Research Article

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Feasibility of a Resilience-Enhancement Program Combined with mHealth Among Vietnamese Mothers of Children with Autism Spectrum Disorder

Tuyet Thi VU[1], Pornpat Hengudomsub[2], Pornpan Srisopa[2]

[1] Ph.D candidate in Nursing Science, Faculty of Nursing, Burapha University, Chon Buri, Thailand; Instructor at School of Health Science, Eastern International University, Vietnam

[2] Department of Psychiatric and Mental Health Nursing, Faculty of Nursing, Burapha University, Chon Buri, Thailand

Correspondence: Pornpat Hengudomsub, Ph.D., Department of Psychiatric and Mental Health Nursing, Faculty of Nursing, Burapha University, Muang, Chon Buri 20131, Thailand. E-mail: pornpath@buu.ac.th

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Abstract

Background: Providing care for children with Autism Spectrum Disorder (ASD) presents unique challenges for mothers due to behavioral management needs and significant emotional and financial strains. Therefore, these mothers require greater support especially resilience enhancement. **Objectives:** This pilot feasibility study aimed to evaluate the feasibility and acceptability of a resilience-enhancement program combined with mHealth (RE-mHealth) among Vietnamese mothers of children with Autism Spectrum Disorder (ASD), and to explore preliminary changes in parenting stress, resilience, and parenting self-efficacy. **Methods:** A two-group pilot randomized feasibility study with pre- and posttest assessments was used. Vietnamese mothers of children with ASD were randomly allocated to the intervention (n=5) or control (n=5) group using sequentially numbered, opaque, sealed envelopes (SNOSE). This intervention focused on promoting mindfulness, resilience, and parenting support. It was delivered through a hybrid format that combined face-to-face and mobile-based approaches. The feasibility outcomes included recruitment, retention, implementation processes, and participants' feedback collected through open-ended questions after the intervention. Parenting stress, resilience, and parenting self-efficacy were assessed using the Autism Parenting Stress Index (APSI), Connor–Davidson Resilience Scale (CD-RISC-25), and revised Parenting Sense of Competence Scale (PSOC-R). Recruitment and retention were satisfactory, with all participants completing the study. **Results:** Preliminary changes were observed in the intervention group, resilience increased from 63.40 to 75.90 (+20.6%), parenting stress decreased from 38.60 to 27.10 (−29.8%), and parenting competence increased from 52.60 to 64.80 (+23.2%). Smaller changes were observed in the control group (64.10 to 67.60; 37.90 to 34.90; and 53.10 to 56.70, respectively). Participants generally reported positive experiences; however, unstable internet connections and some interruptions due to childcare responsibilities during sessions were reported. **Conclusion**: The RE-mHealth intervention appeared feasible and acceptable within real-world caregiving contexts. Embedding

mental health support into child-focused care settings may enhance engagement and should be further evaluated. These preliminary findings support further refinement and testing in a fully powered randomized controlled trial.

Keywords: Pilot feasibility study**,** Autism Spectrum Disorder, Vietnamese mothers, mHealth, Parenting self-efficacy

What was Known

- Mothers of children with ASD experience high stress and low resilience.
- Mothers tend to prioritize their child's needs over their own well-being
- Interventions are often not integrated with child-focused rehabilitation services, requiring mothers to manage separate schedules for their own support and their child's care.

What's New and Next

- This program explored an approach to addressing maternal mental health needs within existing child-focused care settings.
- The RE-mHealth program appeared acceptable based on observational and participant feedback.
- The integration of the program for mothers within child care settings was associated with improved engagement.
- Hybrid psychoeducational delivery may enhance accessibility and flexibility, enabling mothers to better manage their caregiving responsibilities.
- Larger trials are needed to evaluate the effectiveness and implementation of the refined intervention.

Introduction

Mothers of children with autism spectrum disorder (ASD) often experience substantial psychological burden due to continuous caregiving demands, children's behavioral challenges, uncertainty regarding development, and limited support systems [1,4]. In Vietnam, previous studies have highlighted challenges related to autism awareness, care-seeking experiences, and access to appropriate services; however, the extent and impact of these challenges may vary across families and settings [5, 6]. Parenting stress among mothers of children with ASD is influenced not only by child-related characteristics but also by caregiving responsibilities, limited social support, and difficulties accessing appropriate resources. Therefore, interventions addressing maternal psychological adaptation are needed alongside child-focused services. Despite increasing growing recognition of these issues in Vietnam, existing research have primarily focused on describing caregiver burden, family experiences, and service-related challenges, highlighting the need for feasible and culturally appropriate interventions [7, 8]. While resilience, coping strategies, and self-efficacy have been identified as key protective factors that may support mothers in adapting to the ongoing demands of caring for children with ASD [2,9,10]. However, interventions integrating these components within a culturally appropriate and scalable format remain framework remain limited.

