consequently, family-centered relapse prevention is a key strategy in the management of schizophrenia [12,14].

Family often represents the primary support system for patients, whether they are healthy or ill [15]. In the context of relapse prevention, family support constitutes a form of direct care, making it imperative for families to understand the challenges faced by individuals with mental disorders. Nonetheless, the level of family knowledge regarding relapse prevention warrants consideration. Research in various parts of the world has indicated that families frequently turn to spiritual remedies and shamans for the treatment and prevention of schizophrenia relapse, attributing the condition to malevolent spirits, magic, curses, or disbelief [16,17].

Significant factors associated with schizophrenia relapse include family knowledge and emotional expression [18-22]. Suboptimal family care for individuals with schizophrenia often involves a lack of information within the family about the disorder and its treatment [22], which influences relapse rates among patients with schizophrenia.

The impacts of relapse on families include heightened stress and emotional strain [18-22]. Medication non-adherence is a major risk factor for patient relapse [9,23]. Additional contributors include the inability to recognize and manage the signs and symptoms of relapse [8,24]. The family dynamic also influences relapse, with contributing factors such as insufficient family support, high levels of expressed emotion within the family, inadequate knowledge about psychosis, and challenges in providing care for patients with schizophrenia [16,25,26].

A variety of publications addressing relapse prevention in patients with schizophrenia have emerged, including a review focused on this topic [27]. Additional studies [28-30] have explored various interventions aimed at preventing relapse in patients with schizophrenia, encompassing psychoeducation,

family therapy, supportive therapy, monitoring, behavior modification, prevention strategies, and self-intervention techniques. One report [8] examined the perceptions and roles of families in relapse prevention among individuals with mental disorders, including schizophrenia. The authors recommended improving patients' knowledge, coping abilities, and family support to help avert relapse and alleviate the burden on patients. Despite these efforts, no comprehensive and objective review has yet been published regarding trends in relapse prevention for schizophrenia.

Given growing concerns about escalating schizophrenia relapse rates, this assessment is particularly relevant. Addressing risk factors for schizophrenia relapse can improve patient quality of life; thus, relapse prevention is of high importance. From a healthcare perspective, this study was conducted to potential strategies for preventing schizophrenia relapse, while also identifying limitations and suggesting possible future directions.

This exploratory review and bibliometric study examined key findings, methodologies, and trends in relapse prevention for individuals with schizophrenia, aiming to synthesize the current body of research on this topic. It included a thorough examination of relapse prevention interventions for people with schizophrenia and assessed how these interventions affect the quality and sustainability of relapse prevention efforts. Bibliometric analytics were employed to identify the most prominent authors, journals, countries, and topics within the area of schizophrenia relapse prevention. This analysis is anticipated to provide valuable insights into the state of research on schizophrenia relapse prevention and to potentially reduce future schizophrenia relapse rates.

METHODS

Type of Research

This exploratory review examined research on schizophrenia relapse prevention, utilizing data from the Scopus database spanning the years 1973 to 2023. The search methodology involved the extraction of relevant information by employing the keywords "relapse AND schizophrenia" AND "prevention." This search targeted article titles, abstracts, and keywords, with the results limited to English-language publications within the designated timeframe. The compiled dataset comprised 683 original articles and 279 reviews, all sourced from journals, for a total of 962 publications. The data processing approach

involved the retrieval of relevant information from the Scopus database using the specified keywords. The 962 publications were then screened using Open Refine within Microsoft Excel (Microsoft Corp., Redmond, WA, USA). Subsequently, the refined dataset was subjected to further analysis employing Tableau and VOSviewer for visual representation and interpretation. This multistage approach provided a comprehensive understanding of the current state of research on schizophrenia relapse prevention through the year 2023.

Bibliometric Analysis

Bibliometric analysis is employed to examine research developments and trends within a field, evaluate the impacts of articles and authors, and appraise the prospects for future research. The results of this analysis can assist researchers in identifying potential areas of study and finding prospective collaborators [31]. The metrics employed in the present bibliometric analysis include examination of the number of publications, the number of citations, and the h-index. The number of citations reflects the frequency with which an author’s work is referenced by peers. The h-index considers both the quantity of an author’s publications and the number of citations each has garnered. Overall, bibliometric analysis offers valuable information for researchers, policymakers, and stakeholders engaged in the advancement of a scientific domain.

