



Development of the “BUU True Friend” Mobile Application: Feasibility and Usability Study for Chronic Psychiatric Rehabilitation

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Abstract

Background: Currently, promoting psychiatric rehabilitation through the integration of technology is of great importance to support the daily lives of chronically psychiatrically ill individuals living in the community. **Objective:** This research and development (R&D) study aimed to design and develop a prototype health application for promoting psychiatric rehabilitation among individuals with chronic mental illness in the community. **Methods:** The target population consisted of 40 individuals with chronic psychiatric conditions attending outpatient services at the Psychiatric Clinic, Queen Savang Vadhana Memorial Hospital, Sriracha District, Chon Buri Province, in July 2025. The research was divided into two phases: 1) application development phase according to the ADDIE Model process; and 2) feasibility and usability testing. Following a 14-day trial on participants' smartphones, usability and feasibility evaluations were formally completed by both the study participants (patients) and psychiatric clinic nurses to ensure multi-stakeholder feedback. Data collection tools included a personal information questionnaire, a Living Skills Assessment for Psychiatric Rehabilitation, an mHealth App Usability Questionnaire, and Guidelines for evaluating mHealth usability. Data were then analyzed using descriptive statistics, including frequencies, percentages, means, and standard deviations, as well as inferential statistics with the Wilcoxon signed-rank test. **Results:** The findings revealed that the “BUU True Friend” application was rated highly for application quality by expert evaluators. Application users reported high satisfaction with the application's overall usability. While

no statistically significant difference was found in psychiatric rehabilitation skills likely due to the limited 14-day trial, the 100% user retention rate and high satisfaction scores demonstrate the application's strong feasibility and usability. **Conclusion:** These findings indicate that the "BUU True Friend" application is a viable prototype for promoting psychiatric rehabilitation among individuals with chronic mental illness in community settings.

Keywords: Psychiatric rehabilitation, Community-based care, mHealth, Chronic mental illness, ADDIE model

What was Known

- Psychiatric rehabilitation is essential for recovery, yet community-based access remains limited.
- Most current mHealth apps focus on symptom screening and general mental health education rather than long-term functional rehabilitation.

What's New and Next

- This study presents a nursing innovation shifting from general screening to structured, domain-specific, life-skill rehab based on the LSD-30 framework, targeting six core areas for community living.
- The application uniquely integrates a caregiver-verification system to enhance self-management and treatment adherence, aligning with the Department of Mental Health's 2025 Strategic Map for community-based care.
- Future research will move from self-reported scales to Randomized Controlled Trials (RCTs) with objective behavioral data from app logs to assess long-term efficacy.

Introduction

The current situation indicates a rising trend in the prevalence of psychiatric disorders worldwide. The World Health Organization (WHO) reported that approximately 970 million individuals, or one in every eight people globally, are living with mental health conditions ⁽¹⁾. In Thailand, the number of psychiatric patients accessing services has steadily increased. In the fiscal year 2025, there were 822,642 outpatient visits for psychiatric care, including 51,892 newly registered patients ⁽²⁾. Mental illness is recognized as a critical public health issue because of its potential to cause long-term disability and the loss of social roles among affected individuals. Moreover, it has considerable impacts on caregivers, family members, and society at large. Psychiatric disorders often follow a chronic course and have a high likelihood of recurrence, leading to worsening symptoms and

prolonged emotional and behavioral disturbances. These conditions adversely affect the quality of life of both patients and their families ⁽³⁾.

Chronic psychiatric patients are defined as individuals who have had the illness for at least two years, have been hospitalized for at least six months within the past five years, or have had more than two readmissions within one year. These patients also show limitations or impairments in at least three of six essential life skills, including self-care, cohabitation within the household, social skills, relaxation, work or financial management, and community living ⁽⁴⁾. These deficits diminish the ability to perform daily activities, adversely affect interpersonal relationships, and contribute to low self-worth, lack of motivation, and poor treatment adherence. All of which pose significant obstacles to rehabilitation. Furthermore, families bear the ongoing burden of caregiving, while society incurs economic losses from reduced workforce participation and the costs of long-term care. These impacts collectively reduce overall quality of life and undermine individual potential. Therefore, care for this patient group should emphasize continuity of care to prevent relapses and promote rehabilitation, enabling patients to regain a lifestyle as close as possible to that of the general population ⁽³⁾.

Rehabilitation is the process of enhancing psychiatric patients' ability to perform activities of daily living following illness across six domains. These domains include self-care, cohabitation within the household, social skills, vocational skills, leisure and recreational activities, and community living. These are regarded as fundamental components necessary for the daily functioning of individuals with chronic psychiatric disorders ⁽³⁾. The primary aim of rehabilitation is to improve individuals' functioning and quality of life by strengthening personal capabilities while minimizing impairments or disabilities resulting from psychiatric conditions. Therefore, rehabilitation for this population must be comprehensive, continuous, coordinated among healthcare teams, professionals, and family members, and individualized to address each patient's specific needs ⁽⁵⁾.

The Department of Mental Health (DMH), Ministry of Public Health, has strategically prioritized integrating mental health services into the broader healthcare system to improve access to rehabilitation and support patients' reintegration into society ⁽⁶⁾. To operationalize this policy, the DMH has adopted digital health technologies, developing mHealth applications such as @SmileConnect, Khuikun, Sabaijai, and Hero. While these tools effectively support mental health education, screening, and appointment scheduling ⁽⁷⁾ consistent with global trends in which over 50% of apps are designed for preliminary assessment, they have significant limitations for chronic psychiatric care ⁽⁸⁾.

Specifically, existing DMH platforms like Smile Hub and Mindfit are primarily tailored for at-risk populations and the prevention of acute psychological distress rather than for structured, long-term functional rehabilitation ⁽⁷⁾. Consequently, a critical service gap remains for individuals with chronic psychiatric conditions living in the community. To address this unmet need, the present study developed the “BUU True Friend” application, a comprehensive mHealth tool designed to facilitate domain-specific psychiatric rehabilitation in real-world community settings.

