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Eco-therapy for recovery in people with schizophrenia: A scoping review

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Abstract

Background: Schizophrenia is a chronic mental disorder that affects thought processes, perception, emotions, and behaviour, often requiring long-term treatment and rehabilitation. Eco-therapy has emerged as a complementary approach that uses interactions with nature to support psychological well-being and recovery.
Purpose: To map the available evidence on eco-therapy among people with schizophrenia, focusing on intervention types, care settings, and recovery-related outcomes.
Method: This scoping review followed the methodological framework proposed by Arksey and O'Malley and refined by Levac et al. The literature search was conducted in four electronic databases: PubMed, Scopus, EBSCO (CINAHL), and SAGE. The search covered English-language primary research articles published between 2015 and 2024. Study selection was guided by the Population–Concept–Context (PCC) framework and reported according to PRISMA-ScR.
Results: Ten studies met the inclusion criteria. Three main intervention approaches were identified: horticultural therapy, animal-assisted interventions, and exposure to natural environments, including virtual reality-based nature relaxation. These interventions were implemented in clinical and community settings and examined various outcomes, including psychiatric symptoms, social functioning, daily functioning, quality of life, and psychological well-being.
Conclusion: Eco-therapy shows potential as a complementary approach to supporting recovery among people with schizophrenia. However, variations in intervention characteristics and outcome measurements limit comparisons across studies. Further research is needed to develop standardised intervention protocols and evaluate their feasibility and implementation, particularly in low- and middle-income countries, including Indonesia.

Keywords: Eco-Therapy; Nature-Based Interventions; Recovery-Oriented Care; Schizophrenia.

INTRODUCTION

Mental health problems remain a significant public health concern worldwide, including in Indonesia. These conditions can affect social relationships, employment, and overall quality of life, creating challenges not only for individuals but also for their families and healthcare systems. In 2019, approximately 970 million people worldwide were living with a mental disorder, with anxiety and depressive disorders being the most prevalent (American Psychiatric Association, 2022; World Health Organization, 2022). In Indonesia, the Basic Health Research survey has reported a considerable burden of mental health problems in the general population, with variations between urban and rural areas (Ministry of Health of the Republic of Indonesia, 2019). Mental disorders are generally characterised by clinically significant disturbances in emotion regulation, cognition, or behaviour that can cause distress and interfere with social, occupational, and family functioning (American Psychiatric Association, 2022). Among these conditions, schizophrenia is

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considered a severe mental illness that requires particular attention (Farkhah et al., 2017).

Schizophrenia is a severe mental disorder characterised by disturbances in thought processes, perception, emotions, and behaviour. People living with this condition may experience difficulties distinguishing reality, often accompanied by symptoms such as hallucinations and delusions (Videbeck, 2022). Its clinical course varies considerably, as individuals may differ in their underlying causes, symptom presentation, treatment responses, and illness progression (Fitrikasari & Kartikasari, 2022). Schizophrenia also contributes substantially to the global burden of disability, affecting tens of millions of people worldwide. Estimates published in the mid-2010s indicated approximately 21 million cases globally (World Health Organization, 2016). In Indonesia, the prevalence of severe mental disorders, including schizophrenia, was reported at approximately 7 per 1,000 population, representing an estimated 1.6 million people (Directorate of Mental Health, 2022; Ministry of Health of the Republic of Indonesia, 2019). These figures underline the need for continuous and comprehensive mental health services to address the long-term needs of people with schizophrenia.

Managing schizophrenia involves more than controlling psychiatric symptoms; it also requires attention to patients' daily functioning and overall recovery. Pharmacotherapy remains the mainstay of treatment, supported by other biological and psychosocial interventions to improve clinical and functional outcomes (Fitrikasari & Kartikasari, 2022). Rehabilitation also plays an important role in helping individuals manage the effects of the illness, participate in community life, and maintain social relationships (Pardede et al., 2021). Nevertheless, relapse remains a challenge, particularly when individuals lack adequate recovery support and coping strategies (Afconneri & Puspita, 2020). This situation highlights the need to explore complementary approaches that can support existing treatment and rehabilitation programmes.