Resilience theory suggests that individuals can adapt positively to significant stressors through the development of protective psychological resources [13, 15]. Mindfulness-based approaches may contribute to caregiver well-being by increasing awareness of emotional experiences, reducing reactive responses to stress, and supporting

emotional regulation. Previous studies have suggested that mindfulness-based interventions may reduce stress and improve psychological outcomes among parents of children with ASD [13,15].

Mobile health (mHealth) provides opportunities to deliver psychological and parenting support in flexible formats that can be integrated into caregivers' daily routines. For mothers of children with ASD, who often experience competing caregiving responsibilities and limited times for self-care, mHealth may improve accessibility and continuity of intervention delivery [11,12]. Previous studies have reported that mindfulness-based and resilience-focused interventions may contribute to improved psychological outcomes among caregivers [13,15]; however, evidence regarding culturally adapted and hybrid interventions for mothers of children with ASD remains limited.

Notably, mothers often prioritize their child's care over their own mental health, which may reduce participation in standalone mental health interventions [16, 17]. Therefore, integrating maternal support within existing child-focused services may provide a more feasible and acceptable approach.

Although resilience-based and mindfulness-informed interventions have been explored among caregivers, limited studies have examined integrated approaches combining resilience enhancement, mindfulness practices, parenting support, and mHealth delivery for mothers of children with ASD, particularly within the Vietnamese context.

Therefore, this pilot feasibility study aimed to evaluate the feasibility and acceptability of the RE-mHealth intervention among Vietnamese mothers of children with ASD and to explore preliminary changes in parenting stress, resilience, and parenting self-efficacy.

Materials and Methods

1. Research Design

This study employed a two-group pilot randomized feasibility design with pre- and posttest assessments. It was conducted in two sequential stages. First, preliminary instrument testing was performed among 30 mothers of children with ASD recruited from the same target population but independent from the subsequent feasibility sample. This process was conducted to evaluate the clarity, completion time, and internal consistency reliability of the measurement instruments before their application in the pilot study.

Following this preparation stage, 10 Vietnamese mothers of children with ASD who met the eligibility criteria were recruited from Nhan Hoa Inclusive Education Development Support Center, Ho Chi Minh City, Vietnam. Participants were randomly allocated to either the intervention group (n = 5) or the control group (n = 5). Children's ASD diagnoses were confirmed based on documentation provided by the center.

The pilot feasibility study evaluated the feasibility and acceptability of the RE-mHealth program, while preliminary changes in study outcomes were explored through pre- and posttest assessments. After completion of the intervention, participant feedback was collected to understand their experiences, assess acceptability, and identify areas for further refinement of the program.

2. Population and sample

Participants were recruited from Nhan Hoa Inclusive Education Development Support Center. Participants were mothers of children diagnosed with autism spectrum disorder (ASD). Eligible mothers were screened according to the inclusion and exclusion criteria before enrollment.

Eligible participants were mothers aged ≥18 years who were the primary caregivers and co-resided with their child with ASD, could read and communicate in Vietnamese, and had access to a smartphone for internet-based intervention components.

The children of these mothers were required to be aged 3–10 years diagnosed with ASD by a psychiatrist. Mothers and children were excluded if they had serious medical, genetic, or psychiatric conditions that could interfere with participation in the intervention or completion of assessments. Participants were discontinued if they were unable to completely attend scheduled sessions, withdrew voluntarily, or experienced a medical condition requiring hospitalization during the intervention. The instruments were tested for reliability with 30 mothers. Subsequently, 10 mothers who met the eligibility criteria were recruited and randomly assigned to either the intervention group (n = 5) or the control group (n = 5).

3. Instruments

The instruments were divided into two parts: 1) Instruments for the RE-mHealth program and (2) Instruments for data collection.

