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E-B Environment - Behaviour Proceedings Journal

AcE-Bs2024Langkawi

https://www.amerabra.org

e-IPH e-International Publishing House Ltd., United Kingdom

12th ASIAN Conference on Environment-Behaviour Studies,
Holiday Villa Beach Resort & Spa, Langkawi Island, Malaysia, 01-03 Mar 2024

Non-Pharmacological Intervention to Improve Motivation among Patients with Schizophrenia: A scoping review

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Abstract
In recent years, recognition of motivational deficits in individuals with schizophrenia has grown, leading to increased exploration of non-pharmacological interventions in mental health. This review maps the literature on such treatments targeting motivational impairments in schizophrenia, aiming to identify gaps and suggest future research directions. The review identified 16 articles out of 80, predominantly randomized controlled trials. Various interventions, including cognitive training, behavioral programs, and mobile apps, have been identified to enhance motivation in this population. Despite limitations, the review provides a comprehensive overview and establishes a foundation for further research in enhancing motivation interventions for schizophrenia.

Keywords: intervention; treatment; motivation; schizophrenia

DOI: https://doi.org/10.21834/e-bpj.v9i28.5787

1.0 Introduction

Schizophrenia, a global mental illness affecting millions, presents challenges in Malaysia, with incidence rates ranging from 7.7 to 43.0 per 100,000 (Chee & Salina, 2014). It disrupts perceptions, thoughts, feelings, and behaviours (Nolen-Hoeksema, 2014), particularly manifesting in negative symptoms such as reduced goal-directed behaviour, social interactions and motivations (Aleman et al., 2017). Distinguishing between primary and secondary negative symptoms is therapeutically significant (Mucci et al., 2017). Comprehensive treatment for patients with schizophrenia involves pharmacological, rehabilitative, and social support interventions (Diez-Carral et al., 2015). This scoping review focuses on non-pharmacological interventions, recognizing their role in fostering recovery through meaningful activities (Höhl et al., 2017; Brown & Stoffel, 2019). It aims to explore non-pharmacological treatments targeting motivational impairments in schizophrenia, offering insights for future investigations and clinical strategies to enhance quality of life and treatment outcomes.

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DOI: https://doi.org/10.21834/e-bpj.v9i28.5787

2.0 Literature review

Schizophrenia represents a severe mental illness characterized by profound disturbances in cognition, affect, and behaviour (Mihaljević-Peleš et al., 2019). Its pervasive impact extends beyond the individual, impairing the capacity to discern reality, constructing a distinct internal world, and estranging individuals from social interactions and environments (Jespersen, 2019). Moreover, the ripple effects of schizophrenia extend to familial dynamics, presenting challenges and disruptions for the affected individual's family members (Kate, 2013). Drawing from The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5; American Psychiatric Association, 2013), the clinical presentation of schizophrenia is characterized by a spectrum of symptoms, including delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behaviour, and negative symptoms such as diminished motivation and low self-esteem, all of which pose significant challenges for individuals diagnosed with the disorder.

Leweke et al. (2018) posit that dysregulation within the dopaminergic system may underlie the motivational deficits observed in schizophrenia, thereby exacerbating social impairments (Barch & Dowd, 2010). Research suggests that imbalances in neurotransmitters, particularly dopamine and glutamate, play a significant role in the pathophysiology of schizophrenia. (Barch & Dowd, 2010; Leweke et al., 2018). Dopamine dysregulation in specific brain regions, such as the mesolimbic pathway, is associated with symptoms like hallucinations and delusions. Dopamine also influences motivation and reward processing in the brain. Dysfunctions in dopamine signaling pathways may contribute to reduced motivation and pleasure in individuals with schizophrenia. The second reason patients with schizophrenia lack motivation is due to Brain Abnormalities (Heuvel & Fornito, 2014). Both Structural and Functional: Neuroimaging studies have identified both structural and functional abnormalities in the limbic system, striatum, and prefrontal cortex of patients with schizophrenia. It is believed that these anomalies are the cause of the emotional dysregulation, decreased motivation, and cognitive deficiencies seen in schizophrenia. Interactions between these brain regions may become disrupted, which could lead to problems integrating motivational signals and initiating and maintaining goal-directed behaviours.