Eco-therapy, also referred to as nature-based therapy, is one approach that has attracted attention in the field of mental health. It involves activities and interactions with natural environments intended to promote physical and psychological well-being through a closer connection between people and nature. Meaningful engagement with natural surroundings may contribute to health and well-being, while limited contact with nature may have adverse effects on physical and psychological health (Wijaya Mulya et al., 2024). In mental health care, eco-therapy has been explored through activities that encourage interaction with green spaces and participation in meaningful experiences (Prasandya et al., 2023). These activities take various forms, including horticultural therapy, gardening, park-based activities, animal-assisted interventions, and outdoor walking (Prasandya et al., 2023). Previous studies have also reported potential benefits in several psychological domains, including mood, self-esteem, self-confidence, and social skills. Such findings have increased interest in eco-therapy as a complementary approach to mental health promotion, practice, and education (Kahveci & Göker, 2019; Wang et al., 2025).

Despite growing interest in nature-based approaches to mental health care, their application among people with schizophrenia remains varied in terms of intervention types, delivery settings, and recovery-related outcomes. A clearer understanding of these approaches is needed to examine how eco-therapy has been implemented and what aspects of recovery have been addressed in previous studies. Therefore, this scoping review aims to map the available evidence on eco-therapy among people with schizophrenia, focusing on the types of interventions, care settings, and recovery-related outcomes reported in the literature. It also seeks to identify gaps in existing research and areas requiring further investigation, particularly in relation to the development of mental health services in Indonesia.

RESEARCH METHOD

This study employed a scoping review design to map the available evidence on eco-therapy or nature-based interventions among people with schizophrenia. The review was guided by the Population–Concept–Context (PCC) framework. The population comprised individuals with schizophrenia or schizophrenia-spectrum disorders, the concept covered eco-therapy or nature-based interventions, and the context included inpatient, outpatient, rehabilitation, and

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community-based mental health settings. The reporting followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).

A literature search was conducted across four electronic databases: PubMed, Scopus, EBSCO (CINAHL), and SAGE. The search covered English-language articles published between 2015 and 2024, with the final search conducted in October 2026. Search terms included schizophrenia, dementia praecox, schizophrenia spectrum, psychosis, ecotherapy, nature-based intervention, nature therapy, green therapy, horticultural therapy, gardening, animal-assisted intervention, and environmental therapy. Boolean operators (AND and OR) were used to combine the search terms. Outcome-related terms were not included as mandatory search terms to avoid missing relevant studies that used different terminology.

Studies were included if they were primary research articles involving individuals with schizophrenia or schizophrenia-spectrum disorders, examined eco-therapy or related nature-based interventions, were published between 2015 and 2024, and were available in full text. Eligible study designs included randomized controlled trials, quasi-experimental, pre-experimental, observational, qualitative, and mixed-methods studies. Secondary publications, including systematic reviews and scoping reviews, editorials, letters, commentaries, research protocols, theses, dissertations, conference proceedings, and other non-journal publications were excluded. Studies that did not meet the population or intervention criteria were also excluded.

All retrieved records were collected in a reference management worksheet, and duplicates were removed before screening. Study selection involved two stages: title and abstract screening, followed by full-text assessment based on the eligibility criteria. The initial search identified 1,486 records, and 10 studies met the inclusion criteria for the final review. Screening was conducted by one reviewer (IM), while uncertain cases were discussed with a second reviewer (SSF) until consensus was reached. The study selection process is presented in the PRISMA flow diagram.

Data were extracted using a structured data charting table prepared before the extraction process. The extracted information included authors, publication year, country, study design, research setting, sample size, intervention type, duration, frequency, and facilitators. The review also examined the reported outcomes, including psychiatric symptoms, social functioning, quality of life, and psychological well-being, as well as the measurement instruments used. The findings were synthesised descriptively and grouped according to intervention type, delivery setting, and recovery-related outcomes. The results are presented in narrative form and a summary table to describe intervention characteristics, reported outcomes, and gaps in the available evidence.

No formal methodological quality appraisal was conducted because the purpose of this scoping review was to map the available evidence rather than evaluate intervention effectiveness or establish causal relationships. Studies were included based on their relevance to the review objectives and eligibility criteria, regardless of their methodological quality.