Conceptual Framework

This study involved the design and development of a prototype mobile health application, “BUU True Friend,” using a systematic process guided by the ADDIE Model ⁽⁹⁾. The ADDIE Model comprises five phases, as follows:

1) Analysis: This phase involves a systematic investigation of current problems to identify root causes and assess the needs of the target population. In this stage, the researcher conducted focus group discussions with key stakeholders, including psychiatrists, psychiatric nurses, patients, caregivers, and family members of individuals with chronic mental illness. The objective was to gather data on problems and service needs related to the rehabilitation of people with chronic psychiatric disorders in the community, and to explore patients' and caregivers' expectations for these services. The analysis identified needs for support with medication management, daily routines, and relapse monitoring. These findings informed features such as “My Medication Box” for adherence and “Daily Activities” for life skills. A review of relevant empirical evidence on psychiatric rehabilitation complemented this process.

2) Design: The design phase synthesizes analysis results to define the objectives, expected outcomes, and structure of the application. It involves designing the application's functions, user interface, and operational sequence to align with the identified problems and the target group's needs. In this phase, the researcher designed the platform's functionalities by integrating the concept of psychiatric rehabilitation from Srithanya Hospital 10, emphasizing the rehabilitation of six aspects of daily living skills for individuals with psychiatric conditions. This was combined with the concept of family support proposed by Morelli et al. ⁽¹¹⁾, which focuses on encouraging caregivers and family members to support medication adherence in accordance with the treatment plan. Additionally, the application was developed to incorporate protective behavioral health factors to reduce relapse rates. These factors included motivation enhancement for behavior change and commitment to cessation

of substance use ⁽¹²⁾. The specific features were then defined, and storyboards for each function were created to guide the development of the application software.

3) Development: The development phase involves creating and building a prototype based on the analysis and design stages. In this step, the researcher used storyboards to develop a prototype of the application in collaboration with software developers.

4) Implementation: The implementation phase involves the trial use of the application developed in the previous phase. In this step, the researcher submitted the prototype application to experts for quality evaluation. Based on their feedback, the application was refined and then tested for feasibility and usability with a pilot study group.

5) Evaluation: The evaluation phase assesses the effectiveness and efficiency of the application after real-world pilot testing. In this step, the researcher used results from the pilot study including both effectiveness and platform performance data to refine and enhance the application before its full-scale implementation.

Study Aim

This study aimed to design and develop a mHealth application for nursing services to promote and support rehabilitation for individuals with chronic psychiatric conditions in community settings, and to assess the feasibility and usability of the developed mobile health application.

Materials and Methods

Design

This study employed a Research and Development (R&D) approach based on the five-phase ADDIE Model to develop a prototype mHealth application to promote rehabilitation for individuals with chronic psychiatric disorders in community settings. The study also examined the application's feasibility and usability. The research was divided into two phases: Phase 1 involved developing the application using the ADDIE Model, and Phase 2 focused on testing the application's feasibility and usability.

Sample and setting

The population consisted of chronic psychiatric patients receiving outpatient services at the Queen Savang Vadhana Memorial Hospital Psychiatric Clinic and at Sri Racha Hospital in Chonburi Province during July 2025.

The sample consisted of 40 male and female chronic psychiatric patients, aged 20 to 59 years, diagnosed by psychiatrists according to the ICD-10, primarily with Schizophrenia, Bipolar Disorder, and Major Depressive Disorder. To ensure a consistent level of cognitive capacity for smartphone application interaction, individuals with primary intellectual disabilities or neurocognitive disorders were excluded. These individuals received outpatient services at the Chonathi Clinic, Outpatient Department, Queen Savang Vadhana Memorial Hospital, Sri Racha, Chonburi Province. The sample size was determined using G*Power version 3.1 with the following settings: t-tests, means: Wilcoxon signed-rank test (one-sample case), A priori: Compute required sample size given α , power, and effect size^(13,14). A medium effect size of 0.5 was selected based on Cohen's recommended guidelines⁽¹⁵⁾. The level of significance (α) was set at 0.05, and the statistical power was set at 0.90. The calculation indicated a required sample size of 38 participants. To account for an expected dropout rate of 5%⁽¹⁶⁾, the sample size was increased to 40 participants.

Sampling Procedure: The researcher publicized the study to patients attending appointments at the outpatient psychiatric clinic and conducted home visits to encourage participation. The researcher used convenience sampling, selecting participants based on the following inclusion criteria: psychiatric patients with illness duration of at least two years; no intellectual impairment; a primary family caregiver who has lived with them for at least six months; ability to read, write, or communicate information; ownership of an Android smartphone and ability to use smartphone applications; and consent to participate in the research project. Exclusion criteria for this study included: patients receiving only injectable psychiatric medication. Discontinuation criteria included: checking the database and finding that patients participating in the study used the application less than 80% of the total trial period; inability to follow up on the study results during the 14-day trial period; and experiencing severe psychiatric relapses that caused loss of control over thoughts and behaviors during participation in the research.

Research Instrument

The instruments used in this study were divided into two functional types: those used for research implementation and those used for data collection, as follows:

1. **Instruments Used for Research Implementation:** The instrument used for research implementation was the prototype application "BUU True Friend," an mHealth application platform developed by the researcher. The platform comprised nine functional features derived from the

psychiatric rehabilitation concept of Srithanya Hospital ⁽¹⁰⁾, the family support framework by Morelli et al. (2015), and a literature review on health behavior promotion to reduce relapse ⁽¹²⁾. To achieve the goal of user-centered design, the researchers systematically developed the application's functions based on stakeholder needs identified during the analysis phase. The scope of functionality and objectives for the developed features are as follows:

Function 1: *“My Information.”* This function serves as a database creation tool for system administrators. The workflow begins with initial data entry upon first use. The system stores the patient's personal information, including full name, age, diagnosis, address, and phone number. It also records information about the primary caregiver, including full name, age, underlying conditions, address, and phone number for contact or coordination as needed. Nurses are responsible for marking the patient's home location on Google Maps to facilitate accurate, rapid access for the care team to target areas. The objective of this function is to assist in monitoring application usage and evaluating various health behaviors.

Function 2: *“My Medication Box.”* This function was developed based on the psychiatric rehabilitation concept, with a focus on enhancing patients' self-care skills. Upon first use, the patient and nurse collaboratively enter medication information, which can be selected from a database of illustrated images and basic details aligned with the hospital's psychiatric medication list. If the patient uses medications outside this database, they can upload photos and manually enter additional information. The patient then specifies details for each medication, such as dosage, number of pills, administration times, and remaining quantity, by referencing the medication packaging. The system includes a notification feature that reminds the patient to take medications at scheduled times. When a reminder is triggered, the patient is prompted to confirm medication intake; upon confirmation, the system automatically updates the remaining pill count. Caregivers are responsible for verifying the accuracy of daily medication data to ensure the patient consistently and completely follows the prescribed regimen. The objective of this function is to support patients in adhering to their medication plans consistently and to enhance their competence in managing medications independently.