Motivation, closely intertwined with self-esteem (SE) (Basco & Han, 2016), is pivotal for maintaining a satisfactory quality of life (QOL) (Morgades-Bamba et al., 2019). However, its attenuation in schizophrenia often precipitates a decline in self-esteem, further compromising overall well-being (Degnan et al., 2021). The dearth of motivation has been linked to diminished performance in essential activities of daily living (ADL) (Pluck & Lee, 2013), instrumental activities of daily living (IADL) (Ran et al., 2017), reduced social engagement (Jespersen, 2019), and limited participation in leisure pursuits (Cella et al., 2016), highlighting the multifaceted repercussions of motivational deficits in individuals grappling with schizophrenia.

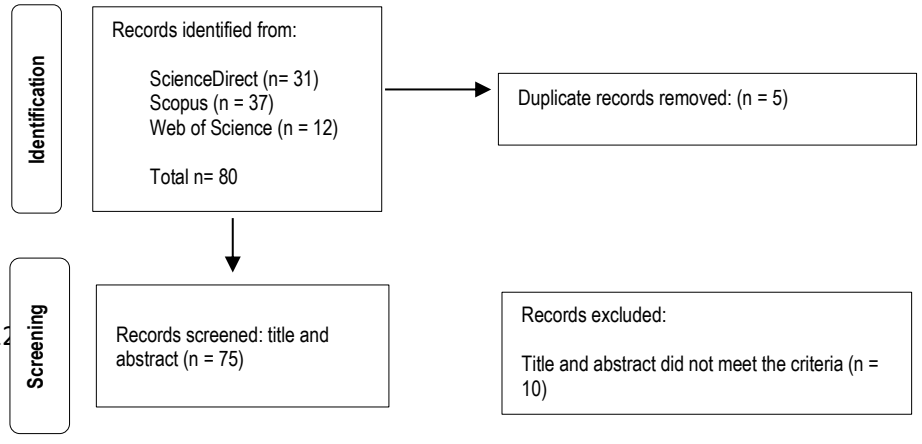
3 .0 Methods

In conducting this review, we adopted the scoping review framework proposed by Arksey and O'Malley (2006), which consists of five key stages: defining the research question, identifying relevant studies, selecting appropriate studies, extracting and cataloguing data, and synthesizing and reporting the findings (McKinstry et al., 2014). To ensure a thorough investigation of recent literature concerning motivation interventions in schizophrenia, systematic searches were conducted in December 2023 across prominent databases such as SCOPUS, Web of Science, and Science Direct. The search utilized the keywords "*intervention OR treatment AND motivation AND schizophrenia*", specifically in the title and abstract sections of articles. Inclusion criteria were defined to encompass relevance to the topic, presence of specified keywords, publication between 2013 and 2023, English language, and full article availability.

Following the removal of duplicate entries, titles and abstracts were screened, followed by a detailed examination of the full texts. The selected articles provided crucial data regarding intervention specifics, study methodologies, participant demographics, and outcomes related to motivation, facilitating a comprehensive synthesis of motivation interventions in schizophrenia and reflecting the most current research in this domain.

3.1 Article selection process and selection criteria

Figure 1 illustrates the PRISMA diagram outlining the process utilized for paper selection. Studies were considered eligible if they investigated or discussed motivational interventions within the context of schizophrenia treatment. The screening of titles and abstracts of retrieved papers was conducted by one author (N.A.) to identify relevant literature. Subsequently, the same author meticulously reviewed full-text copies of retained papers and conducted searches within reference lists to identify any additional relevant literature. Additionally, two authors (A.D. and S.A.) independently assessed half of the full texts each. Any discrepancies regarding inclusion, quality, and relevance were resolved through comprehensive discussions involving all reviewers. Figure 1 shows the review process. The summary table for each included article is in Table 1.