3.1 Instruments for the RE-mHealth program

The Resilience Enhancement combined with mHealth (RE-mHealth) program was developed as a nurse-led intervention based on resilience theory, mindfulness-based approaches, and parenting support frameworks. The program aimed to strengthen maternal resilience, coping strategies, emotional regulation, and parenting self-efficacy among mothers of children with ASD. The intervention consisted of structured sessions focusing on mindfulness practices, resilience-building strategies, and practical parenting support. The mHealth component provided supplementary learning materials and ongoing support for each session. Detailed session structure and implementation procedures are described in the intervention protocol. The implementation procedures of the intervention are described below.

Implementation Process

The focus in each session was as follows:

Week 0: Baseline assessment and orientation.

Week 1: Rapport building (face-to-face) and emotional awareness (mindfulness techniques). Week 2: emotional regulation and breathing-based stress management. Week 3: coping strategies, self-care, and practical tools (goal setting, circle of control). Week 4: enhancing parenting self-efficacy and integration, followed by post-intervention assessment.

The RE-mHealth program was developed based on Resilience Theory by Richardson [27] and Stress and Coping Appraisal Theory by Lazarus and Folkman [28]. It was delivered four weeks (60–90 minutes/session), Session

1 and Session 8 were conducted face-to-face, while Sessions 2–7 were delivered online. The hybrid format was designed to provide flexibility and reduce participation barriers for mothers with caregiving responsibilities.

Table 1 Summary of the RE-mHealth Intervention Structure and Content

Week	Sessions	Intervention component	Session objectives and key activities	mHealth-supported activities
Week 1	Sessions 1–2	Online Social Support	Building a supportive and psychologically safe environment; introducing the concept of "You are not alone"; identifying and accessing available online support resources	Online communication and self-reflection activities to enhance connection and psychological support
Week 2	Sessions 3–4	Enhancement of Coping Strategies	Sharing and identifying challenges in raising children with ASD; providing psychoeducation on effective management strategies; developing adaptive coping strategies using a coping strategy wheel	Digital resources and self-monitoring activities to support coping practice
Week 3	Sessions 5–6	Promoting Emotional Health and Mindfulness Techniques	Exploring personal feelings and emotions; enhancing stress management strategies; practicing mindfulness techniques to support adaptive responses to caregiving stress	Emotional reflection records and practice reminders through mHealth tools
Week 4	Sessions 7–8	Enhancement of Parenting Self-efficacy	Sharing successful caregiving experiences; strengthening parenting confidence; rehearsing strategies for mothers' effective adaptation to caregiving challenges	Self-monitoring, reflection, and reinforcement messages through mHealth tools

Brief qualitative feedback was collected after the intervention using researcher-developed open-ended questions based on the objectives of feasibility and acceptability assessment. Questions explored participants' experiences, perceived benefits, barriers to participation, and suggestions for program improvement. Responses were summarized descriptively to identify common themes related to intervention implementation and refinement.

Qualitative questions included:

"What challenges did you experience after your child was diagnosed with ASD?"; "How did the intervention program help you cope with stress or caregiving difficulties?"; "Which part of the program did you find most helpful?"; "Did you experience any barriers in participating in the program or using the technology-based materials?"; "What suggestions do you have for improving the program?"

3.2 Instruments for data collection

Instruments for data collection included:

3.2.1 A demographic questionnaire was developed by the researcher to collect participants' characteristics, comprising two sections: child-related information, including age, gender, severity of ASD, and behavioral characteristics; and maternal information, including age, education level, occupation, working hours, marital status, family characteristics, and prior caregiving training experience.

3.2.2 The Connor–Davidson Resilience Scale (CD-RISC-25) was originally developed in English by Connor and Davidson [18]. It is widely used to assess resilience, making it a valuable tool for evaluating adaptive coping in individuals facing stress. The scale consists of 25 items rated on a 5-point Likert scale, covering domains such as hardiness, coping, flexibility, and self-efficacy. Total scores range from 0 to 100, with higher scores indicating greater resilience. The CD-RISC-25 assesses several resilience-related domains, including personal competence, tolerance of negative affect, adaptability, control, and perceived self-efficacy. In the present study, preliminary testing of the Vietnamese-translated CD-RISC-25 was conducted among 30 Vietnamese mothers of children with ASD to evaluate its clarity and internal consistency. The scale showed excellent internal consistency (Cronbach's α = 0.949), supporting its reliability for use in the subsequent pilot feasibility study.