Function 3: *“Don't Forget Your Appointment.”* This function was developed based on the concept of psychiatric rehabilitation, with a focus on restoring self-care skills. The process involves collaboration between the patient and the nurse to record the next doctor's appointment and set a one-day reminder. When the reminder is triggered, the patient completes an online symptom

assessment to self-evaluate. The results are automatically sent to the nurse's database. At the same time, the caregiver assesses the severity of the patient's psychiatric symptoms using the same system. Both sets of data—from the patient and the caregiver—are stored in the nurse's database for comparison and analysis to assess consistency between the patient's and caregiver's perceptions of symptoms. The objective of this function is to enable patients to recognize and manage early warning signs and to promote adherence to follow-up care through collaborative monitoring.

Function 4: *"Daily Activities."* This function was developed based on the concept of psychiatric rehabilitation, focusing on restoring self-care skills, interpersonal living skills within the home, and the ability to use leisure time constructively and for relaxation. The process begins when the patient logs into the system to plan daily activities. During the initial session, the nurse provides psychoeducation on time management and helps the patient identify suitable activities. Activity planning divides the day into six time slots. For each time slot, the patient selects activities from three main categories: Self-care, such as bathing, eating, and taking medication; Household living, such as doing the dishes, gardening, or caring for pets; and Leisure and relaxation, such as exercising, listening to music, or reading. Once all time slots are filled, the system presents the activity plan in a clock-based visual format. At the end of each day, the patient performs a self-assessment of adherence to the activity plan, with the caregiver helping to verify the accuracy of the report. The goal of this function is to enable patients to independently manage their daily routines and foster discipline and consistency in everyday life.

Function 5: *"Stress Relief for Recovery."* This feature was developed based on the concept of psychiatric rehabilitation, focusing on restoring patients' ability to use their leisure time effectively and practice relaxation techniques. The workflow begins with the patient assessing their stress levels through self-perception and a structured questionnaire. The system then analyzes the results and provides appropriate stress management strategies based on the severity of stress: Normal level – the system sends encouraging messages. Mild to moderate level – the patient chooses one of four relaxation strategies: guided imagery, acupressure massage, breathing exercises, or expressive writing. High level – the system recommends reviewing the problem or seeking consultation. Patients can submit a consultation request, and the information will be sent directly to the nurse. The goal of this function is to enable patients to monitor their stress levels, apply emotion-focused coping strategies, engage in rational problem-solving, and seek support from others when necessary.

Function 6: *"Prevent Relapse."* It was developed based on the concept of psychiatric rehabilitation, focusing on enhancing patients' self-care abilities and integrating literature on health-promoting behaviors that help reduce relapse. This function operates weekly. The process begins with the patient assessing their intention to quit substance use on a percentage scale. Next, the patient identifies triggers that influence their substance-use behavior, categorized as: Internal triggers (emotions/feelings such as fear, anger, depression, and loneliness) and External triggers (environmental factors, people, or situations such as parties, peer groups, media, or drug sources). Following this, the patient along with a nurse and caregiver formulates strategies to manage these triggers. After one week, the system sends a notification prompting the patient to evaluate the success of the implemented plan. If challenges remain, the plan can be revised collaboratively. Should the patient require further support, the system provides an option to submit a consultation request specifying the issue and the patient's needs. This information is then forwarded to the nurse for appropriate assistance. The goal of this function is to motivate patients to reduce or quit substance use and to empower them to identify triggers and collaboratively plan effective coping strategies with nurses and caregivers.

Function 7: *"Path to Success."* It was developed based on the concept of psychiatric rehabilitation, focusing on restoring patients' functional abilities, particularly in self-care skills, constructive use of leisure time, and relaxation. This function analyzes and summarizes data from the patient's use of other functions, which reflect behaviors across four key areas of health: Self-care from the "Daily Activities" function, Medication adherence from the "My Medication Box" function, Substance avoidance from the "Prevent Relapse" function, and Stress management from the "Stress Relief" function. The system presents this information in bar-chart format to provide a clear overview of progress in each area. Additionally, it offers personalized suggestions to support and improve behavior in these areas. The system also generates monthly scores and star points as feedback and motivation. The goal of this function is to help patients develop sustained motivation and a clear sense of purpose to improve their health behaviors.

Function 8: *"Star Exchange Game."* This was developed based on the principles of psychiatric rehabilitation, with a focus on enhancing social, work-related, and community living skills. Patients can choose to play any of the games in this function, including the Creative Communication Game, the Household Accounting Game, and the My Community Game. Activities are recorded in a personal

logbook, and nurses conduct monthly follow-up assessments. The objective of this function is to empower patients to develop their communication, financial management, and social interaction skills.

Function 9: “No Worries.” It was developed based on a literature review of strategies to promote health behaviors that reduce psychiatric relapse. This function enables both patients and caregivers to access information on psychiatric rehabilitation through various educational media, including video clips and infographics. The objective of this function is to promote mental health education through patient self-directed learning.

2. Instruments for Data Collection

2.1 Personal Information Questionnaire: This questionnaire, developed by the researcher, was used to collect participants’ demographic and clinical information, including age, gender, educational level, marital status, occupation, duration of illness, number of hospitalizations, and relationship with the primary caregiver.

2.2 The Living Skills Assessment for Psychiatric Rehabilitation (LSD-30): This instrument assesses the living skills of individuals with chronic psychiatric disorders in the context of psychiatric rehabilitation. It was developed by Boonyamalik et al.⁽¹⁷⁾ and consists of 30 items that evaluate six domains of living skills. The questionnaire uses a 5-point Likert scale. Interpretation is based on the average score for each domain, calculated by dividing the total score by the number of items in that domain. The rating levels are as follows: Level 1 (Mean 0–0.50): Incapable of performing the activity. Level 2 (Mean 0.51–1.50): Capable but does not perform the activity. Level 3 (Mean 1.51–2.50): Capable but requires assistance every time. Level 4 (Mean 2.51–3.50): Capable but occasionally requires assistance. Level 5 (Mean 3.51–4.00): Capable of performing independently. The questionnaire demonstrated high internal consistency, with a Cronbach’s alpha of .94.