Following bibliometric analysis, a literature review was con-

ducted. Initially, the titles and abstracts in the search results were examined based on predetermined eligibility criteria. Subsequently, the full articles selected during the title/abstract screening phase were evaluated to ensure compliance with the eligibility criteria. These criteria were established impartially and independently. (1) The inclusion criteria were as follows: articles or reviews, with a study period between 2013 and 2023, in the final publication phase, and available in English. (2) The exclusion criteria were as follows: publications in languages other than English; theses, dissertations, books, book chapters, and conference papers; and grey literature.

A flow diagram illustrating the article selection process for the literature review is presented in Figure 1.

Systematic Review Analysis

Systematic review analysis is a systematic method used to collect or synthesize data from previous studies to answer specific research questions. Systematic review analysis involves several stages, including the development of research results, the assessment of the quality of evidence, and evaluation to determine conclusions.

Ethics Statement

This article is a review article that uses bibliometric analysis, not original research, and therefore does not require ethical approval.

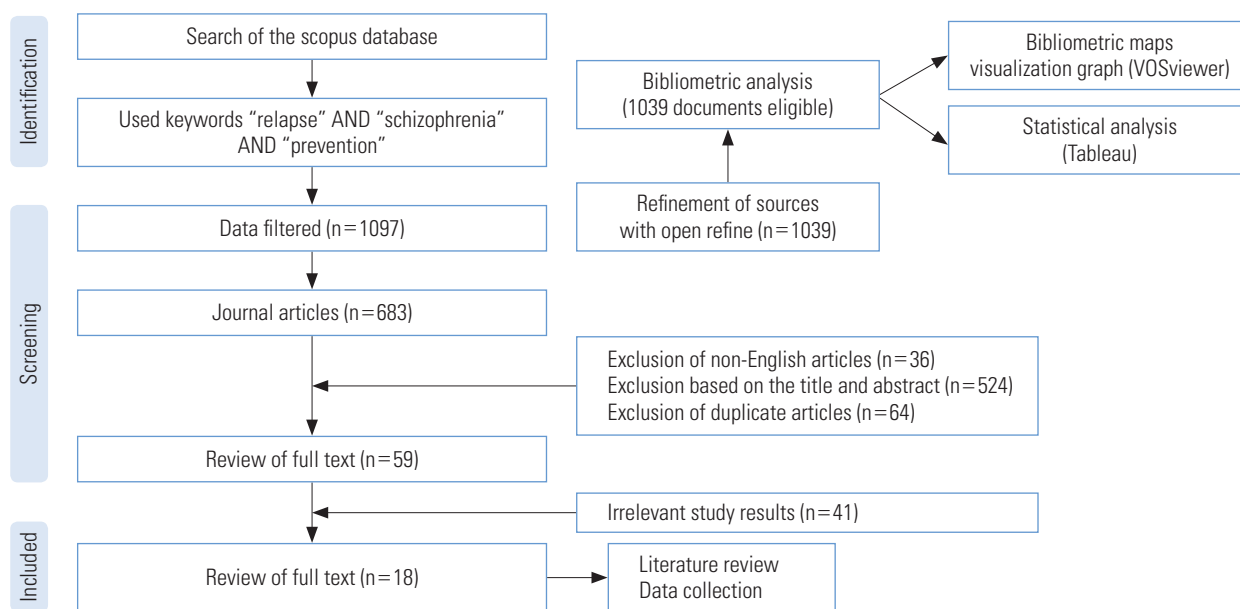


Figure 1. Table data processing flowchart.