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RESEARCH RESULTS

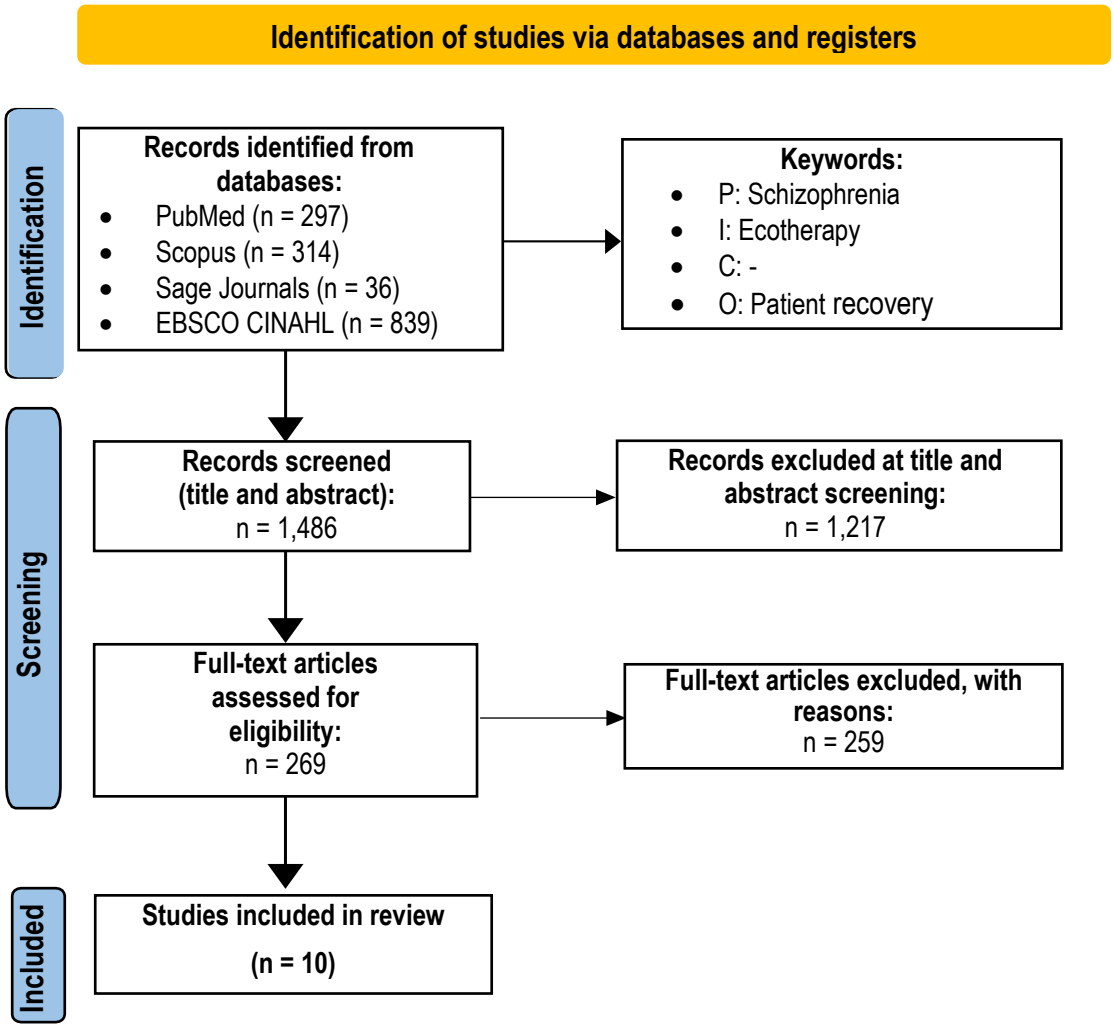


Figure PRISMA-ScR Flow Diagram of the Study Selection Process.