2.3 The Mobile Health App Usability Questionnaire (MAUQ): Developed by Wilasinee and Supachai⁽¹⁸⁾, this questionnaire evaluates the usability of mobile health applications. The assessment is divided into two parts: Part 1 evaluates overall quality (29 items), and Part 2 assesses user risk during app use (9 items), for a total of 38 items. The rating scale is a 2-level Likert scale with three response options scored as follows: “Yes” equals 1 point, while “No” or “Not sure” equals 0 points. The total score is the sum of all item scores. However, if the app being evaluated is read-only and does not require user input, items 35 to 38 are not assessed. Thus, the possible score range is 0–38 for interactive apps and 0–34 for read-only apps. Interpretation is based on the total sum: higher

scores indicate better app quality. The scale demonstrated excellent content validity (Content Validity Index = 0.9) and reliability, with Cronbach's alpha coefficients ranging from 0.76 to 0.83.

2.4 Guidelines for Evaluating the Usability of mHealth Applications for Experts: Developed by the Healthcare Information and Management Systems Society and translated into Thai by Weerachod and Pamonsinlapatham⁽¹⁹⁾, this tool assesses user satisfaction with applications across four domains, totaling 25 items: 1) System usability (7 items); 2) Efficiency (6 items); 3) Effectiveness (6 items); and 4) User satisfaction (6 items). The questionnaire uses a 5-point Likert scale, with 5 = very satisfied, 4 = satisfied, 3 = moderately satisfied, 2 = slightly satisfied, and 1 = least satisfied. Scores are interpreted as follows: 4.51–5.00 = very high satisfaction; 3.51–4.50 = high satisfaction; 2.51–3.50 = moderate satisfaction; 1.51–2.50 = low satisfaction; and 1.00–1.50 = very low satisfaction. The questionnaire has been validated for content and demonstrates good reliability, with a Cronbach's alpha of .86.

Data Collection

The researcher divided the study into two phases following the five-step ADDIE Model, with details as follows:

Phase 1: Application Development. This phase covers steps 1 through 4 of the ADDIE Model, as detailed below:

Step 1: Analysis. The researcher held stakeholder group meetings in the study area, including psychiatrists, psychiatric nurses, patients, caregivers, and patients' family members. The researcher gathered information on problems and needs from these stakeholders and reviewed empirical evidence on concepts, theories, and nursing practices related to psychiatric patient rehabilitation, family support, and health behavior promotion to reduce relapse. This review encompassed documents, textbooks, research articles, and academic papers from both domestic and international sources. The collected information was used to define the objectives for developing the application.

Step 2: Design. The researcher designed the application's functions to align with the objectives of creating and developing the app by integrating the psychiatric rehabilitation concept of recovery from Srithanya Hospital⁽¹⁰⁾, the family support framework by Morelli et al.⁽¹¹⁾, and a literature review on promoting health behaviors to reduce relapse⁽¹²⁾ obtained in Step 1 (Analysis). Based on this, the app's functions were designed, features were specified, and detailed storyboards for each function were created to guide the software development process.

Step 3: Development. The researcher used the storyboards to develop a prototype of the application in collaboration with software developers. The application includes nine functions on the Android platform: 1) My Information; 2) My Medication Box; 3) Appointment Reminder; 4) Daily Activities; 5) Stress Relief; 6) Relapse Prevention; 7) Path to Success; 8) Star Exchange Game; and 9) No Worries. Additionally, a user manual for the application was created.

Step 4: Implementation. The researcher evaluated the prototype application's structural validity and system stability with four experts. Quantitative data were collected using the "Guidelines for Evaluation of the Usability of mHealth" questionnaire 20, which assesses four domains: system usability, efficiency, effectiveness, and user satisfaction. Additionally, qualitative data were gathered through structured focus group discussions guided by the following questions: 1. Do you think the knowledge content embedded in the mHealth app is evidence-based and sufficient to address health problems? Why or why not? 2. Do you believe that service users will benefit from the health service system provided by the mHealth app? How so? 3. What is your opinion of the design of the operational strategies in the mHealth app, such as the features in different functions, language use, ease of use, and intrinsic motivation through activities? 4. Do you think the mHealth app adequately ensures privacy and data security? Why or why not? 5. Do you think the mHealth app should be disseminated for use within social groups? Why or why not? 6. How do you think the mHealth app should be improved and further developed?

Following revisions based on expert feedback, the researcher implemented the application for a pilot test with 40 community-dwelling chronic psychiatric patients who met the inclusion criteria. The trial period lasted 14 days, during which application usage was systematically monitored via system logs to track adherence and engagement metrics. At the baseline evaluation stage, each participant had the "BUU True Friend" application installed on their smartphones by the researcher and trained nursing students. Following installation, a demonstration of how to use the app was provided using the user manual given to them. To ensure participant safety and technical continuity during the trial, a 24-hour technical assistance channel was established via a dedicated social media-based user group (Line application). After ensuring participants thoroughly understood the application, the researcher collected data using a personal information questionnaire and the Living Skills Assessment for Psychiatric Rehabilitation (LSD-30). The researcher clarified all items for participants before they performed self-assessments. The entire process of installation, training, and baseline evaluation took approximately 120 minutes.

Phase 2: Feasibility and Usability Testing (Step 5, the Evaluation phase of the ADDIE Model) was conducted during the 14-day trial period. This phase assessed feasibility using the framework adapted by Bowen et al. (2009)⁽²¹⁾, focusing on four indicators: (1) Acceptability; (2) Implementation; (3) Practicality; and (4) Limited-efficacy testing. The evaluation was divided into two parts as follows:

Part 1: The Feasibility Test assessed Implementation (through retention and adherence rates) and Practicality/Acceptability (through structured focus group discussions) across the following areas: (1) *System Usage*: Guiding questions covered privacy concerns, connection issues, benefits, and opinions on app design; (2) *Health Status Assessment*: Questions addressed the accuracy and speed of the assessment, as well as the perceived realism of the information; (3) *Health Advice*: Questions explored the importance of following recommendations, perceived health improvement, and overall opinions on the advice provided.