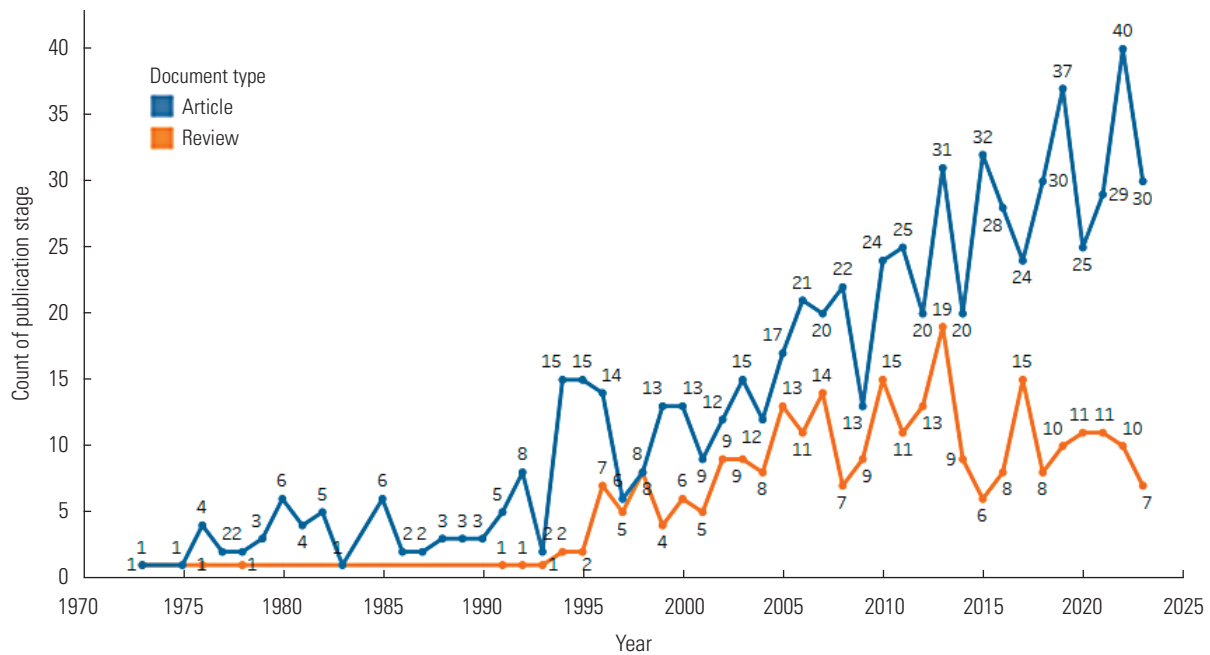


Figure 2. Trends in journal publications per year in schizophrenia research.

RESULTS

Trends in Publications on Schizophrenia Relapse Prevention by Document Type

The bibliometric analysis visualization presented in Figure 2 illustrates an upward annual trend in the literature on relapse prevention in schizophrenia. The findings for both articles and reviews represent the evolution of this research. From 1993 to 2023, the number of documents published exhibited an average annual increase of 8.8%, with a total of 1097 documents (279 reviews and 683 articles). High variability, with considerable fluctuation in publication numbers, was observed for both articles and reviews over the 40-year period. Current research on this topic is garnering increasing interest and is anticipated to continue expanding, in line with government initiatives prioritizing community-based interventions for mental health disorders. Consequently, schizophrenia relapse prevention is emerging as an increasingly attractive area of research.

Contributions by Country

The number of publications produced by a country can reflect the level of engagement and the distribution of authorship on a topic. As shown in Figure 3, among the 37 contributing countries, only 32 have published 5 or more documents. The United States is at the forefront of research on relapse prevention in schizophrenia, with more articles on the topic than

any other country. The United States has collaborated with 33 other nations, establishing a total of 208 collaborative links. Germany, the United Kingdom, and Switzerland are the main contributors to this collaborative network.

Author Keyword Co-occurrence Network Analysis

Among 93 keywords (“items”) identified, 10 clusters were established, each color-coded (Figure 4). The clusters are as follows: 1 (red), 2 (green), 3 (blue), 4 (yellow), 5 (dark purple), 6 (dark blue), 7 (orange), 8 (brown), 9 (light purple), and 10 (pink). As shown in Figure 4, cluster 2 (green) is the most prominent, comprising 17 items and 113 occurrences focused on relapse prevention. The term “relapse prevention” is linked to several other clusters within the author keyword analysis co-occurrence network. These include cluster 1 (red), which relates to antipsychosis and includes 15 items and 63 occurrences, and cluster 3 (blue), comprising 10 items and 26 appearances and focusing on digital technology (technology, health, and mobile health). In addition, clusters 4 (yellow) and 6 (light blue) focus on antipsychotic medications. Cluster 5 (dark purple) relates to family interventions, containing 9 items and 14 occurrences, while cluster 6 (dark blue) covers adherence and includes 8 items and 12 occurrences.

Cluster 7 (orange), which focuses on initial interventions, contains 7 items and 49 occurrences. Cluster 8 (brown), comprising 6 items with 15 occurrences, relates to electroconvul-