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Table Characteristics of Included Studies and Eco-Therapy Interventions (N = 10)

(Author, Year) (Country)	Study Characteristics	Eco-Therapy Intervention	Intervention Duration and Schedule	Outcomes and Key Findings
(Kangarloo et al., 2023) (United States)	Exploratory study; n = 34; individuals with schizophrenia spectrum disorder (SSD) and controls; community-based setting.	Greenspace exposure measured using the Normalized Difference Vegetation Index (NDVI), GPS tracking, and ecological momentary assessment (EMA) through smartphone prompts.	7 days; three smartphone prompts per day; repeated speech sampling.	**Outcomes:** Affect measured through self-report and speech-derived affect words. **Findings:** Greater greenspace exposure was associated with more positive affect words and fewer anger-related words among participants with SSD.
(Veling et al., 2021) (Netherlands)	RCT; n = 50; outpatient psychiatric care, including individuals with schizophrenia.	Virtual reality (VR) nature relaxation using VRelax 360° nature videos at home.	10 days; repeated home-based sessions.	**Outcomes:** Momentary positive and negative affect, perceived stress, and psychiatric symptoms. **Findings:** VR nature relaxation was associated with immediate improvements in affect and short-term reductions in perceived stress and psychiatric symptom burden.
(Sisman et al., 2020) (Turkey)	RCT; n = 80; community mental health centre (CMHC).	Horticultural therapy involving theoretical instruction and hands-on plant cultivation.	6 weeks; approximately six sessions; 50 minutes per session.	**Outcomes:** Functional remission, including social and daily functioning. **Findings:** The horticultural programme was associated with improvements in functional remission and everyday functioning.
(Monfort et al., 2022) (Spain)	Quasi-experimental prospective study; n = 36; individuals with schizophrenia and substance use disorder.	Animal-assisted therapy (AAT) involving interaction and care activities with a therapy dog.	10 sessions over approximately 3 months; 45 minutes per session; weekly group sessions.	**Outcomes:** Positive psychotic symptoms and daily functioning. **Findings:** AAT was associated with reductions in positive psychotic symptoms and improvements in daily functioning in the intervention group.

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(Zhu et al., 2016) (China)	Randomized, double-blind, placebo-controlled study; n = 110; hospital-based setting.	Horticultural therapy combined with treatment as usual (TAU), compared with a control group.	12 weeks; three sessions per week; 90 minutes per session.	**Outcomes:** Psychiatric symptom severity, including Positive and Negative Syndrome Scale (PANSS) scores. **Findings:** Horticultural therapy combined with usual care was associated with greater improvements in psychiatric symptoms than the control condition across follow-up assessments.
(Eum & Kim, 2016) (South Korea)	Quasi-experimental study; n = 55; psychiatric hospital.	Structured horticultural therapy programme.	8 weeks; twice weekly; 60 minutes per session.	**Outcomes**: Self-efficacy, stress responses, and psychiatric symptoms. **Findings:** The programme was associated with increased self-efficacy and reductions in stress responses and psychiatric symptoms.
(Supiatun et al., 2021) (Indonesia)	Quasi-experimental study; n = 28; hospital-based setting (RSUD).	Horticultural occupational therapy involving the cultivation of fast-growing vegetables using a standard operating procedure (SOP).	8 sessions; session duration and frequency not reported.	**Outcomes:** Quality of life, including domains assessed using WHOQOL-BREF. **Findings:** Horticultural occupational therapy was associated with improvements in quality of life, particularly in the physical and social domains.
(Oh et al., 2018) (South Korea)	Quasi-experimental study; n = 28; mental health clinic/rehabilitation centre.	Horticultural therapy involving vegetable gardening and structured horticultural activities.	10 sessions over approximately 10 weeks; 120 minutes per session; weekly.	**Outcomes:** Positive, negative, and general psychopathological symptoms. **Findings:** Horticultural therapy was associated with improvements across the assessed symptom domains following the programmed.
(Liu et al., 2022) (China)	RCT; n = 60; female inpatients in a psychiatric hospital.	Edible horticultural therapy involving planting, labelling, and sharing experiences.	6 weeks; approximately 60 minutes per session; frequency not reported.	**Outcomes:** Clinical symptoms and social functioning. **Findings:** Edible horticultural therapy was associated with improvements in clinical symptoms and social functioning.

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(Chen et al., 2022) (Taiwan)	RCT; n = 40; stable middle-aged and older adults with schizophrenia.	Animal-assisted therapy involving structured physical, cognitive, social, and positive-emotion activities, followed by feedback.	12 weeks; 60 minutes per session; weekly.	**Outcomes:** Social functioning and physical performance, including lower-extremity strength. **Findings:** AAT was associated with improvements in social functioning and physical performance.