Part 2: The Usability and Limited-Efficacy Test involved evaluating Acceptability using the mHealth App Usability Questionnaire (MAUQ), completed by stakeholders (psychiatric clinic nurses and pilot study participants). Furthermore, limited-efficacy testing was conducted to assess the application's impact on promoting rehabilitation among chronic psychiatric patients, using the Living Skills Assessment for Psychiatric Rehabilitation (LSD-30) after 14 days of use. Success was predefined as achieving a retention rate >80% and average usability scores at a "good" level.

Data Analysis

The researcher assessed the completeness of the evaluation data both before and after the trial. The collected data were analyzed in SPSS, with significance set at 0.05. Descriptive statistics, including frequency distributions, percentages, means, and standard deviations, were used to analyze personal data, app quality, feasibility for user retention, and user satisfaction with the app. The effectiveness of the rehabilitation application was evaluated by comparing pre- and post-trial results using the Wilcoxon signed-rank test.

Results

Based on the research objectives, the reporting of results is divided into two phases as follows:

1. Phase of Application Development

Starting with the problem analysis step, which led to the establishment of development goals for the application, the researcher designed and developed a Use Case Diagram in tabular format to

define the functions and operational features of the “BUU True Friend” application. The details are shown in Figure 1-2.

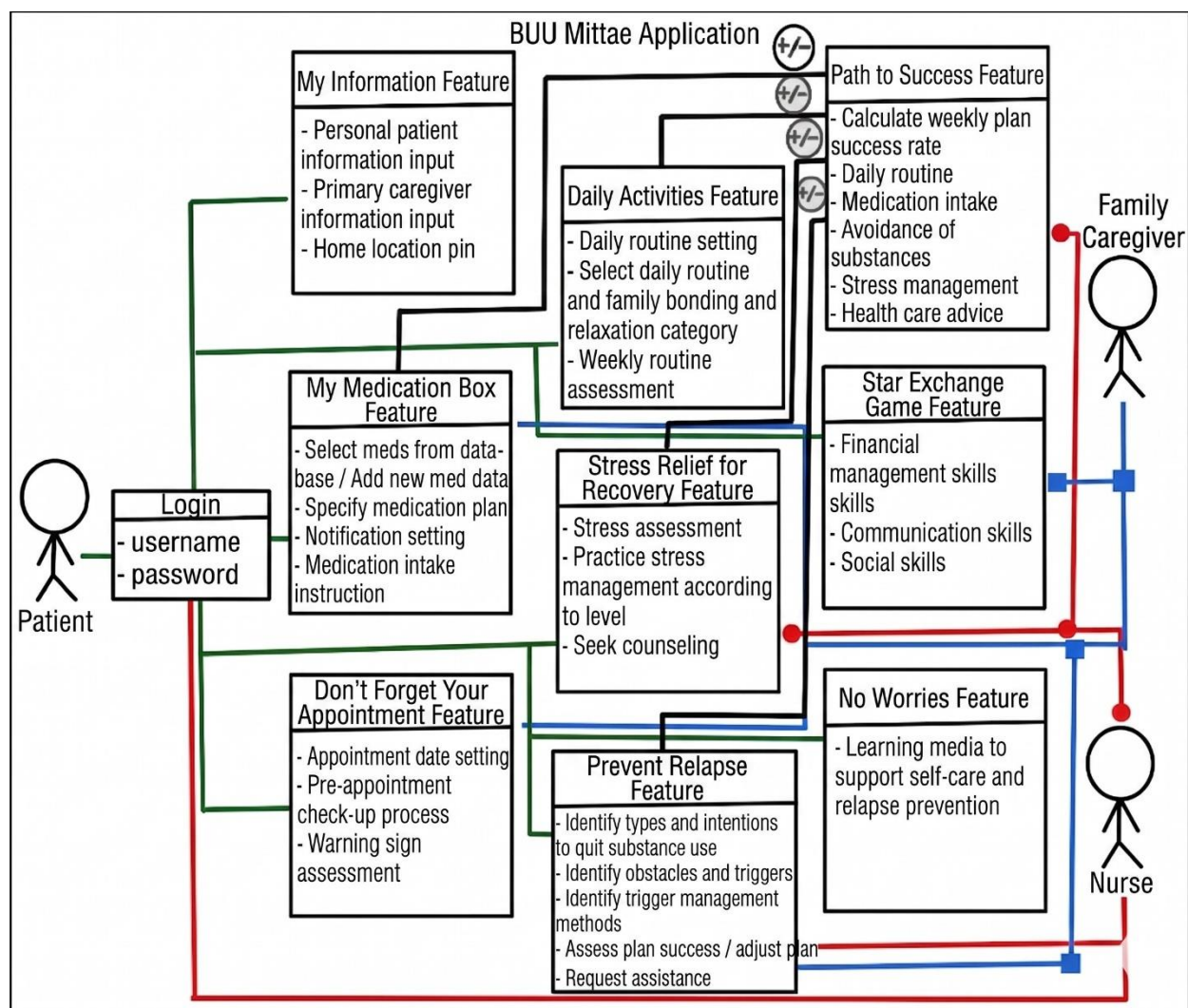


Figure 1: Use Case Diagram

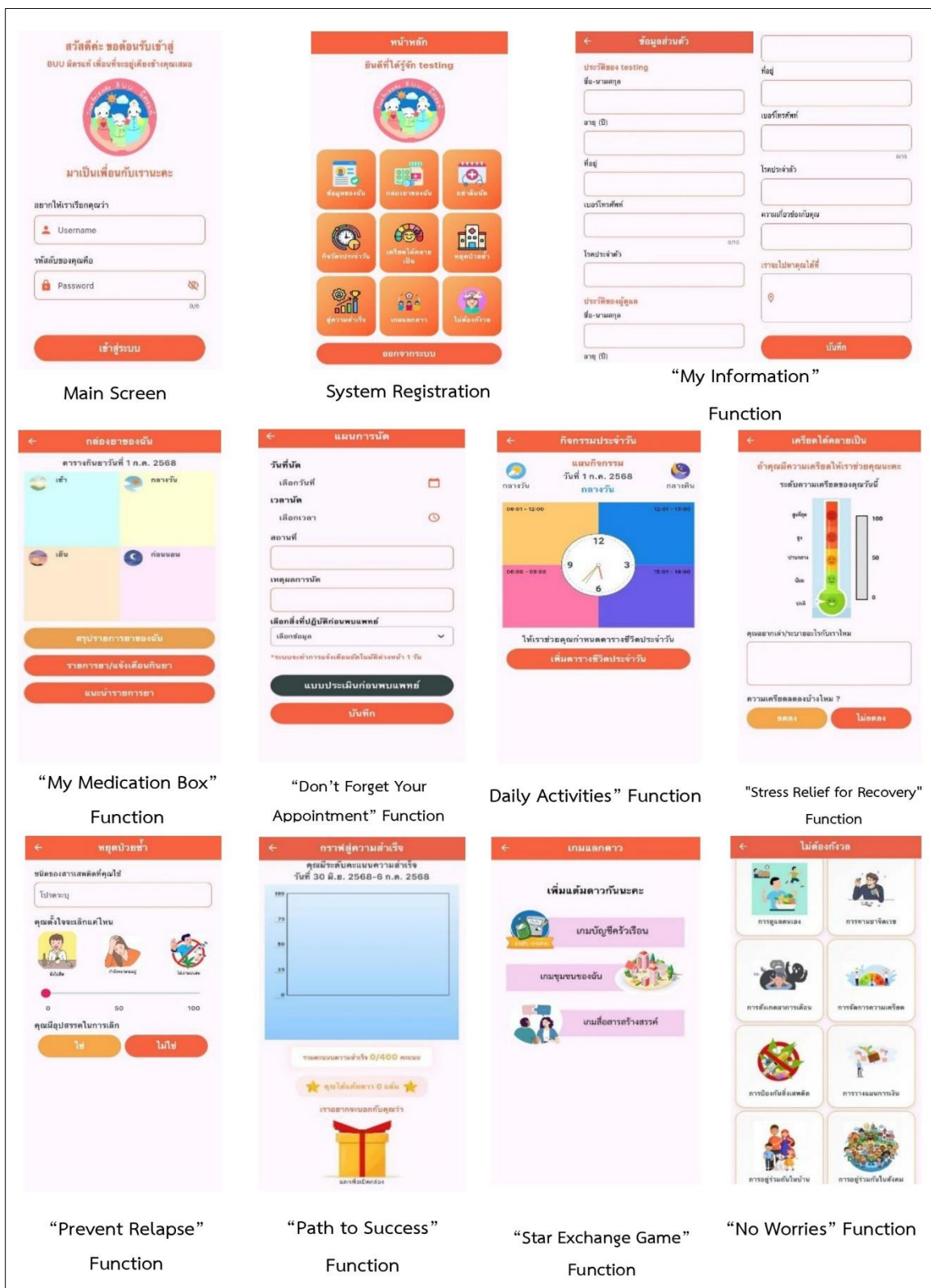


Figure 2: User Interface and Functionalities of the Application

According to Figure 1-2, the “BUU True Friend” application comprises nine functional modules that users can access freely in any order after registration. These functions include: “My Information,” “My Medication Box,” “Appointment Reminder,” “Daily Activities,” “Stress Relief,” “Relapse Prevention,” “Star Exchange Game,” and “No Worries.” The only exception is the “Path to Success” function, which requires data transfer from several health behavior functions: medication adherence data from “My Medication Box,” daily routine data from “Daily Activities,” stress management data from “Stress Relief,” and substance avoidance data from “Relapse Prevention.” Therefore, users must first engage with these functions to allow health behavior data both positive and negative to be transferred for analysis within the “Path to Success” function, which then provides personalized feedback for health behavior modification. Nurses provide feedback based on evaluation results from the “Path to Success” function and serve as consultants for stress management and substance cessation within the “Stress Relief” and “Relapse Prevention” functions. Additionally, nurses have access to patients’ registration data. Family caregivers are involved with the “My Medication Box” and “Appointment Reminder” functions, as the system sends medication reminders and treatment follow-up notifications to them. They also participate in the “Star Exchange Game,” in which patients are assigned social skills development tasks, and caregivers are responsible for evaluating task completion within the application.