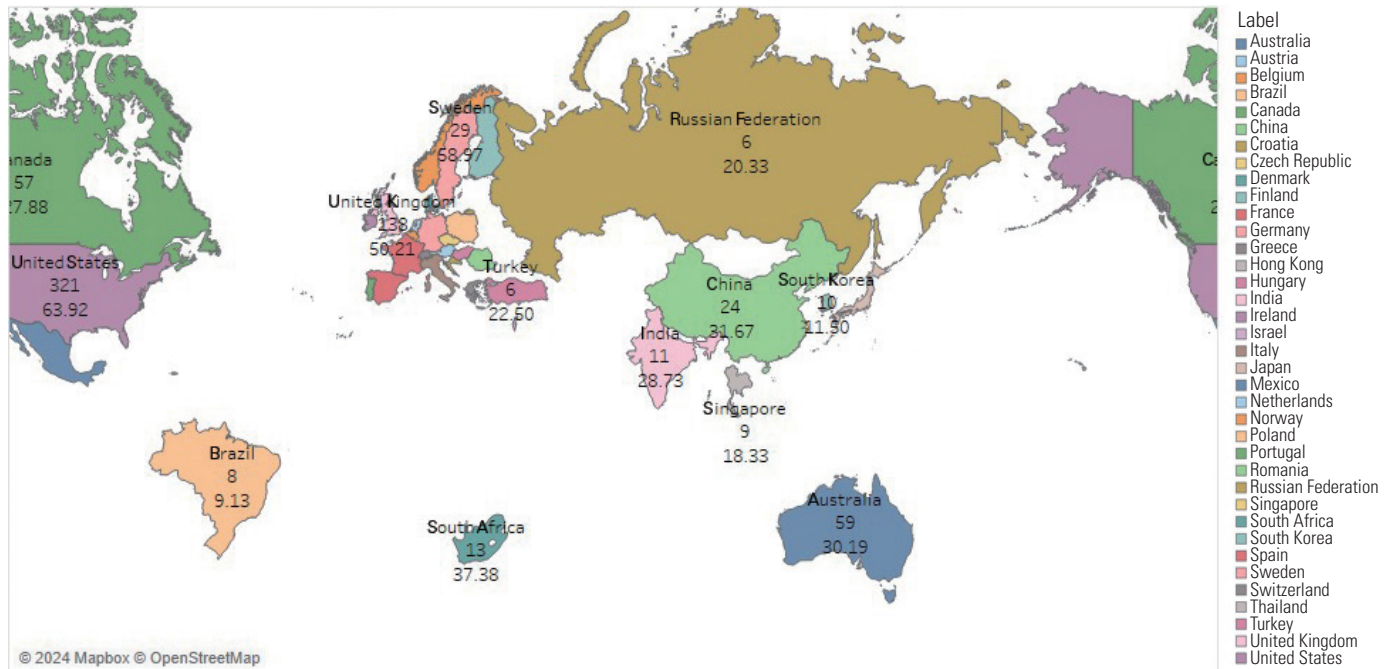


Figure 3. Number of published documents by country.

