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Utilization of Digital Technology in Handling Schizophrenia: Literature Study

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Abstract: *In the modern era, digital technology is widely found and used by people because it is easy to access. The use of digital technology-based interventions on psychosis problems can increase cost-effectiveness because patients do not have to go to hospitals or clinics for treatment. The literature study aimed to identify the use of digital technology in the management of schizophrenia. The research method used the PICO with the keyword using in Indonesian and English "Patients and Families AND Digital Technology AND Control of Psychosis Patients' Symptoms" in the period 2011-2021, Indonesian and English, full-text literature, original research, focused on digital technology schizophrenia and individual and family sample populations. The results of the search for articles in the literature study found 12 articles that were relevant to the main topic. The study results showed that digital technology affects the care process for schizophrenics and is also useful for families as caregivers. Using digital technology, actions that can be done are psychoeducation, behavior change, prevention strategies, and good handling interventions. The implementation of digital technology measures provides comprehensive benefits and easy access through both the web and the application.*

Keywords: *Digital Technology, Schizophrenia, Intervention*

INTRODUCTION

Schizophrenia is a heterogeneous disorder between genetic and environmental factors that interact and contribute to the risk of developing the disorder. People with schizophrenia usually tend to be unable to connect the thoughts that arise in themselves which causes the loss of the ability to carry out daily activities in meeting their basic needs other than the need for food and sleep, as well as the inability of sufferers to perform self-care (Merduaty & Hariyati, 2019; Townsend, 2019).

Handling of schizophrenic patients is not only in terms of symptom reduction, psychotherapy, family psychoeducation, group therapy, and pharmacotherapy, but is better overall, especially in improving the client's cognitive function decline as an effort to improve the client's welfare (Motlova et al., 2017). Handling improving cognitive function of schizophrenic patients can be done of them with pharmacological therapy. In line with Coman's research (2010), it was found that effective pharmacological treatment is used to treat cognitive dysfunction and negative symptoms that positively affect its function (Coman, H., Nemes, B., Nica, S., Rusu, I., Herta, D). ., & Cosman, 2010). In addition to pharmacological therapy, there are several non-pharmacological therapies commonly used to improve cognitive function in schizophrenic patients. Currently, many non-pharmacological therapies can help schizophrenic patients in improving their cognitive function.

In the modern era, digital technology is very widely found and used by people, because it is easy to access. This shows that various digital technologies such as the web, android applications, and other internet sites can increase psychosis problems and are useful for becoming mental health services in the current era (Yani, Suryani, & Rafiyah, 2018). In addition, along with the time due to advances in technology, it is important to integrate technology into psychological interventions. There are many

developments in internet-based interventions, although many have not been researched. From several research results on technology-based interventions, it has many advantages and is a very useful medium at this time (Syafitri, 2019).

The problem of psychosis that often arises is the existence of relapses so prevention efforts are needed through digital techniques. In line with global developments, technology can access health-related applications. The use of digital technology-based interventions on psychosis problems can increase effectiveness, especially in terms of costs, and can save the client's budget because they don't have to come to health services directly such as hospitals or clinics. Interventions that can be provided digitally include psychoeducation, monitoring behavior change, prevention strategies, and handling interventions. The use of digital technology-based interventions can be used to overcome mental disorders such as delusions, hallucinations, and so on that are included in psychosis (Yuliastuti, Susanti, & Wardani, 2021). Syafitri's research (2019) explained that after the client was given digital intervention, it proved effective and gave quite significant results because through various methods used both visually in the form of images and videos, they were able to attract patients interest (Syafitri, 2019).

The COVID-19 pandemic has also had a significant impact on families who care for clients with schizophrenia problems, especially in undergoing treatment. Based on the results of a study, it is stated that families experience a burden in caring for schizophrenic patients in the current pandemic conditions (Ilmy, Noorhamdani, & Windarwati, 2020). The handling strategy that can be used to overcome the problem of family burden, one of which is a psychoeducational approach. Family psychoeducation is the provision of systematic, relevant, extensive, and up-to-date information as well as treatment and intervention management for families (Motlova et al., 2017). However, providing family psychoeducation also has its challenges during the current pandemic because it requires the use of technology in its approach for both families and patients suffering from schizophrenia (Yuliastuti et al., 2021).

Given the importance of providing digital technology-based interventions for both families and people with schizophrenia today. From this background, the authors hope to find out the effect of digital technology on people with schizophrenia and their families. The purpose of this critical review is to identify the use of digital technology in the treatment of schizophrenia.