The researcher conducted a content validity and system stability assessment of the developed application with four experts. The quantitative evaluation showed high overall user satisfaction with the application’s quality (mean = 4.15, SD = 0.14). Satisfaction was further categorized into four aspects: system usability (mean = 3.96, SD = 0.81); efficiency (mean = 4.15, SD = 0.57); effectiveness (mean = 4.29, SD = 0.58); and user satisfaction (mean = 4.18, SD = 0.47). Regarding the qualitative data, several key issues and suggestions were raised by the experts: 1. Usability Issues: “The knowledge content, especially PDF files that need to be downloaded, consumes significant memory space and takes a long time to download. If internet connection or memory capacity is insufficient, delays may occur”; “If users forget their username or password, how can they contact for assistance?” 2. Application Design: “Do most patients understand the medication names written in English?”; “The ‘Appointment Reminder’ function should notify users one week before the appointment, as a one-day notice may not provide sufficient preparation time for family members, possibly resulting in missed appointments”; “The stress assessment function should allow recording and comparison of previous data”; “The medication detail descriptions are displayed in

small font, making them difficult to read; a click-to-zoom feature should be added to enhance readability"; "In the phone number entry field, incomplete or excessively long numbers can be saved, potentially resulting in inaccurate contact information"; "When accessing the 'Appointment Reminder' function, the screen initially appears blank; users must add appointment dates via the icon on the top right before any appointment details appear. It is recommended to add more detailed appointment information, such as the doctor's name, location, hospital, or clinic where the user receives services."

In addition, the experts provided several key recommendations for improving and developing the application, as follows: System Functionality: Create dedicated e-books for mental health education and assign an administrator (Admin) from the responsible agency to continuously update information and provide ongoing guidance after the application is delivered. Design Aspects: Recommendations included adding Thai-language drug names to the medication-setting feature, integrating a reminder system into the "Don't Forget Your Appointment" function with alerts sent one week and one day in advance, and displaying weekly stress trends to support patients' continuous self-assessment. Furthermore, the application should allow screen zooming, restrict incomplete phone number inputs, reposition the appointment icon for greater visibility, and provide doctor details and preparation guidelines for the appointment day. Additionally, include an emergency support function that evaluates risk using an in-app assessment tool and triggers immediate alerts when high risk is detected.