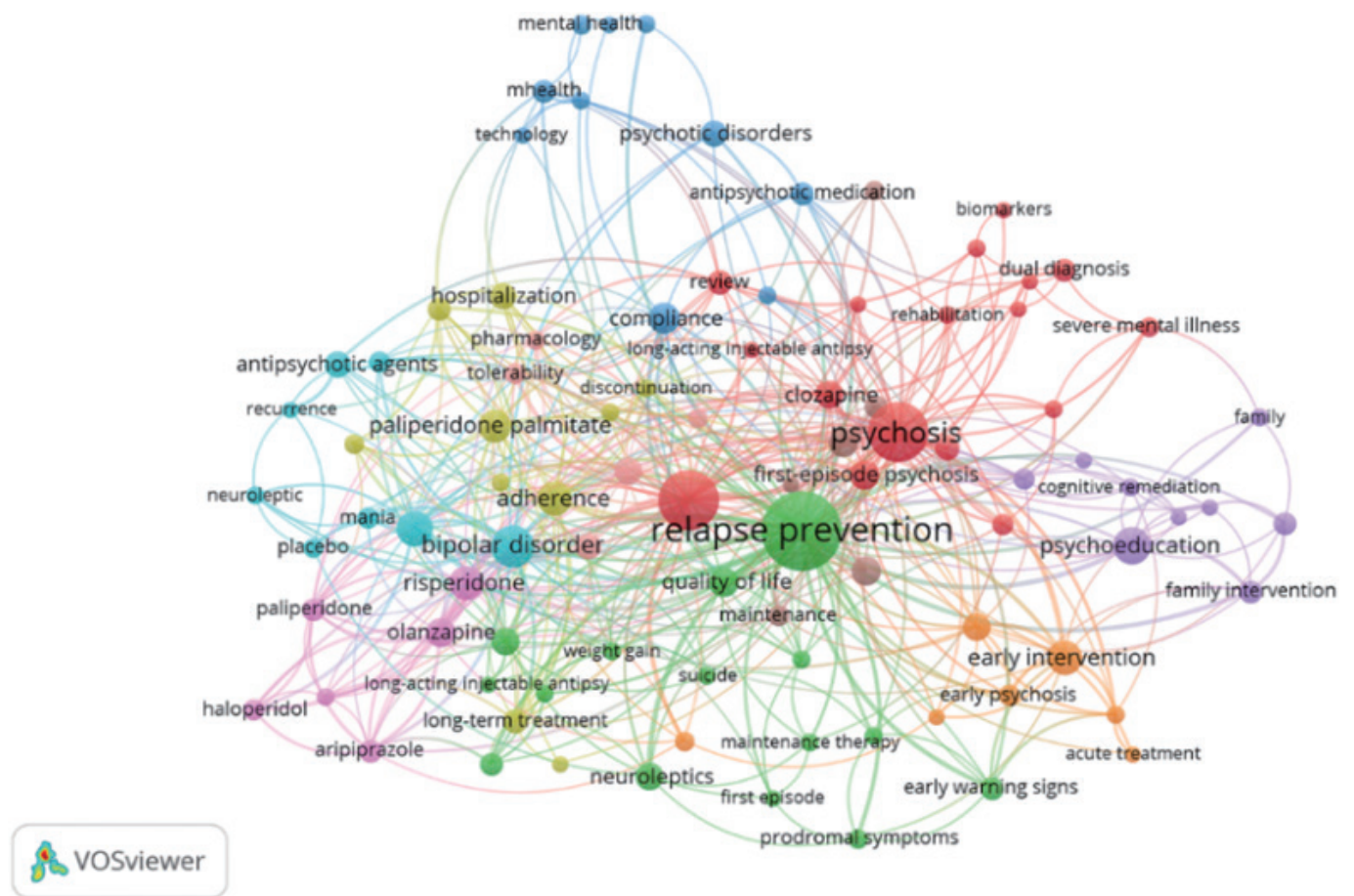


Figure 4. Author keyword co-occurrence network, categorized into clusters.

Table 1. Digital technology for schizophrenia relapse prevention

Country	Population sample	Method	Measured variable	Results	Reference
USA	Patients with schizophrenia in 10 locations in the USA, in an outpatient setting between Feb 26, 2013, and Apr 17, 2015	Quasi-experiment	Technology to prevent recurrence	Over a 6-mo follow-up period, 43% of control participants and 24% of intervention participants required hospitalization ($\chi^2 = 11.76$, $p < 0.001$); The no. of inpatient days decreased by a mean of 5 ($\beta = -4.58$; 95% CI, -9.03, -0.13; $p = 0.044$) in the intervention condition compared to the control	[32]
USA	Synthesized evidence from 23 published trials of digital interventions for schizophrenia from Jan 2020 until Jun 2023	Narrative study	Digital intervention	Recent findings: 23 studies were identified, covering smartphone apps and web-based platforms to reduce symptom severity, prevent relapse, and promote physical health; The main findings to date are a decrease in the symptom burden, improved medication adherence, and increased engagement in physical activity	[33]
UK	People with schizophrenia	Descriptive study	e-Prevention	Technologies offered through e-Prevention include: (1) long-term continuous recording of biometrics and behavioral indices through a smartwatch; (2) video recording of patients when interviewed by a clinician, using a tablet; (3) automatic and systematic storage of data on a dedicated cloud server; and (4) the ability to detect and predict relapse; The results were significant, suggesting the eventual feasibility of predicting psychopathology and preventing relapse	[34]
UK	Service users aged > 16 y who have schizophrenia spectrum disorder with evidence of relapse within 2 y	A multicenter, 2-arm, parallel-group cluster randomized controlled trial involving 8 community mental health services, with follow-up for 12 mo	“Early signs monitoring to prevent relapse in psychosis and promote Well-being, engagement, and recovery” (EMPOWER) smartphone app	Eight of 33 patients (24%) in the EMPOWER group experienced relapse compared to 13 of the 28 (46%) in the conventional care group; Fewer participants in the EMPOWER group experienced relapse (RR, 0.50; 95% CI, 0.26, 0.98), and their time to first relapse was longer (HR, 0.32; 95% CI, 0.14, 0.74), compared to the usual treatment group at month 12; EMPOWER participants displayed lower fear of relapse compared to those in the conventional care group (mean difference, -4.29; 95% CI, -7.29, -1.28); Piloting digital technology to monitor early warning signs, in conjunction with peer support and clinical triage to detect and preventive relapse, is worthwhile	[35]
UK	18- to 60-y-olds with a diagnosis of schizophrenia or schizoaffective disorder	Randomized controlled trial	ITAPERS (Information Technology Aided Relapse Prevention Program in Schizophrenia) (mobile app and mobile web)	No difference was observed between groups in the survival rate without hospitalization; However, 33% of all alerts were associated with no increase in antipsychotic dose; In the Cox multivariate proportional risk model, of the 13 potential predictors, only variables associated with ITAREPS (no. of alerts without pharmacological intervention [HR, 1.38; $p = 0.042$] and patient non-adherence to ITAREPS [HR, 1.08; $p = 0.009$])	[36]
India	The intervention group consisted of 23 caregivers (families), while the control group included 25 participants who had family members with schizophrenia	Quantitative; experimental study with control group	Yoga therapy with audio-visual components	Self-directed audio-visual yoga therapy affected caregivers' ability to care for people with schizophrenia, but no significant difference was found between the intervention and control groups	[37]
USA	This study included 51 participants (age range: 18 to 47 y)	Experimental design	Virtual reality	The use of virtual reality technology can increase empathy for people with schizophrenia; This study found that 2-dimensional videos, if realistic, can also potentially increase empathy	[38]