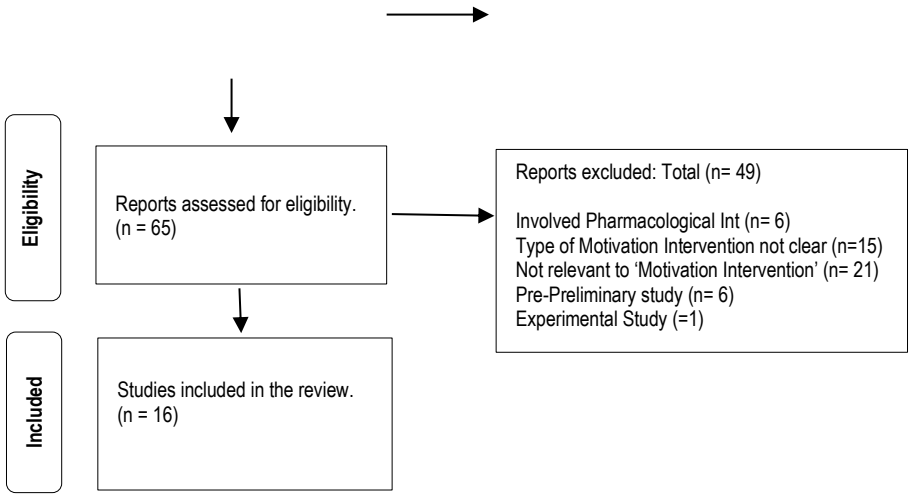


Fig. 1: PRISMA diagram

Table 1. Non-Pharmacological Motivation Intervention

Num	Author(s)/ Year	Study design	Aim	Population/ Country	Motivation Intervention / Description	Summary of findings
1	Mororó., et al., 2023	Mixed quantitative and qualitative research design	To identify factors that may enhance (facilitators) or decrease (barriers) engagement in activity.	Patients with schizophrenia / Brazil	Digital cognitive training Computerized cognitive training for attention bias modification (games, jigsaw puzzles, memory tasks) 41-hour for at least 3 times/week 13-14 weeks	Digital cognitive training helps identify factors that may enhance (facilitators) or decrease (barriers) engagement in activity.
2	Nguyen., et al., 2016	Development	To reduce the syndrome of a diminished capacity to experience.	Participants were healthcare professionals/ Switzerland	The positive emotions program for schizophrenia (PEPS) It consists of 8 sessions that promote skill in the behavioural expression of emotions, savouring pleasant moments, anticipating pleasant moments and relaxation exercises. 1 hour for 8 group sessions	PEPS is a specific, short, easy-to-use, group-based intervention to improve pleasure and motivation in schizophrenia.
3	Schlosser., et al, 2018	Randomized controlled trial	To improve motivation and quality of life	Participants with schizophrenia / United States	PRIME, a Mobile App Intervention A mobile app intervention designed to target reward-processing impairments and enhance motivation. Three primary features of PRIME (from left to right): Goals (goal-setting), Community (Text-based motivational coaching), and Moments (social networking and community feed). 4 days/week 12 weeks	PRIME has the potential to be an effective mobile-based intervention for improving aspects of mood and motivation in young people with schizophrenia.
4	Thonon,,2020	Pre -post-test	To investigate its effects on motivation and associated processes in a naturalistic setting and to explore the dynamics between the processes.	Participants with schizophrenia / France	Switch The switch program was delivered in individual sessions. Sessions were dedicated to building a therapeutic alliance and identifying personal resources, goals, and values Multisensory "imagery" was used to help to look forward into the future. 1 hour per week for the first 6 months 1 hour every fortnight between the 6th and ninth months One hour every three weeks between the 9th and 12th months. In total, 30 sessions	The intervention results in significant enhancements in motivational negative symptoms and functional outcomes, suggesting its meaningful impact.
5	Favrod., et al.,2019	A Randomized Controlled Clinical Trial	To improve pleasure and motivation in schizophrenia patients by targeting emotion regulation and cognitive	Participants were diagnosed with schizophrenia./ Switzerland	The positive emotions program for schizophrenia (PEPS) It consists of 8 sessions that promote skill in the behavioural expression of emotions, savouring pleasant	PEPS is an effective intervention to reduce anhedonia in schizophrenia.