3.2.3 The Autism Parenting Stress Index (APSI) was originally developed in English by Silva and Schalock [26] to assess parenting stress among mothers of children with ASD. It is widely used to identify stress related to autism-specific challenges and to evaluate intervention outcomes. The APSI measures three dimensions of parenting stress through 13 items: core autism symptoms (5 items), co-morbid behaviors (4 items), and co-morbid physical issues (4 items). This instrument uses a Likert-type scale, with total scores ranging from 0 to 52, obtained by summing responses across all items. Higher scores indicate greater levels of parenting stress. In this study, the Vietnamese-translated version of the APSI was adapted and pilot tested among 30 Vietnamese mothers of children with ASD to evaluate clarity, feasibility, and internal consistency before implementation in the main pilot feasibility study. The scale demonstrated excellent internal consistency in the present sample (Cronbach's α = 0.920).

3.2.4 The Parenting Sense of Competence Scale–Revised (PSOC-R) was used to examine parenting self-efficacy. It was originally developed and revised by Linda Gilmore [19] to assess parents' self-perceptions of their parenting abilities. Similar to the original version, the PSOC-R evaluates parenting confidence, focusing on general parenting efficacy rather than child-specific or contextual factors. The scale consists of 16 items rated on a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree) and includes two dimensions: efficacy and satisfaction. Total scores are calculated by summing the two subscales, with higher scores indicating greater parenting self-efficacy. The PSOC-R has indicated good reliability in previous studies (Cronbach's alpha = 0.92). A validated Vietnamese version of the instrument was used. Where necessary, translation and back-translation procedures were conducted to ensure linguistic and cultural equivalence. In this study, the scale demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.947.

The findings from reliability testing indicated that above instruments demonstrated high internal consistency and provided preliminary support for their use in the phase of pilot feasibility randomized controlled trial.

4. Statistical Analysis

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics and feasibility indicators. Due to the small sample size, exploratory non-parametric analyses were conducted. The Mann–Whitney U test was used for between-group comparisons, and the Wilcoxon signed-rank test was used for within-group comparisons. Fisher's exact test was applied for categorical variables when appropriate.

Results

Results for pilot feasibility randomized controlled trial

The results of a pilot randomized controlled trial study can be presented as follows:

Participant flow and recruitment

A total of 10 mothers of children with ASD were enrolled in the pilot feasibility study. Participants were randomly allocated to the intervention group (n = 5) or control group (n = 5) using sequentially numbered, opaque, sealed envelopes (SNOSE). All enrolled participants completed the study assessments. Recruitment, retention, and completion rates were summarized as feasibility indicators. All participants completed the baseline (T1) and post-intervention (T2) assessments, yielding a 100% retention rate, with no withdrawals or reported adverse events.

Baseline characteristics of the participants are presented in Table 2. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize participants' demographic characteristics in this pilot randomized controlled trial.

A total of 10 mothers of children with ASD were randomly assigned to either the intervention group (n = 5) or the control group (n = 5). All of these participants met the eligibility criteria and voluntarily agreed to participate in this study. There were no statistically significant differences in baseline demographic characteristics between the two groups. The mean age of mothers was 34.6 years (SD = 4.2) in the intervention group and 36.1 years (SD = 3.8) in the control group. Most participants had a college or university education and were married or partnered. The majority of children were male, with a mean age of 6.1 years (SD = 1.8) in the intervention group and 6.4 years (SD = 1.9) in the control group. The mean time since ASD diagnosis was 3.2 years (SD = 1.4) and 3.6 years (SD = 1.7 in the intervention and control groups, respectively. All participants completed both baseline (T1) and post-intervention (T2) assessments, resulting in a retention rate of 100%. No participants withdrew from the study. The average time required to complete the questionnaires was approximately 10–15 minutes.

Attendance and participation appeared to improve when intervention sessions were scheduled during the children having the therapy at the center. Mothers attended the intervention in a separate room while their children continued therapy under the supervision of therapists and center's staffs. The first on-site intervention session was attended by all participants in the intervention group (5/5, 100%). Participants indicated that scheduling the RE-

mHealth intervention during their children's therapy sessions optimized waiting time and improved convenience, allowing mothers to engage in meaningful activities while accompanying their children to treatment.