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Table 1. Continued from the previous page

Country	Population sample	Method	Measured variable	Results	Reference
Japan	Respondents included 20 caregivers, over 18 y old, who were caring for patients with schizophrenia; Participants needed to be able to use the internet in English and to have internet access at home	Mixed- methods research design using Medical Research Council complex interventions	E-health psychoeducation therapy	Psychoeducation therapy provided through electronic media impacted the caregiver's ability to recognize the patient's illness and problem-solving strategies	[39]
China	Age 18-60 y medical diagnosis: schizophrenia or schizoaffective disorder	Randomized controlled trial	LEAN (Lay health supporter, E- Platform, Award System, Integration) (mobile apps and mobile web)	Engages lay health supporters (LHS), who are family members or volunteers who assist the patient in facilitating medication adherence, who monitor for early signs of relapse and medication side effects, and who work with staff for the treatment program; E-Platform, which consists of E-reminder (reminder to take medicine) E-monitor (monitoring early signs of relapse and drug side effects); E-educator (sends periodic SMS messages to patients, LHS, and health workers about schizophrenia symptoms, treatment, adherence strategies, rehabilitation, and social resources)	[40]
USA	Age, 18-70 y Medical diagnosis: schizophrenia, schizoaffective disorder, or psychosis score of 4 on the Brief Psychiatric Rating Scale	Randomized controlled trial	Internet cognitive behavioral skills (mobile web)	Features cognitive behavioral therapy consisting of 10 modules to treat auditory hallucinations	[41]
UK	Age, 18-35 y Score of 3 or more on each item of the Positive and Negative Syndrome Scale (PANSS) Score of at least 1 on the Calgary Depression Scale	Mixed-methods design	TechCare (mobile apps)	Delusion assessment features based on the PANSS; mood assessment features based on the Calgary Depression Scale; Features of cognitive behavior-based interventions: therapy to improve thoughts, feelings, and behaviors, stress models, techniques to regulate mood, especially designed media such as music, pictures, and videos	[42]
Sweden	Age above 18 y; caregiver of mentally ill patient	Randomized controlled trial	Web-based mindfulness intervention (mobile web)	The program can be accessed through a smartphone, tablet, or computer with an internet connection; Features include: assessment of caregiver stress and burden in caring for patient; mindfulness exercises with audio/video files (960 min) and accompanied by on-screen captions; descriptive text and daily mindfulness practice instructions, including self-compassion exercises, time logs, and personal diaries; basic mindfulness exercises consisting of breathing exercises, body scanning, yoga, mindfulness of experience through the senses, and meditation	[43]
USA	Age 60 y or older; living in the community; medical diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder or depression; history of physical illness	Pre/post pilot study	Peer TECH (Peer-Delivered and Technology) (mobile apps)	Peer TECH e-modules consisting of video and text on psychoeducation and coping skills; access to self-support management; intervention components that match the patient's needs and goals; reminders to take medication/treatments; HIPAA-compliant chat features	[44]
Denmark	250 patients diagnosed with schizophrenia and receiving intervention	Randomized clinical trial	Mobile phone application (mobile apps)	Features of early warning sign assessment on to assess recurrence in patients receiving 1 y of therapeutic dose reduction antipsychotics	[45]

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Table 1. Continued from the previous page