			skills relevant to apathy and anhedonia.		moments, anticipating pleasant moments and relaxation exercises. 1 hour for 8 group sessions	
6	Martin., et al.,2020	Review	To review the current state of neuroimaging and behavioural research addressing components of motivational deficits in this complex and impairing syndrome.	Literature of the current state of neuroimaging and behavioural research/ United States	Behavioural interventions Cognitive remediation therapy was used in behavioural strategies. Exercises typically focus on specific cognitive functions, where tasks are repeated (often on a computer) at increasing degrees of difficulty.	Behavioural intervention, such as cognitive remediation therapy, may benefit motivational components.
7	Tabak.,et al, 2015	Randomized controlled trial	To examine correlations among mindfulness, negative symptoms, and psychological constructs associated with negative symptoms and adaptive functioning, including motivation, emotion regulation, and dysfunctional attitudes	Schizophrenia patients / United States	Mindfulness-based interventions Mindfulness-based therapies use meditation, relaxation, and awareness exercises to help focus on the present moment, aiming over time to experience day-to-day situations and stressors in nonjudgmental and non-reactionary ways. 15-45 Minutes daily	Schizophrenia patients may benefit from mindfulness-based interventions.
8	Luther., et al., 2020	Randomized controlled trial	To test the feasibility and preliminary effectiveness of Mobile Enhancement of Motivation in Schizophrenia (MEMS).	participants with a schizophrenia-spectrum disorder / United States	Mobile Enhancement of Motivation in Schizophrenia (MEMS) MEMS consist of 3 sets of personalized, interactive text messages each weekday to reinforce and cue goal completion. Approximately 45 minutes 8 weeks	Results demonstrate that MEMS is feasible as a brief, low-intensity mobile intervention that could effectively improve some aspects of motivation
9	Mow., et al, 2022	Quantitative	To examine associations between twice daily self-reports of social motivation and behaviour.	Participants with schizophrenia/ United States	Smartphone-based mobility metrics Patients report the number of hours spent at home, the number of locations visited, the probability of being stationary, and the likelihood of following one's typical routine using a smartphone. Twice a day for 60 days	Smartphone-based mobility can be used to monitor social motivation among schizophrenia patients.
10	Choi., et al., 2020	Randomized controlled trial	To explore the effect of combining PE and CT towards patient motivations.	outpatients with schizophrenia / United States	Physical (PE) and cognitive (CT) exercise PE was conducted three times per week on Monday, Wednesday, and Friday from 10 to 10:30 am, while CT was provided shortly after, from 11 to 11:30 am. Those in the PE + CT group did PE on Mondays and Fridays and CT on Wednesdays. 3 months,2 months follow up, a total of 5 months	Combining PE and CT leads to lasting effects that are superior to those of either intervention alone.
11	Shreya., et al, 2022	Review	To examine the feasibility and acceptability of CR remote interventions for motivation.	Nine (n =847) fully remote and one hybrid CR intervention. / Canada	Cognitive remediation (CR) Exercises typically focus on specific cognitive functions, where tasks are repeated (often on a computer) at increasing degrees of difficulty.	Acceptability rates for remote CR interventions were high, and responses from caregivers were positive.
12	Alice., et al., 2020	Clinical Trial	To examine the relationship of subjective awareness of cognitive deficit to aspects of motivation and cognitive learning during an efficacious CR program	Individuals with schizophrenia / United States	Cognitive remediation (CR) Exercises typically focus on specific cognitive functions, where tasks are repeated (often on a computer) at increasing degrees of difficulty.	CR could impact engagement in and how one values treatment via its effect on perceived competency
13	Blanca., et al, 2023	An exploratory, pragmatic, randomized clinical trial	To evaluate the effectiveness of lifestyle intervention and to assess the persistence of potential effects in a 24-month long-term follow-up	Participants with schizophrenia / Spain	Aerobic exercise program and behavioural counseling Jogging, walking, and climbing are examples of aerobic exercises that can be used, and behavioural counselling is centred on the individual working to change their behaviours. 3 times/week 12 sessions	Participants in both conditions attended, on average, at least half of the groups that were offered, indicating that many individuals living with negative symptoms are willing to participate in an intervention to improve social and community participation.

14	Melike., et al., 2016	A case study	To describe the achievement of treatment collaboration through motivational interviews (MI) in a patient with treatment-resistant schizophrenia	Participants with schizophrenia / Turkey	Motivational Interviewing Open questions, affirmations, reflective listening, and summary reflections (OARS) are the basic interaction techniques and skills that are used "early and often" in the motivational interviewing approach.	The MI method can be used to ensure continued treatment effectiveness, to increase patient awareness about the disease and benefits of treatment, and to increase patients' self-efficacy
15	Favrod., et al,2022	Quantitative	to evaluate the efficacy of motivational interviewing (MI) in	Participants with schizophrenia/ United States	Motivational Interviewing Open questions, affirmations, reflective listening, and summary reflections (OARS) are the basic interaction techniques and skills that are used "early and often" in the motivational interviewing approach.	Fidelity to the MI intervention was high, and MI condition was associated with increases in perceived. MI showed some promise and may be a worthwhile addition to more comprehensive, robust efforts.
16	Thanh., et al,2023	Randomized controlled trial	To investigate whether early task-specific intrinsic motivation and its domains (e.g., interest, perceived competence, and value) predicted treatment engagement within the context of intensive cognitive training and aerobic exercise interventions.	Participants with first-episode schizophrenia / United States	Cognitive training (CT) and aerobic exercise (AE) programs AE (examples: Jogging, walking, and climbing) was conducted three times per week from 10 to 10:30 am, while CT was provided shortly after, from 11 to 11:30 am. 6 months	CT and AE have higher baseline scores of intrinsic motivations for cognitive.