Table 2 Baseline Characteristics of Participants among Experimental Group and Control Group (n = 10)

Characteristic	Experimental (n = 5)	Control (n = 5)	p-value
	n (%)	n (%)	
Mother's age (years), Mean (SD)	34.6 (4.2)	36.1 (3.8)	0.58[U]
Highest education level			1.00[FS]
High school or lower	1 (20.0)	1 (20.0)	
College/University	4 (80.0)	4 (80.0)	
Employment status	3 (60.0)	3 (60.0)	-
Monthly household income (million VND)			0.91[FS]
<5	2 (40.0%)	1 (20.0%)	
5.1–10	1 (20.0%)	2 (40.0%)	
10.1–15	1 (20.0%)	1 (20.0%)	
≥15	1 (20.0%)	1 (20.0%)	
Relationship status			-
Married/Partnered	5 (100.0)	5 (100.0)	
Single/Divorced/Widowed	0 (0.0)	0 (0.0)	
Child's age (years), Mean (SD)	6.1 (1.8)	6.4 (1.9)	0.79[U]
Child's gender			
Male	5 (100.0)	5 (100.0)	-
Female	0 (0.0)	0 (0.0)	
Diagnosed with ASD	5 (100.0)	5 (100.0)	-
Years since diagnosis, Mean (SD)	3.2 (1.4)	3.6 (1.7)	0.67[U]

Note: SD: Standard Deviation; [U]: The Mann-Whitney U test statistic; [FS]: Fisher's exact test.

Acceptability of the intervention and participants' feedback

The RE-mHealth intervention was generally perceived as acceptable by participants, based on observations made during the pilot study and their feedback. Participants reported that the hybrid format was practical and provided greater flexibility than fully face-to-face delivery. Mothers perceived participation as easier when sessions were conducted during their child's therapy time or while their child remained nearby, as this reduced disruption to caregiving responsibilities. Participants also described the program as meaningful and emotionally supportive, contributing to a sense of connection through shared experiences and mutual understanding among mothers facing

similar caregiving challenges. Several mothers reported that the group provided emotional encouragement during periods of distress and created opportunities for peer support and open sharing. In addition, participants developed a peer practice group to maintain motivation after the intervention, with some mothers continuing daily breathing exercises together at 5:00 a.m. as part of their ongoing self-care routine.

Participants perceived the RE-mHealth activities as practical for daily life and preferred brief simplified, and flexible techniques. Many reported using breathing exercises and the STOP technique during moments of stress, such as child-related challenges or emotional overwhelm. Mindfulness-based strategies were often practiced informally during routine activities (e.g., housework, walking, or waiting), which was perceived as more feasible than formal sitting practice. Longer or more structured practices were difficult to maintain due to limited uninterrupted time.

Several implementation challenges were identified during the pilot study. Childcare responsibilities sometimes disrupted participation, as mothers prioritized their child's care and therapy schedules. In response, the program was reduced to four sessions, aligned with child schedules, and supported by reminder messages. Fixed schedules also limited attendance, indicating the need for greater flexibility. Some mothers reported minor technical difficulties during online sessions, including unstable internet connections and repeated log-ins. These issues were managed through brief technical guidance, early session access, real-time support during sessions, and recorded materials for participants who missed sessions. These qualitative findings informed several practical modifications, including flexible scheduling, small-group delivery, and closer alignment with caregiving routines. These adjustments were subsequently considered and incorporated into the design of the main study.

Participant feedback also revealed underlying emotional challenges experienced by mothers

These qualitative observations provided additional context for the quantitative findings. Several mothers described substantial emotional challenges following their child's ASD diagnosis. Participants reported feelings of sadness, worry, and emotional burden, with some becoming tearful while sharing their experiences. Feelings of guilt and helplessness were also reported, particularly when managing children's behavioral difficulties or developmental changes. Some mothers described limited family support and increased caregiving demands, which contributed to feelings of isolation. Daily challenges, including managing emotional outbursts and resistance behaviors, were associated with frustration and subsequent feelings of guilt. During the pilot study, some participants experienced elevated emotional distress and were referred to on-site psychological services for additional support; they subsequently resumed participation after receiving appropriate support. These qualitative findings highlighted the complex emotional and caregiving challenges experienced by mothers and informed the refinement of the RE-mHealth intervention, including the need for brief, flexible mindfulness-based strategies that could be integrated into daily caregiving contexts.

Blinding and trial procedures

Outcome assessment was conducted by a research assistant who was blinded to group allocation. Randomization and allocation concealment were performed as planned using sealed opaque envelopes (SNOSE). Each participant was assigned a study ID, and personal information was kept confidential. Outcome assessment

was conducted by a blinded research assistant; however, inadvertent unblinding could not be fully ruled out, as participants attended at different times and had minimal interaction with each other. This reduced the risk of information exchange between groups. No unblinding was reported during data collection. Preliminary intervention effects are presented below.