Country	Population sample	Method	Measured variable	Results	Reference
Canada	38 schizophrenia respondents	Pre-post design	App4Independence (Android or iPhone mobile apps)	Real-time features such as news feeds; offline features such as settings and voice detection; assessments of signs and symptoms and patient needs; medication reminders Intervention features: how to overcome social isolation; relevant resources to cope with symptoms, peer engagement platform to facilitate anonymous strategy/tip sharing between fellow A4i users; health checks and goal-setting to inform content delivery and highlight mental health; integration with health information systems, allowing staff to remotely monitor patients	[46]
UK	60 patients with schizophrenia	Single-arm open-label trial	Digital medicine system (mobile app)	Tablet sensor: pharmacologic oral coencapsulation (CoE) with the patient's antipsychotic; Proteus patch: a transmission is sent to a patch attached to the patient's skin when the patient takes medication, and a smartphone analyzes the received transmission; The processed data are transferred through a smartphone app and sent to the patient, family, and officers through a web portal or mobile app.	[47]
Australia	170 respondents who were diagnosed with schizophrenia using certain criteria on the PANSS scores and the Brief Psychiatric Rating Scale	Randomized controlled trial	HORYZONS (Online Social Therapy) (mobile apps and mobile web)	Interactive online therapy features (understanding psychosis, identifying and practicing personal strengths, promoting positive relationships with others, fostering positive emotions, early warning signs and prevention of relapse, managing stress, anxiety, and depression, and vocational skills)	[48]
Spain, Hungary, and Israel	Age 18-45 y Medical diagnosis of schizophrenia; meets criteria for treatment-resistant schizophrenia (TRS)	Prospective multicenter feasibility study	m-RESIST (mobile therapeutic attention for TRS)	Wearable: a smartwatch that will collect data from patient and send it to a smartphone wirelessly (activity level, heart rate, sleep patterns, and steps); Smartphone: the basis of the m-RESIST application; Patients can access educational content about TRS; track early warning signs of relapse, symptoms, and biological variables; request help with questionnaires; and use CBT-based coping strategies; Web-based platform: a tool used by providers of health services to collect patient data and communicate and coordinate with patients and other health workers	[49]

RR, relative risk; HR, hazard ratio; CI, confidence interval; SMS, short message service; HPAA, Health Insurance Portability and Accountability Act; CBT, cognitive behavioral therapy.

Data from the top 10 authors and 15 institutions contributing to schizophrenia research were evaluated. Notably, several of these top authors have collaborated as co-authors. Consequently, when analyzing data pertaining to individual authors, the results should be interpreted as a replication of the data. Figure 3 details the top 10 countries by number of publications. The United States leads with the most publications, followed by Germany and the United Kingdom. Moreover, the United States excels in quality as well as quantity, exhibiting the highest citation count ($n=20\,519$) among countries. This achievement likely stems in part from United States government policy, which allocates a substantial 3.5% of its budget

to research and development. The United States has maintained its position as a frontrunner in scientific research across various disciplines, including schizophrenia research. Based on the National Science Foundation [50] that the United States was responsible for approximately 25% of the world's scientific publications.

Germany ranked second with 200 publications, demonstrating a robust research sector through both the quantity and the quality of its output. This strength is further evidenced by a total citation count of 7309, indicating considerable impact and investment in research and development. According to a recent publication by the German Academic Exchange Service,

Germany invests approximately 90.3 billion euros in research, which is about 2.9% of its gross domestic product. This investment ranks Germany among the top 10 countries globally for research spending. Moreover, the private sector plays a key role in advancing research in Germany by financing projects at universities and research institutes, fostering the development of products that benefit their businesses.

The United Kingdom ranked third in the total number of publications, demonstrating considerable research output with 138 papers and a total of 6929 significant citations. It holds the second position globally in science and research, with 54% of its research output deemed world-leading, outperforming the United States, Canada, Germany, Japan, and Brazil. According to the latest research findings, the United Kingdom tends to provide the best treatment for schizophrenia. The United Kingdom Department of Health has established that the primary treatment for this condition is antipsychotic drug therapy. Additionally, individuals with schizophrenia are universally offered cognitive behavioral therapy by adult clinical psychologists.

Figure 3 illustrates the collaboration network among countries regarding relapse prevention in schizophrenia, highlighting various clusters. The United States is at the forefront, leading in collaborations with other nations. American scientists frequently engage in international partnerships, increasing their citation statistics. This finding aligns with research by Heras-Mozos et al. [51] and Maramis et al. [12], which indicates that papers authored by international teams display higher average citation rates. Germany ranks second in collaborations, with 198 connections and partnerships with over 10 countries. Figure 3 also depicts the temporal evolution of national contributions, with purple nodes representing those with a substantial number of publications in earlier studies. Notable countries in this category include Italy, Hong Kong, China, Hungary, Finland, and Ireland.