METHODS

The topic in this evidence-based critical review took the topic of the use of digital technology in dealing with Schizophrenia problems. Before searching the literature, the researcher made a PICO as a literature review as follows:

P: Patient and family
I: Digital Technology
C:-
O: Controlled signs and symptoms of psychosis patients.

In the process of making this literature, the researcher carried out several stages. The first stage was to search the database based on the year of publication of scientific literature, the electronic database used is Google Scholar, Pubmed, and Wiley. At this stage, the researchers searched for reference sources from various databases using keywords in Indonesian "Patients AND Family AND Digital Technology AND Control of symptoms of psychosis patients" while in English "Patient AND Family AND Digital technology AND Control signs and symptoms of psychosis patient".

The next stage was the stage of searching for reference sources for selecting literature on the same topic. The language of the literature search used English and Indonesian and the time limit was 10 years (2011-2021). The results of the literature search were analyzed in the form of a table which was then narrated in the discussion (Kurniawan et al., 2022). Table 1 and 2 are about the inclusion and exclusion criteria of articles and the results of article from database

Table. 1. Inclusion and exclusion criteria of articles

Criteria	Inclusion	Exclusion
Year of published	2011-2021 (in the past 10 years)	Before 2011 or after 2021
Language	Indonesian language and English	Not using English or Indonesian language
Type	Original research	A systematic review
Focus	Digital Technology	Beside Digital Technology
Population and samples	People with schizophrenia	People without schizophrenia

After searching with keywords and paying attention to the inclusion and exclusion criteria, the number of literatures is shown in table 2.:

Table. 2. Results of article from database

Databases	Articles	Screening articles	Found articles
Google Scholar	110.920	68	8
Pubmed	75	10	2
Wiley	2.879	18	2
Total	113.874	96	12

RESULTS

The results of searching the database with exclusion, inclusion, and selection of the entire contents of the research articles, we got 12 research articles which were then analyzed. The most populous country is England (Cella et al., 2019; Craig et al., 2018; Eisner et al., 2019; Lobban et al., 2020, 2017; Sin, Henderson, & Norman, 2014), then other countries. such as America (Schlosser et al., 2018), Australia (Alvarez-Jimenez et al., 2019; Thomas et al., 2016), Hong Kong (Chan et al., 2016), Germany (Lim et al., 2020) and Canada (Lal et al., 2020). There are a variety of digital interventions described and the desired outcomes. While 4 research articles can be described as being based on android or smartphone applications (Cella et al., 2019; Eisner et al., 2019; Lim et al., 2020; Schlosser et al., 2018), 7 research articles use the Web (Alvarez- Jimenez et al., 2019; Chan et al., 2016; Lal et al., 2020; Lobban et al., 2020, 2017; Sin et al., 2014; Thomas et al., 2016). Another study used avatar therapy (Craig et al., 2018).

DISCUSSION

Smartphone Application-Based Digital Technology Intervention

The PRIME application is an application-based intervention on mobile that includes community, goal and achievement tracking, and cognitive behavioral therapy (CBT) based training. This intervention is designed to target the motivational system by utilizing social reinforcement to engage and maintain directed behavior. This study on the use of PRIME was conducted over 12 weeks. PRIME provides users with motivational training, clinical doctors who are experienced in research-based interventions, behavioral activation, attention, and psychoeducation to help participants overcome obstacles that hinder their daily activities and improve health. In addition, PRIME provides a platform for its users to interact with each other. Users can message each other directly and can also share positive and spontaneous moments of daily life to increase motivation and desire to socialize. This study involved 63 patients who were included in the DSM-IV-TR criteria, namely schizophrenia, schizophreniform and schizoaffective, who were in the young age range of 16-36 years. Participants also have no history of neurological disorders or head trauma, can speak English well, and have an IQ of >70 as measured by the Wechsler Test for Adult Reading (WTAR). The results of this study indicate that participants who actively use the PRIME application have significantly increased mood and

motivation. Participants also have the willingness to report themselves when they feel depressed, have increased self-efficacy, and also have the motivation to live their future life with a more beautiful goal. This shows that Prime is effective in increasing motivation in schizophrenia patients (Schlosser et al., 2018).