Preliminary effects of the intervention

Descriptive statistics, including frequencies, means, and standard deviations, were summarized at each time point. Due to the small sample size of this pilot randomized controlled trial (n = 10), non-parametric tests were used. Within-group changes were examined using the Wilcoxon signed-rank test, while between-group differences were analyzed using the Mann–Whitney U test. Fisher's exact test was used for categorical variables when appropriate.

Post-test comparisons observed differences between the intervention and control groups in resilience, parenting self-efficacy, and parenting stress. The intervention group had higher median resilience scores (76, IQR = 72–80) compared with the control group (68, IQR = 64–71) and higher median parenting self-efficacy scores (65, IQR = 61–69) compared with the control group (57, IQR = 54–60). In contrast, median parenting stress scores were lower in the intervention group (27, IQR = 24–31) than in the control group (35, IQR = 31–39).

However, these between-group differences did not reach statistical significance for resilience (U = 3.00, p = .056), parenting stress (U = 4.00, p = .095), or parenting self-efficacy (U = 3.00, p = .056). Given the small sample size. These preliminary differences are interpreted in the context of the pilot design with limited sample size. Further studies with larger samples are required to confirm these observed patterns.

Table 3 Between-group Comparison of Post-test Outcome Scores using the Mann–Whitney U test

Outcomes	Group	Post-test Median (IQR)	Mean Rank	U	p-value
Resilience	Intervention	76 (72–80)	7.40	3.00	.056*
	Control	68 (64–71)	3.60		
Parenting stress	Intervention	27 (24–31)	3.80	4.00	.095*
	Control	35 (31–39)	7.20		
Self-efficacy	Intervention	65 (61–69)	7.40	3.00	.056*
	Control	57 (54–60)	3.60		

Note: *p value <.05

Although between-group comparisons did not reach statistical significance, exploratory within-group analyses indicated favorable changes among mothers in the intervention group. Specifically, resilience increased from a median score of 63 to 76 (+20.6%), parenting self-efficacy increased from 53 to 65 (+23.2%), and parenting stress decreased from 39 to 27 (−29.8%) after the intervention. No comparable statistically significant changes were observed in the control group. Given the pilot nature and small sample size, these findings should be interpreted

cautiously as preliminary trends rather than evidence of intervention effectiveness. Further evaluation with a larger adequately powered randomized controlled trial is warranted.

Table 4 Within-group comparison of Resilience, Parenting stress and Self-efficacy score (n=10) using the Wilcoxon signed-rank test

Outcome	Group	Baseline Median (IQR)	Post-test Median (IQR)	Relative Change (%)	Z	Effect size (r)	p-value
Resilience	Intervention	63 (59–68)	76 (72–80)	+20.6	-2.02	0.90	.041*
	Control	64 (60–68)	68 (64–71)	+5.5	-1.60	0.72	.223
Parenting stress	Intervention	39 (35–43)	27 (24–31)	−29.8	-2.02	0.48	.034*
	Control	38 (34–42)	35 (31–39)	−7.9	-1.48	0.33	.074
Self-efficacy	Intervention	53 (49–57)	65 (61–69)	+23.2	-2.02	0.50	.025*
	Control	53 (50–58)	57 (54–60)	+6.8	-1.48	0.33	.498

Note: * p<.05

As this was a pilot study with a small sample, the findings should be interpreted cautiously. Nevertheless, the consistent direction of improvement, together with the percentage changes and moderate effect sizes, indicated preliminary signals of improvement in mothers' resilience, parenting stress, and parenting self-efficacy. However, these findings are exploratory study and may not be interpreted as evidence of intervention effectiveness. Instead, these findings provided preliminary information to support further refinement and evaluation of the RE-mHealth intervention in a larger randomized controlled trial.

Discussion

This pilot feasibility study examined the feasibility, acceptability, and preliminary exploratory outcomes of the RE-mHealth intervention among Vietnamese mothers of children with ASD. The findings provide preliminary insights into intervention delivery, participant engagement, acceptability, and implementation challenges within a real-world caregiving context.

Feasibility and acceptability of the RE-mHealth intervention

The feasibility findings suggest that the RE-mHealth program could be implemented within a real-world caregiving context. The study achieved full retention (100%) and complete outcome data, indicating that participants were able to complete the intervention and assessment procedures. Participant feedback suggested that the hybrid delivery format was acceptable and provided flexibility for mothers managing caregiving responsibilities.