Another important element indicative of article content is the choice of keywords (Figures 4 and 5). Analyzing frequently used keywords can reflect core aspects of schizophrenia relapse prevention. Therefore, keyword mapping is essential to identify patterns across research areas and to uncover gaps in the literature.

In these figures, the size of the circle representing each cluster, which denotes specific keywords in scientific publications, reflects the frequency of those keywords' usage. Larger circles indicate a higher number of publications incorporating those terms. As outlined by Olivares et al. [20], the color of the circle

signifies the relationship between keywords.

Keywords with light blue nodes have been extensively utilized in previous studies, while yellow keywords represent new terms that are currently under investigation by researchers. The categories include "cognitive remediation," "m-health," "digital technology," "psychotic disorders," "mental health," "antipsychotic agents," and "hospitalization." Collectively, these clusters contribute to the development of innovative and sustainable strategies aimed at preventing relapse in patients with schizophrenia, thus improving their quality of life.

Table 1, reflecting the systematic review analysis, illustrates the global advancement of digital technology in accessing health-related applications through mobile phones, which represents a logical progression in health condition management [52]. The use of internet-based and mobile-based interventions can improve cost-effectiveness [53]. For instance, studies have demonstrated the effectiveness of digital technologies in reducing hospitalization days among individuals with schizophrenia. Specifically, during a 6-month period, the intervention group experienced a mean of 5 fewer hospital days ($\beta = -4.58$; 95% CI, -9.03 to -0.13; $p = 0.044$) compared to the control group [32]. Digital technologies encompass personalized relapse prevention planning that includes face-to-face meetings and medication management via smartphones and computers, as well as web-based prescriber decision support systems. These findings align with research [35], indicating that digital technology is effective for monitoring early warning signs, in conjunction with peer support and clinical triage, to detect and prevent relapse in schizophrenia. While several studies have employed digital technology for relapse prevention in mental disorders such as depression, anxiety, and eating disorders [54], little research is available on the use of digital technology for relapse prevention in schizophrenia.

This study has several limitations. First, it was dependent on the Scopus search engine for data collection, excluding studies not indexed by this database. Second, citation counts derived from Scopus tend to be more conservative than those from Google Scholar, potentially resulting in an underestimation of the citation figures. Finally, the reported number of papers from specific institutions and researchers encompasses a variety of paper types, including original research, reviews, viewpoints, editorials, case reports, and letters to the editor. Consequently, the total count of articles may not accurately represent the volume of original research output by the researchers in question.

In general, our findings suggest a marked interest in schizophrenia relapse prevention research among researchers worldwide. However, this interest remains concentrated within a select few research centers, highlighting the need for broader participation in schizophrenia research. The findings emphasize the importance of expanding efforts in schizophrenia relapse prevention research across the globe. To bridge this gap, it is imperative to undertake multicenter studies, improve the research capabilities of clinicians from various educational institutions and sectors, and design studies with increased translational potential to improve outcomes in schizophrenia relapse prevention. Achieving these goals necessitates substantial investment, and funding bodies must be made aware of this critical need. At the policy level, research policies must be formulated that are tailored to the needs of individual countries. These policies should aim to strengthen infrastructure and provide the necessary financial support for schizophrenia relapse prevention research. Furthermore, they should encourage research activities that yield translational benefits for individuals with schizophrenia, covering immediate, medium, and long-term outcomes.

CONCLUSION

This bibliometric analysis of research on schizophrenia relapse prevention reveals an increasing trend in the number of publications, with the United States as the foremost contributor. Leading authors in this field are John M. Kane, Stefan Leucht, and Christoph Correll. Prominent clusters identified in the author keyword co-occurrence network relate to relapse prevention, antipsychotic treatment, digital technology, and family interventions. The results suggest potential research avenues, such as the incorporation of family interventions, cognitive remediation, and digital technology into relapse prevention strategies.

NOTES

Conflict of Interest

The authors have no conflicts of interest associated with the material presented in this paper.

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Author Contributions

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ORCID

Isymiarni Syarif <https://orcid.org/0009-0008-0042-0079>
Hasnawati Amqam <https://orcid.org/0000-0003-4961-8517>
Saidah Syamsuddin <https://orcid.org/0000-0002-4331-1680>
Veni Hadju <https://orcid.org/0000-0001-5321-0157>
Syamsiar Russeng <https://orcid.org/0000-0001-6232-8990>
Yusran Amir <https://orcid.org/0000-0001-6739-0195>

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