4 .0 Findings

The search found 80 articles on motivation intervention in schizophrenia, resulting in 75 after removing duplicates. Sixty-five studies met inclusion criteria during the abstract review, and 16 were included in this scoping review. Most studies were conducted in Western countries (n=15). Six were randomized controlled trials; one was pre-post, another a review, and one quantitative. The rest used mixed methods, clinical trials, development, exploration, or case studies.

4.1 *Non-Pharmacological Treatments Targeting Motivational Impairments in Schizophrenia.*

Out of 80 studies reviewed, 16 have been included in this analysis. Among these 16 papers, 13 distinct types of motivational interventions were identified, which can be categorized into three main types: Psychological and Behavioural Interventions, PE and CT, and Interventions utilizing mobile and computer applications.

4.2 *Psychological and Behavioural Interventions*

Psychological and behavioural interventions have emerged as the predominant approach for addressing the needs of individuals with schizophrenia within community settings, as evidenced by seven studies (n=7) (Nguyen et al., 2016; Thonon et al., 2020; Favrod et al., 2019; Martin et al., 2020; Tabak et al., 2015; Melike et al., 2016; Favrod et al., 2022). These interventions signify a concerted effort to provide comprehensive support and therapeutic strategies tailored to the unique challenges faced by individuals grappling with schizophrenia within community contexts. The primary objectives across these studies varied, encompassing endeavours to alleviate the syndrome of diminished capacity to experience (Nguyen et al., 2016; Favrod et al., 2019), explore the impact of interventions on patient motivation (Thonon et al., 2020), evaluate the current landscape of neuroimaging and behavioural research pertaining to motivational deficits (Tabak et al., 2015), and investigate correlations among mindfulness, negative symptoms, and psychological constructs related to negative symptoms and adaptive functioning (Melike et al., 2016; Favrod et al., 2022).

The duration of these interventions predominantly spanned one hour per session (Nguyen et al., 2016; Favrod et al., 2019), typically comprising eight sessions. However, Thonon et al. (2020) introduced a lengthier program, conducted gradually over a period of twelve months, with sessions occurring weekly for the first six months and then continuing bi-weekly for the subsequent six months, totaling 30 sessions. On the other hand, Tabak et al. (2015) advocated for shorter daily interventions, ranging from fifteen to forty-five minutes, tailored to schizophrenia patients. Notably, specific durations were not explicitly specified in other studies (Martin et al., 2020; Melike et al., 2016; Favrod et al., 2022).

4.3 Physical (PE) and Cognitive Interventions (CT)

In the realm of PE and CT, five studies have been integrated, notably featuring contributions from Blanca et al. (2023), Choi et al. (2020), Thanh et al. (2023), Alice et al. (2020), and Shreya et al. (2022). Notably, these studies exclusively focus on patients with schizophrenia who are not hospitalized, shedding light on the effectiveness and applicability of such interventions within community-based settings. These investigations focus on evaluating the effectiveness of lifestyle interventions in motivating patients with schizophrenia (Blanca et

al., 2023; Choi et al., 2020; Thanh et al., 2023) and exploring the association between cognitive deficits and motivation (Alice et al., 2020; Shreya et al., 2022). The duration of these interventions varied from one to six months, typically comprising sessions held three times per week, each lasting between thirty minutes to one hour for every activity (Blanca et al., 2023; Choi et al., 2020; Thanh et al., 2023). However, the specific duration of the programs needed to be specified in two of the studies (Alice et al., 2020; Shreya et al., 2022).