2. Phase of Application Feasibility Testing

2.1 General Characteristics

The participants (N = 40) were predominantly female (60.00%), with a mean age of 43.38 years (SD = 16.97). Educational backgrounds varied, with 40.00% completing higher education and 37.50% completing secondary education. Half of the cohort (50.00%) were general laborers, and 40.00% reported being single. Primary caregivers were mostly relatives, children, or spouses (42.50%). Regarding their clinical profile, the participants had an average illness duration of 5.61 years (SD = 6.05) and a mean of 0.78 psychiatric hospitalizations (SD = 1.91). The sample covered major Thai psychiatric illness groups, such as Schizophrenia and Mood Disorders. It maintained homogeneity by selecting participants with significant impairments in at least three life skills, ensuring consistent rehab needs.

2.2 Feasibility of Application Usage (Feasibility Test)

2.2.1 Feasibility Assessment through User Engagement (Participants' Interaction with mHealth App / Engagement)

During the 14-day trial of the "BUU True Friend" application, the user retention rate was 100%, with all 40 participants remaining in the trial and no dropouts reported. The average adherence rate—measured by daily app usage duration—was 14.62 minutes per day, which aligns with the recommended 10 to 20 minutes of daily usage.

2.2.2 Feasibility Study Based on User Experience

The feasibility of the application was further examined through a focus group interview using a semi-structured format. The interview covered design, perceived usefulness, perceived benefits, and overall development recommendations. Additionally, data from the issue tracking report were analyzed. Key qualitative findings from participants included the following: "The medication names were difficult to set up because they were displayed only in English"; "The options in the daily routine function were too limited and did not align well with actual daily activities"; "The time range for setting medication reminders was too broad"; "It was not possible to edit individual medication entries in case of incorrect settings"; "There should be a function to track abnormal movements caused by medication side effects"; "The system was unstable in some functions, such as recording medication intake"; "The 'Don't Forget Appointment' function lacked options for selecting the location, appointment time, and reason for the visit."

Additionally, participants offered several key suggestions to improve and develop the application. These included enhancing its flexibility and user-friendliness, particularly by allowing users to enter medication names in Thai, which would clarify medication information and reduce user confusion. Furthermore, it was suggested that a function be added to allow users to enter daily activities in the "Other" category, enabling them to record personalized activities that reflect their real-life contexts. Participants also recommended providing clearer information on appropriate medication times and incorporating a function to edit previously entered medication lists to accommodate changes based on medical advice. Moreover, users suggested that, if additional funding becomes available, it should be allocated to enhance the system's stability and performance. They also proposed adding features to record information, such as locations, appointment times, and reasons

for appointments, to improve treatment tracking and reduce errors when accessing healthcare services.

2.3 Usability Test

Overall user satisfaction with the application among the sample group was good (mean = 30.90, SD = 6.78). This can be further categorized into the following aspects:

Aspect 1: General Quality Assessment. The overall quality was rated as good (mean = 23.75, SD = 5.27). The application uses language that is easy for users to understand and provides health benefits (mean = 0.98, SD = 0.16). The app's menus were designed for ease of learning and use, and the content aligns well with the app's intended benefits. Additionally, the presentation of information was visually appealing and engaging (mean = 0.98, SD = 0.16). The lowest satisfaction score was for willingness to pay for the app if a fee were charged (mean = 0.30, SD = 0.46).

Aspect 2: User Risk Assessment. Regarding privacy policy communication in Thai, notification of data confidentiality, and users' ability to set passwords to access the app or data, all three items received the highest scores (mean = 0.90, SD = 0.30). However, the lowest score was for government certification of the app (mean = 0.60, SD = 0.50). Moreover, the overall quality evaluation by psychiatric clinic nurses was also rated as good (mean = 4.15, SD = 0.14), which aligned with the ratings in the subdomains as follows: system usability was rated good (mean = 3.96, SD = 0.81), efficiency was good (mean = 4.15, SD = 0.57), effectiveness was good (mean = 4.29, SD = 0.58), and user satisfaction was good (mean = 4.18, SD = 0.47).

2.4 Effectiveness Study on Psychiatric Rehabilitation in Six Domains

The researcher initially tested the assumptions for the paired-sample t-test and found that the Kolmogorov-Smirnov test yielded a p-value < .001, indicating that the dependent variables were not normally distributed. This violated the normality assumption. Therefore, the researcher applied the Wilcoxon signed-rank test, a nonparametric statistical method, to compare the dependent variables, as shown in Table 1.

According to Table 1, the Wilcoxon Signed-Rank test comparing mean psychiatric rehabilitation life skills scores across all domains showed no statistically significant differences between the pre- and post-application trial periods (p-value > .05).

Table 1. Comparison of Mean Scores for Psychiatric Rehabilitation Life Skills Domains of Participants Before and After Using the Application (N = 40)

Psychiatric Rehabilitation Life Skills	Ranks	N	Mean Rank	Sum of rank	Z-Value	p-value (Sig. 2-tailed)
Personal Hygiene	Negative ranks	5	5.40	27.00	-0.535 ^a	0.593
	Positive ranks	4	4.50	18.00		
	Ties	31				
Household Living	Negative ranks	11	10.05	110.50	-0.628 ^a	0.530
	Positive ranks	8	9.94	79.50		
	Ties	21				
Communication	Negative ranks	6	10.75	64.50	-0.259 ^a	0.796
	Positive ranks	9	6.17	55.50		
	Ties	25				
Community Living	Negative ranks	7	15.14	106.00	-0.038 ^a	0.970
	Positive ranks	13	8.00	104.00		
	Ties	20				
Relaxation	Negative ranks	11	13.27	146.00	-0.115 ^b	0.909
	Positive ranks	13	11.85	154.00		
	Ties	16				
Occupational	Negative ranks	10	14.30	143.00	-0.538 ^a	0.591
	Positive ranks	12	9.17	110.00		
	Ties	18				

*p < .05

Note. Negative ranks: score after using the application < before using the application; positive ranks: score after using the application > before using the application; ties: score after using the application = before using the application. a. Based on Positive ranks, b. Based on Negative ranks.