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DISCUSSION

The findings show that eco-therapy has been applied among people with schizophrenia through three main approaches: horticultural therapy, animal-assisted interventions, and exposure to natural environments, including virtual reality (VR)-based nature relaxation. These interventions varied in their activities, duration, frequency, and delivery settings. The reported outcomes included psychiatric symptoms, social and daily functioning, quality of life, and psychological well-being. This variation indicates that eco-therapy encompasses several approaches rather than a single standardised intervention. Therefore, its contribution to recovery should be understood in relation to the specific activities and outcomes examined in each study.

Schizophrenia is a severe psychotic disorder that can affect thought processes, perception, behaviour, social relationships, independence, and occupational functioning (Setyanto et al., 2017). Its development and clinical course involve various neurobiological and neuropsychological factors, including genetic vulnerability, structural brain abnormalities, and neurotransmitter dysregulation, particularly involving dopamine (Wiramihardja, 2022). Given these complex characteristics, recovery requires long-term support that combines pharmacological treatment, psychosocial interventions, and rehabilitation. However, maintaining continuous support remains challenging, particularly in community settings where mental health literacy and access to appropriate services may be limited. This highlights the need for complementary approaches that can be adapted to patients' daily activities and rehabilitation needs.

Horticultural therapy was the most frequently reported intervention among the included studies. Activities involved planting, watering, fertilising, pruning, harvesting, and other gardening tasks. Some programmes also included food preparation, tasting, and group discussions. Through these activities, participants could engage in practical tasks and observe the outcomes of their efforts as plants grew and developed. Such experiences may encourage participation, provide a sense of achievement, and support confidence in performing everyday activities. These aspects are relevant to schizophrenia rehabilitation, particularly for individuals experiencing reduced motivation, social withdrawal, and difficulties with daily functioning.

The contribution of horticultural therapy to functional recovery was reported in several included studies. A plant cultivation programme delivered through a community mental health centre was associated with improvements in functional remission among individuals with schizophrenia (Sisman et al., 2020). This finding is relevant to community-based rehabilitation, which aims to maintain daily functioning and encourage participation in everyday life. Similarly, edible horticultural therapy involved planting activities and opportunities for participants to share their experiences, allowing practical activities to be combined with social interaction and communication (Liu et al., 2022). These findings suggest that horticultural programmes may address functional and social aspects of recovery in addition to psychiatric symptoms.

The potential contribution of horticultural therapy may be related to the structure and nature of the activities. Regular gardening tasks provide opportunities to develop routines, while touching soil, observing plant growth, and smelling flowers involve visual, tactile, and olfactory stimulation. Gardening also includes light physical activity and opportunities for interaction when conducted in groups. Participation in meaningful activities may further encourage a sense of achievement and the development of practical skills that support rehabilitation (Pieters et al., 2019). Horticultural therapy has also been examined alongside usual pharmacological treatment, demonstrating how gardening activities can be incorporated as a complementary component of psychiatric care (Zhu et al., 2016). Nevertheless, differences in programme duration, frequency, and activity components make it difficult to determine which elements are most closely associated with the reported outcomes.

Evidence from Indonesia is particularly relevant to the development of locally appropriate interventions. A horticultural occupational therapy programme using structured procedures for people with schizophrenia has been reported in an Indonesian healthcare setting (Supiatun et al., 2021).

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The use of standard operating procedures (SOPs) provides a basis for organising activities and maintaining consistency during implementation. It may also support the involvement of mental health nurses and other members of multidisciplinary teams. However, implementation requires consideration of available space, plant selection, staffing, equipment, and patient safety. Further research is needed to examine how horticultural interventions can be adapted to the resources and needs of different Indonesian mental health services.

Animal-assisted therapy (AAT) was another approach identified in the included studies (Chen et al., 2022; Monfort et al., 2022). Unlike horticultural activities, which focus on interaction with plants and the surrounding environment, AAT involves structured interactions between participants and animals. These activities may provide opportunities for social engagement, emotional expression, and physical participation. Such opportunities may be relevant to rehabilitation, particularly for individuals experiencing social withdrawal, reduced motivation, or difficulties maintaining interpersonal relationships.