Several implementation challenges were identified, including competing caregiving demands, children's therapy schedules, and technical difficulties during online sessions. Participants were more engaged when intervention sessions were aligned with their children's therapy schedules, allowing mothers to participate without additional childcare arrangements.

These findings highlight the importance of integrating caregiver-focused interventions within existing family routines, which is consistent with previous evidence showing that caregiving burden and time constraints may influence psychological well-being and intervention participation among parents of children with ASD [7,21,22].

Technical challenges, including unstable internet connections and repeated log-ins, were also reported during online sessions. These issues were addressed through technical guidance, reminder messages, early session access, real-time support, and recorded materials. These findings highlight the importance of usability, accessibility, and implementation support when integrating digital health interventions into care for caregivers [23].

Participant experiences and intervention refinement

Qualitative feedback provided additional insight into participants' experiences and informed refinement of the RE-mHealth intervention. Mothers described the intervention as meaningful and emotionally supportive, particularly through opportunities for sharing experiences and receiving peer support.

Participants also indicated that brief and flexible strategies, including breathing exercises and mindfulness-based activities, were easier to integrate into their daily routines than longer structured practices. These findings are consistent with previous studies suggesting that mindfulness-based and psychosocial interventions may support stress management among parents of children with ASD [13,14,15].

Preliminary exploratory outcomes

In this pilot study, the intervention group showed favorable patterns of change in resilience, parenting self-efficacy, and parenting stress among mothers. Nevertheless, these findings provide preliminary insights that warrant further evaluation in a larger randomized controlled trial.

These preliminary patterns are consistent with previous studies suggesting that resilience-based, psychosocial, and caregiver support interventions may contribute to improved psychological adjustment among parents of children with ASD [2,11,25]. The potential mechanisms may involve enhanced coping strategies, emotional regulation, and social support, which are consistent with resilience theory and stress-coping frameworks [18].

Further evaluation with a larger adequately powered randomized controlled trial is required to determine intervention effectiveness and sustainability.

Strengths and limitations

A strength of this study was the contextual adaptation and pilot testing of a resilience-based mHealth intervention among Vietnamese mothers of children with ASD in a real-world caregiving setting.

Some limitations should be acknowledged. The small sample size, recruitment from a single study setting as well as a pilot study design limit the generalizability of the findings.

Implications for the main study

The pilot findings informed several considerations for the main trial, including a reduced session structure, flexible scheduling aligned with caregiving routines, hybrid delivery, small-group implementation, and continued mHealth-supported follow-up. These adaptations may enhance the practicality and acceptability of intervention delivery; however, further evaluation is required to determine their impact on engagement, implementation, and outcomes in a larger randomized controlled trial.

Conclusion

This pilot feasibility study provided preliminary information regarding the feasibility and acceptability of the RE-mHealth program among Vietnamese mothers of children with ASD. The intervention appeared feasible when integrated into mothers' caregiving routines, and preliminary changes in parenting stress, resilience, and parenting self-efficacy were observed. However, these findings should be interpreted cautiously due to the small sample size. Further refinement and evaluation through a fully powered randomized controlled trial are warranted to determine intervention effectiveness and implementation potential.

Ethical Approval

The study was approved by the Institutional Review Board for the Protection of Human Subjects in Research, Burapha University (Approval No. IRB3-127/2568, approved on 27 October 2025). The study was also approved by the Ethics Committee of Eastern International University, Vietnam (Approval No. 02/ĐHQTMĐ-HĐĐĐ; approved on 06 January 2026). The study was registered as a randomized controlled trial in the Thai Clinical Trials Registry (registration number TCTR20250908002). All participants took part voluntarily and signed informed consent forms after receiving a clear explanation of the study objectives and procedures. Participants were informed of their right to withdraw from the study at any time without any negative consequences. All data were kept confidential and presented in aggregated form to ensure privacy.

Author Contributions

VTT, PH, and PS conceived the study, developed the research protocol, and oversaw the implementation of the intervention. VTT conducted data collection, coordinated recruitment, and managed participant follow-up. VTT, PH, and PS performed data analysis, interpreted the findings, drafted the manuscript. All authors reviewed, revised, and approved the final version of the manuscript prior to submission.

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Conflicts of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and publication of this article.

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