Discussion

Based on the study results, the findings can be discussed in relation to the research objectives as follows:

1. *Development of the “BUU True Friend” Smartphone Application.* The application was built to run on the Google Cloud Platform, which provides comprehensive infrastructure for data storage, processing, and security. “BUU True Friend” was designed for Android smartphones, the most widely used operating system among psychiatric patients. This choice was made because Android devices are affordable and user-friendly, enabling patients to learn and use the application’s features without significant barriers. This aligns with the Ministry of Public Health’s ⁽²²⁾ assessment report on health application usage patterns, which found that most patients with chronic diseases primarily use Android-based applications. Most of these applications focus on delivering educational content (mean = 51.30), followed by applications for physical or mental health assessment (mean = 24.30). These findings suggest that smartphone applications are feasible for use among patients with chronic psychiatric conditions.

2. *Feasibility and Effectiveness of Application Use.* The study on the feasibility of application use found that no participants discontinued using the app during the 14-day trial period. Overall, satisfaction with the application, general quality, and risk-related aspects of use were rated as good. Regarding the app’s effectiveness in psychiatric rehabilitation skills, the results showed no statistically significant changes in any of the six domains after using the app. This lack of significant change might be attributed to the trial’s relatively short duration, which was only 14 days. Behavioral changes related to health might not yet have occurred within this limited timeframe. Supporting this, Khwanmuang ⁽²³⁾ reported that behavioral change requires at least 66 days, or approximately two months, to manifest.

However, when examining each domain individually, there was a trend toward improvement across all psychiatric rehabilitation skills. This indicates that the functional features of the “BUU True Friend” application can effectively meet user needs and enhance the six key rehabilitation skill areas for patients with chronic psychiatric conditions. These include: the personal and caregiver database within the “My Information” feature; the “My Medication Box” function that promotes adherence to prescribed medication regimens and enhances patients’ self-management capabilities; the “Don’t Forget Your Appointment” feature that supports treatment follow-up; the “Daily Activities” function that encourages rehabilitation behaviors related to self-care, household living, and constructive use

of free time; the “Stress Relief” feature that fosters skills for managing negative emotions from daily stress; the “Stop Relapse” function that strengthens commitment to substance abuse cessation, a trigger for relapse; the “Path to Success” function, which reflects progress in health behavior and motivates ongoing behavior change; the “Star Exchange Game” feature that promotes social, occupational, and community living rehabilitation behaviors; and the “No Worries” feature that serves as a knowledge base for self-directed mental health education in psychiatric rehabilitation. These findings align with the meta-analysis by Linardon et al.⁽²⁴⁾, which reported that smartphone health applications can reduce mental health problems and psychiatric symptoms while enhancing well-being and quality of life in psychiatric patients. Such applications are cost-effective, easily accessible, and pose a low risk of use.²⁵ Consequently, these promising trends provide a robust foundation for future iterations to integrate AI-driven personalization, effectively bridging the gap between digital feasibility and long-term clinical efficacy.

Limitation

This study has several limitations. First, the intervention period was relatively brief (14 days), which may have been insufficient to produce measurable changes in psychiatric rehabilitation skills. Second, the study used a single-group pre-post design without a control group, limiting causal inferences from the findings. Third, the modest sample size (n=40) and recruitment from a single site may limit both statistical power and the generalizability of the results. Additionally, reliance on self-reported questionnaires may have introduced response bias. Moreover, psychiatric diagnoses were not analyzed separately, despite potential differences in rehabilitation needs and digital engagement across diagnostic groups. Furthermore, detailed analytics on application usage were not examined, limiting understanding of user interaction patterns with the intervention. Most notably, the absence of a long-term follow-up assessment constrains our understanding of whether the high rates of user retention and satisfaction observed during the 14-day trial can be maintained over extended periods (e.g., 1 to 3 months) or translate into meaningful reductions in long-term psychiatric readmission rates. Future research should involve larger RCTs with extended follow-up durations, comprehensive digital usage logs, and rigorous control of environmental and caregiver-related variables to establish better the clinical efficacy and sustained impact of the intervention.

Conclusion

The “BUU True Friend” application demonstrates exceptional feasibility and usability as a digital health intervention for community-based psychiatric rehabilitation, evidenced by a 100% user

retention rate and high expert-validated quality. While the current 14-day pilot study yielded no statistically significant shifts in life skills, likely because the brief duration was insufficient for habit formation, the findings serve as a fundamental methodological milestone. Healthcare professionals, particularly psychiatric nurses, might consider integrating this application into continuous care models to support self-management and relapse prevention. However, to ascertain long-term therapeutic efficacy, future research might benefit from employing an RCT with an extended intervention period of at least 66 days to allow for measurable behavioral change. Critically, subsequent evaluation protocols could transition from reliance on self-reported scales to multimodal assessments that include objective behavioral measures, such as analyzing application-generated log data (e.g., medication adherence timestamps and daily task completion) and direct community-based observations. In addition, it might be important to consider caregiver support to help patients continue the effective use of the application among individuals with chronic psychiatric conditions.

Ethical Approval and Research Registration

This research project was approved by the Ethics Committee of Burapha University (Approval Code: HS028/2568(C2)) and is valid from July 3, 2025, to July 3, 2026. Furthermore, the study was formally registered with the Thai Clinical Trial Registry (Registration Code: TCTR20250921001). The "BUU True Friend" application, developed as the primary research intervention, was officially copyrighted by the Department of Intellectual Property (DIP) on September 4, 2025. During the recruitment process, the researcher clearly explained the study's objectives, details, risks, and benefits to potential participants. Opportunities were provided for patients to ask questions. Only those who voluntarily agreed to participate signed informed consent forms. Participants were informed that they could refuse or withdraw from the study at any time without affecting their access to healthcare services. Emphasis was placed on anonymity and confidentiality of data, with access restricted solely to the researchers. Data analysis and publication were conducted using aggregated information.

Author Contributions

PSu conceived the research idea, designed the study framework, and supervised the overall project. PSu, PK, PH, CN, PI, PSr, SS, PD, WA, and KR collaboratively developed the structure and content of the "BUU True Friend" application based on the ADDIE model. PSu and PK collected and analyzed the data, including usability and feasibility testing, under PSu's

supervision. PSu and PK interpreted the findings, re-analyzed the results, and drafted the manuscript. All authors critically revised the manuscript, approved the final version, and agreed to be accountable for all aspects of the work to ensure its accuracy and integrity.

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Conflicts of Interest

The authors have no competing interests to declare.

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