Research (Eisner et al., 2019) tested a smartphone application to monitor early signs and baseline symptoms as predictors of relapse in psychotic patients. Briefly, ExPRESS is an android-based smartphone application that prompts participants once a week to answer a personalized set of questions regarding psychotic symptoms, mood symptoms (Calgary Depression Scale), baseline symptoms (Basic Symptom Checklist, BSC), and early signs of relapse (Early Signs Scale, ESS) in the past week (Eisner et al., 2019). Participants have the freedom of access 24 hours each week to respond to the set of questions. Responses will be uploaded automatically to a server that the research team can access via a password-protected web. Weekly self-reports were considered frequent enough to allow meaningful early signs to be detected but not so frequent that they would not burden the participants. Participants in this study were patients diagnosed with the schizophrenia spectrum aged 18 years and over and were members of the UK's Three Mental Health Trusts from June 2015 to 2016. The participants selected in this study were also schizophrenic patients who had more than one episode of psychotic symptoms within a period. within the past 1 year, had more than two episodes of psychotic symptoms in the past 2 years, was fluent in English, was in a stable condition, and was willing to participate in this study without coercion. The results of this study indicate that weekly application-based monitoring to monitor early signs, baseline symptoms, psychotic symptoms, and relapse which is carried out within 6 months is feasible, valid, and acceptable to use. This smartphone-based method can be developed on a large scale to monitor symptoms in psychotic clients by utilizing technology.

Research (Cella et al., 2019) suggests that symptoms in people with psychosis can be monitored through digital technology through smartphone applications to reduce hallucinatory symptoms in people with psychosis. Patients with psychosis often experience this relapse condition due to an increase in signs and symptoms. Research conducted by Cella (2019) suggests that psychosis patients often experience relapses, usually in hallucinatory patients, this is because patients do not carry out routine controls. Monitoring via smartphone can reduce the situation from getting worse. (Cella et al., 2019) conducted for 10 days on 15 patients who had experienced a psychotic episode with the onset of psychosis in the last 12 months; (d) able to give written consent. It was found that as much as 76% decreased hallucinations. The long-term goal is to develop methods that can use mostly passive information to improve symptom monitoring and contribute to the prevention of relapse in people with psychosis.

Lim et al, (2020) used an application from a smartphone related to psychiatric counseling. Lim (2019) stated that there were 12 participants aged 17 to 25 years with psychotic disorders (Lim et al., 2020). Types of psychotic disorders such as delusions, hallucinations, low self-esteem, cronies, suicide risk, violent behavior, and self-care deficits. The services provided by smartphones from the application are about mental health services for Schizophrenic patients. In addition to services, there is also the provision of educational videos. The purpose of smartphone apps is to help individuals to identify and harness their strengths, and to learn and practice positive interpersonal skills that can strengthen their current relationships. Educational activities through smartphones were carried out for 12 days. With the effectiveness of this smartphone application, patients feel happier because of the very interesting videos.

Web-Based Digital Technology Intervention

SMART was created based on the SMART website on a tablet computer, which the facilitator and participants shared during the session. The SMART website is based on Drupal, optimized for tablet computer or smartphone use, and can be accessed via any internet browser including home computers. SMART can be an innovative mental health service intervention designed to support personal recovery from psychotic disorders. SMART can provide interventions for personal recovery in persistent psychosis by leveraging one's life experiences as part of the intervention.

This SMART content domain is based on the Connectedness–Hope–Identity–Meaning–Empowerment (CHIME) framework which has been used as a consumer account synthesis of the main processes involved in the recovery process. This is complemented by a basis for monitoring activities, improving individual coping, and changing behavior based on cognitive behavioral therapy. SMART is also designed to be able to create seven self-management and recovery: namely recovery, managing stress, physical health, individual, empowerment, relationships, and life.

Material for each topic is presented with a series of videos, including a video introduction to the topic by a mental health promoter, complemented by a combination of video, text, and reflective exercises. The content of the video is 2-3 minutes long and contains about a person with psychosis who tells his journey and life experience until he finally recovered to this day. The videos also contain suggestions and concepts discussed by mental health experts. The series that are in SMART is designed to support recovery for other survivors to have the will and motivation to recover independently and completely (Thomas et al., 2016).

Research (Chan et al., 2016) on web-based psychoeducation for internet-based psychoeducation for caregivers of psychosis (iPEP)1 was established in 2013 to provide self-service in seeking information about psychosis knowledge, parenting skills, and local resources. The results obtained in the study were caregivers reported that the website increased their knowledge of psychosis (85.2%); improve their understanding of local resources (77.5%) and make them feel supported (74.7%). More than 80% of respondents would recommend this website to others. There is general agreement that websites are easy to learn how to operate (80%); have clear and easy to understanding the content (81.5%) and contain sufficient information (74.1%).