One included study examined an AAT programme involving physical, cognitive, social, and positive-emotion activities among middle-aged and older adults with schizophrenia (Chen et al., 2022). The structured delivery of these activities is important to ensure that participants receive appropriate guidance and can engage safely throughout the programme. The reported findings also indicate that AAT may address outcomes beyond psychological well-being, including social functioning and physical performance. Another study examined AAT among individuals with a dual diagnosis of schizophrenia and substance use disorder, highlighting its application in a population with additional rehabilitation needs (Monfort et al., 2022).

Despite its potential, AAT requires careful preparation and supervision. Patient screening should consider allergies, fear of animals, and relevant medical conditions. Infection prevention, animal welfare, and the availability of trained handlers or therapists are also important before implementation. These considerations may affect the feasibility of AAT, particularly in healthcare facilities with limited resources. Therefore, appropriate safety procedures, trained personnel, and clearly defined responsibilities are necessary to support interactions between patients and animals.

In addition to structured therapeutic activities, eco-therapy may involve exposure to natural environments and green spaces. Greenspace exposure was examined using the Normalized Difference Vegetation Index (NDVI), GPS tracking, ecological momentary assessments, and speech-based indicators of affect (Kangarloo et al., 2023). Greater exposure to green spaces was associated with more positive affect-related words and fewer anger-related words among participants with schizophrenia spectrum disorders. This approach demonstrates how everyday exposure to natural environments can be examined in relation to emotional experiences. It also emphasises the importance of considering the surroundings in which individuals live and carry out their daily activities when exploring factors related to psychological well-being.

Nature-based interventions can also be delivered through technology. Virtual reality relaxation using the VRelax platform provided immersive exposure to natural environments and was associated with immediate improvements in affective states and short-term reductions in perceived stress and psychiatric symptom burden (Veling et al., 2021). This approach may be useful for individuals who have limited access to outdoor spaces because of mobility difficulties, transportation barriers, or safety concerns. However, its implementation in low- and middle-income countries (LMICs) may depend on equipment availability, costs, technical support, and the willingness of patients and healthcare providers to use the technology.

The physical environment also plays an important role in the implementation of nature-based activities. The availability and public value of green spaces are relevant considerations when developing accessible environments for community use (Andriani, 2022). In healthcare settings, healing gardens and appropriately designed outdoor spaces may provide opportunities for patients to interact with natural surroundings in a more comfortable environment. Nature-based activities, including walking and gardening, have also been discussed in relation to psychological recovery and supportive environments (Sarie & Aji, 2024). However, accessibility, safety, maintenance, and cultural appropriateness need to be

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considered when planning and implementing these activities.

Overall, the findings indicate that eco-therapy may complement recovery-oriented care by creating opportunities for meaningful activities, social participation, and psychological well-being. For mental health nurses and multidisciplinary teams, horticultural activities, animal-assisted programmes, and nature-based exposure represent different options for incorporating nature-related activities into rehabilitation. In Indonesia, horticultural interventions may be particularly adaptable because gardening activities can be adjusted to available spaces and local resources. Nevertheless, these interventions should remain part of comprehensive psychiatric care and require appropriate patient selection, staff preparation, safety procedures, and structured programme delivery.

Several limitations in the available evidence were also identified. First, the included interventions differed in their definitions, activities, and implementation procedures, making comparisons across studies difficult. Second, the outcomes were assessed using various measurement instruments, limiting the consistency of the findings. Third, intervention descriptions were not always sufficiently detailed, particularly regarding facilitator qualifications, intervention fidelity, programme adaptations, and resource requirements. Finally, research from LMICs, including Indonesia, remains limited. Further studies should therefore examine the feasibility, acceptability, and sustainability of eco-therapy within routine mental health services. More consistent reporting of intervention components and outcome measures is also needed to strengthen the available evidence and support the development of practical implementation guidelines.

CONCLUSION

This scoping review identified three main approaches to eco-therapy among people with schizophrenia: horticultural therapy, animal-assisted interventions, and exposure to natural environments, including virtual reality-based approaches. These interventions show potential as complementary approaches to supporting recovery, particularly in relation to psychiatric symptoms, psychological well-being, social and daily functioning, and quality of life. However, variations in intervention characteristics, delivery methods, and outcome measurements limit comparisons across studies and prevent conclusions about the superiority of one approach over another. Further research is needed to develop standardised intervention protocols and evaluate their feasibility, acceptability, safety, and implementation in low- and middle-income countries, particularly Indonesia.

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