4.4 Interventions utilizing mobile and computer applications.

Within the scope of interventions targeting schizophrenia in community settings, four studies stand out (Mororó et al., 2023; Schlosser et al., 2018; Luthe et al., 2020; Mow et al., 2022), each spanning a duration of two to four months. While Mororó et al. (2023) centred their investigation on factors influencing motivation engagement, cognitive enhancements, and symptomatology, particularly related to poor insight, the remaining studies (Schlosser et al., 2018; Luthe et al., 2020; Mow et al., 2022) aimed directly at improving motivation, social motivation, and overall quality of life.

In Mororó et al.'s (2023) study, computer use constituted a pivotal component, with interventions incorporating interactive elements such as memory tasks and jigsaw puzzles. Conversely, the other studies relied on mobile applications tailored to patients, designed to address reward-processing impairments and bolster motivation (Schlosser et al., 2018; Luthe et al., 2020; Mow et al., 2022). Notably, all interventions were implemented on an individual basis, emphasizing personalized approaches to intervention delivery.

5.0 Discussion

This scoping review explores non-pharmacological treatments for motivational impairments in schizophrenia. We found 16 articles across databases and journals, categorizing interventions into psychological/behavioural for example, PEPS and behavioural interventions, physical/cognitive, for example, PE and CT exercise, and mobile/computer-based such as SWITCH and PRIME. These insights offer healthcare providers new strategies. All articles published within the last decade reflect the growing interest in non-pharmacological interventions for schizophrenia. While promising, studies may be limited by small samples and the need for more randomization. Still, positive results highlight the potential of these interventions in improving motivation in schizophrenia.

Furthermore, reviews have highlighted the effectiveness of motivation interventions in schizophrenia, emphasizing the significance of non-pharmacological approaches as adjuncts to conventional psychiatric treatments. Within the reviewed literature, Psychological and Behavioral interventions emerged as the most frequently described motivational intervention (Nguyen et al., 2016; Thonon et al., 2020; Favrod et al., 2019; Martin et al., 2020; Tabak et al., 2015; Melike et al., 2016; Favrod et al., 2022), followed by PE and CT (Blanca et al., 2023; Choi et al., 2020; Thanh et al., 2023; Alice et al., 2020; Shreya et al., 2022), and Interventions utilizing mobile and computer applications out (Mororó et al., 2023; Schlosser et al., 2018; Luthe et al., 2020; Mow et al., 2022). These findings underscore the multifaceted nature of motivational interventions and the importance of adopting comprehensive approaches tailored to individual patient needs.

Based on the synthesis of information on the characteristics of the interventions in the included articles, a 'typical' motivation intervention in schizophrenia may include intervention in community-based patients, with 2–3 weekly 60-minute sessions and a duration of between 2 and 12 months. However, none of the articles explained their choice of intervention characteristics, and all mentioned conducting interventions in overseas mental health centres, suggesting potential influence by centre regulations/policies. Regardless of the intervention type in each study, the articles included in this review demonstrated the positive effects of non-pharmacological motivation interventions. We underscore the implications of this review for the practice of Occupational Therapy (OT) and similar professionals. This scoping review equips healthcare providers with tools to develop motivational intervention sessions in schizophrenia by understanding the characteristics of these three types of interventions: Psychological and behavioural interventions, PE and CT, and Interventions utilizing mobile and computer applications. However, it is important to note that while non-pharmacological interventions identified in this review significantly improve motivation among persons with schizophrenia, the studies were predominantly conducted in Western countries, and none of the participants were hospitalized. Therefore, the applicability of these interventions to the Asian population, particularly in Malaysia, remains unexplored, highlighting the need for tailored programs for persons with schizophrenia in Malaysia.

6.0 Conclusion & Recommendations

This review acknowledges limitations such as incomplete data, publication and selection biases, and language restrictions to English studies. DSM 5 criteria were adopted due to search challenges. While article quality was not assessed, key limitations were discussed. Strengths include addressing literature gaps and outlining common non-pharmacological interventions. Gaps include fewer Asian intervention studies and methodological limitations. Extensively researched interventions involve Psychological/Behavioral, Physical, Cognitive, and mobile/computer applications. Sessions typically occur 2–3 times weekly over 2 to 12 months to improve patient quality of life. Further research is needed to define optimal parameters and long-term effects.

Acknowledgements

I extend my gratitude to my supervisors, colleague (Miss Nurani) and UiTM for their invaluable academic and professional assistance,

which facilitated the completion of this review.

Paper Contribution to Related Field of Study

This paper contributed to the field of health sciences and medicine, especially in the area of non-pharmacological intervention for persons with schizophrenia.

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