The participants also assessed the usefulness of common features and they found that information on psychosis knowledge (77.8%), updates on psychosis-related activities (66.7%), and YouTube learning videos recorded by healthcare professionals (66.2%) were very useful. Several participants suggested that the website could share more information from other caregivers and that they enjoy interacting with other caregivers during official education talks organized as part of the iPEP program.

The effectiveness of family psychoeducation interventions alone has been demonstrated in reducing relapse, hospitalization rates, and improving functioning, and has been shown to increase caregiver knowledge and improve family coping in systematic reviews. Family psychoeducation intervention has been recommended as one of the key psychosocial interventions for early intervention specifically for psychosis services. However, accessibility of services, the high caseload of health care professionals, and the self-stigma of nurses are often obstacles to the implementation of these programs in the real world.

Lobban's research (2017) examines in detail the implementation process of Digital Health Interventions (DHI), which is web-based digital health that aims to support relatives of people with psychosis or bipolar disorder in publicly funded national mental health services (Lobban et al., 2017). Staff engagement with the Relatives Education And Coping Toolkit (REACT) was facilitated by the fit between rationale and device design, and their need to provide support to caregivers as part of national clinical guidelines. The results found that as many as 70% stated that the REACT site provided benefits. The Relatives Education And Coping Toolkit (REACT) recommended that all relatives be provided with information and support, and offered structured family interventions to improve family coping and communication.

Then the research was continued by Lobban (2020) based on this research who has also outlined generalizable recommendations for the successful implementation of DHI using REACT (Lobban et al., 2020). There are three factors in this study that support success, namely the first is the significant impact of the wider social context surrounding mental health. Despite government initiatives to achieve award parity for mental and physical health, the mental health services in this study were chronically underfunded, staff morale was low, and there was high staff turnover and absenteeism. The second is digital trust, competence, governance, and access to limited tools, suggesting that implementing the new DHI will be a challenge.

The third major barrier was staff perception that REACT was a research study, not a clinical initiative, despite extensive efforts to explain that work implementation focus. The results showed that staff was positive about REACT's assistance services to increase support and meet clinical targets. This study focused solely on the uptake and use by staff, but equally important are the factors that impact uptake and use by relatives who are offered REACT (Lobban et al., 2020)

Research (Alvarez-Jimenez et al., 2019) on HORYZONS testing. HORYZONS is the first intervention to exploit online social media technologies accessible via desktop or internet-enabled mobile devices and apply a power and awareness approach to promote long-term social recovery in First-Episode Psychosis (FEP). In addition, the intervention design builds on extensive experience in developing and evaluating effective relapse prevention 98–100 and vocational recovery interventions 58 in early psychosis. Thus, HORYZONS weaves together two novel intervention approaches for FEP with well-established evidence-based protocols, while drawing a solid theoretical basis for social recovery in early psychosis.

Therapists' efficiency using HORYZONS is estimated to be five times higher than that of dedicated FEP services (100 vs. 20 young people with a typical caseload in early psychosis clinics). Thus, if successful, HORYZONS will provide a scalable and cost-effective intervention approach to extend the benefits of early intervention and improve social functioning in patients with FEP thus having the potential to add to the benefits and long-term impact of current early intervention models of psychosis.

The identification of the use of HORYZONS was continued in a study in Canada (Lal et al., 2020). Overall, the beta version of HoryzonsCa was well received by patients and clinical participants. In particular, they value the platform's strengths-based therapeutic approach and consider social media content and features supportive of the recovery process. Horyzons is designed to prevent relapse and support recovery in young people receiving first-episode psychosis (FEP) services. Horyzons has been tested on a sample of 20 young Australian adults for its feasibility, acceptability, usefulness, and safety. Horyzons is a web-based application supported by the Moderated Web-Based Social Therapy (MOST) system. MOST consists of interactive and strength-focused psychosocial interventions, web-based social networking, and clinical and peer moderation. By customizing therapy content to target treatment of specific conditions and adding code customization as needed, the flexible platform enables individual site settings for a wide range of mental health groups. Eligibility criteria for patients were as follows: diagnosed with a psychotic disorder, within their first 3 years of treatment, currently on medication, considered symptomatic stable, and able to participate in focus groups as assessed by their primary care physician.

This Web-based online intervention consists of four core elements, including information about psychosis; various strategies to address and promote well-being; sibling blogs and peer discussion forums; and the "Ask an Expert" function. After the intervention prototype was developed, we tested its feasibility, usability, and acceptability by siblings. In the intervention, most educational materials can be read as HTML documents or can be downloaded as PDF documents. The Blogs & Fellow Brothers Forum and “Ask the Expert” room is interactive and participants are invited to write their blogs and join online discussions with colleagues (other participants) and post questions to the 12 professional members of the expert panel, including general practitioners, mental health nurses, a psychiatrist, and mental health campaigner. A facilitator, mental health nurse with more than 10 years of experience specializing in psychosocial interventions for people with psychosis and their families, moderates online interventions daily for a week and posts weekly updates in the intervention online news forum to all participants to keep them informed. engaged over 4 weeks, spending one to two hours per week using all components of the intervention having a brother or sister affected by psychosis. At the time of the study, most of the participants lived apart from their sick siblings. Nearly 95 percent of all participants evaluated the content of the intervention as (very) relevant to them (n = 16). What participants liked most were the expert question forums and forum settings where discussion topics were grouped into different categories. Overall, participants found the online intervention quick and easy to use, despite navigation problems. The provision of Internet-based information and support

interventions to promote well-being and coping is acceptable and acceptable to siblings with psychosis. Further development in navigation and layout is needed and such improvements are appropriate (Sin et al., 2014).

The Other Based Therapy

AVATAR therapy is a brief therapy for persistent and distressing noises that makes creative and novel use of digital representations of psychotic experiences to provide a controlled yet realistic therapeutic encounter, allowing dialogue and change. AVATAR therapy is feasible, acceptable to participants, and does not produce side effects that can be associated with therapy, this therapy is given by experienced clinicians skilled in psychological therapy. Participants were 18 to 65 years of age, had a clinical diagnosis of schizophrenia spectrum (ICD10 F20-29) or affective disorder (F30-39 with psychotic symptoms), and had experienced auditory verbal hallucinations during the previous 12 months, despite continued treatment.

The primary outcome was a reduction in auditory verbal hallucinations at 12 weeks, measured by the total score on the Auditory Hallucinating Psychotic Symptoms Rating Scale (PSYRATS-AH). Most of the participants were unemployed and the most common diagnosis was paranoid schizophrenia. After completing the avatar setup in the introductory session, which includes a comprehensive voice assessment and word-for-word content, therapy is provided over six weekly 50-minute sessions. The 10-15 minutes of each session involves face-to-face work with the avatar, in which the therapist facilitates a direct dialogue between the participant and the avatar. Participants sit in one room facing their avatar on a computer monitor. The therapist is in a second room with a control panel that allows them to speak in their voice, or as an avatar. Video links allow therapists to see and hear participant responses, allowing them to tailor therapeutic interventions and modify avatar interactions according to the ongoing dialogue. Session progress is determined by discussion in each session of changes in sound severity, malice, or frequency. All sessions were audio-recorded and a copy of the avatar dialogue was provided on an MP3 player to participants with instructions for listening to the recording at home, especially when they heard the sound (Craig et al., 2018).

Healthcare providers, community organizations, and consumers increasingly want to take advantage of digital health/eHealth innovations developed and tested in one part of the world. Digital health adaptation (eHealth) refers to a systematic, targeted, and collaborative process of making changes to digital health innovations to increase relevance and good acceptability (Lal et al., 2020). With the majority of young people now using the internet, social media, and mobile devices, the use of technology is an important avenue to support recovery in youth with FEP (Lal et al., 2020). Relapse in psychotic patients is common. The initial signs felt by the patient have been used to predict relapse which if realized can be prevented before relapse (Eisner et al., 2019).

The literature highlights the increasing interest and documentation of digital technologies in healthcare and their new applications for psychotic disorders. Patient outcomes that improve in psychosis are highly dependent on input from informal caregivers. This systematic review explores the application and outcomes of digital technology in informal caregivers of people with psychosis. There is also diversity in digital applications under review. Most studies are best described as web-based and include those with a dedicated platform with functionality to facilitate communication between caregiver and caregiver groups and professionals. However, studies on the effects and mechanisms of mobile-based technology change in the form of continuous symptom monitoring outside of treatment models deserve further attention in the research community (Bucci, Schwannauer, & Berry, 2019). Of the various digital technology bases used, it is important to pay attention to data protection and security which must be the main concern of psychosis service users (Bucci, Morris, & Berry, 2018).

CONCLUSION

Digital technology is a technology-based intervention either through the web, android applications, and other sites. There are various interventions through digital technology from various

methods that can be used. In the current era, digital technology is very beneficial, especially for people with schizophrenia and their families (caregivers). From various literature studies, it was found that 12 articles discussed interventions using digital technology. These interventions use various methods and can be used on patients and their families (caregivers).

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