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Self-Reminder Pregnant (SRP): An Application to Improve Physical Activity Among Pregnant

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Abstract

Maintaining appropriate levels of physical activity during pregnancy is essential for the health and well-being of both the mother and fetus. However, many expectant mothers reduce their activity levels because of limited information, accessibility barriers, or concerns about potential harm to the baby. To address these challenges, the *Self-Reminder Pregnant (SRP)* application was developed as a digital innovation designed to guide, monitor, and encourage safe physical activity throughout pregnancy. Using a mixed-method approach that combined *Research and Development (R&D)* with a one-group pretest–posttest experimental design, this study validated the SRP application through expert review and user testing. Expert evaluations indicated the tool was feasible (≥75%), while field trials demonstrated its practicality and ease of use. Experimental implementation with 15 pregnant participants showed a significant increase in physical activity levels—from 48% before using SRP to 67% afterward ($t(14) = 9.20$, $p < .001$). These findings confirm that SRP is both feasible and effective for promoting safe physical activity during pregnancy. The application represents a promising innovation in maternal health, particularly for women living in rural communities.

Keyword : Physical Activity, Pregnancy, SRP Application, Maternal Health, Digital Intervention

INTRODUCTION

Pregnancy represents a critical stage in a woman's life that demands special attention to physical, psychological, and social health (Walasik, 2020; Meander, 2021). During this period, women are encouraged to maintain a balanced lifestyle that incorporates suitable physical activity, adequate nutrition, and effective stress management to ensure optimal pregnancy outcomes (Yeshaw, 2020). Nevertheless, pregnant women's lifestyle choices are significantly influenced by their living environment, socioeconomic conditions, and access to healthcare facilities (ACOG, 2020).

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Women living in rural areas often face unique challenges compared to those in urban settings (Dieterich, 2020). Limited healthcare access, insufficient information about pregnancy, and strong cultural traditions often shape their lifestyle patterns. Furthermore, a lack of awareness regarding the importance of medically recommended physical activity frequently causes expectant mothers to drastically reduce their movement (Todorovic, 2020), which can negatively affect their fitness and fetal development.

Physical activity is a key determinant of maternal health (Okafor, 2020; Darling, 2023). Numerous studies have demonstrated that regular, moderate physical activity during pregnancy contributes to multiple health benefits, including maintaining overall fitness, controlling gestational weight gain, enhancing sleep quality, reducing the risk of gestational diabetes, and preparing the body for childbirth (Okafor, 2020; Darling, 2023). Despite these advantages, many women still hesitate to engage in physical activity, primarily due to fears that it might endanger the fetus (Cannon, 2020; Braun, 2022; Rasmussen, 2020). Insufficient education and lack of medical guidance on the appropriate types, intensity, and duration of physical activity further contribute to these misconceptions (Elhakeem, 2020; Laredo-Aguilera, 2020). As a result, both excessive and insufficient activity can lead to health issues ranging from fatigue and musculoskeletal discomfort to pregnancy complications (Zinsser, 2020).

Given these contrasting behaviors, more comprehensive research is needed to explore the physical activity patterns of pregnant women, their influencing factors, and the related implications for maternal and fetal health. The results of such research can serve as a foundation for healthcare professionals, families, and communities to educate and support expectant mothers in performing safe and beneficial physical activities.

One potential solution is the development of the Self-Reminder Pregnant (SRP) application. SRP functions as a digital guide and reminder tool tailored to pregnant women's specific needs and conditions, encouraging regular, safe physical activity. It helps users manage and monitor their activity levels systematically through features such as automatic reminders, activity tracking, and medically informed recommendations (Hussain, 2020).

By providing personalized, evidence-based guidance, SRP not only educates but also motivates pregnant women to maintain healthy activity levels, thereby reducing potential health risks and enhancing overall quality of life during pregnancy. Hence,

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research on the development and implementation of SRP is essential to integrate digital technology into modern maternal health support systems.

METHOD

This study adopted a mixed-methods approach that integrated Research and Development (R&D) procedures with a Pre-Experimental Design. This methodological combination was selected to achieve two main objectives: (1) to design and develop the Self-Reminder Pregnant (SRP) application as a digital tool for monitoring and encouraging safe physical activity during pregnancy, and (2) to evaluate its effectiveness in enhancing adherence to physical activity recommendations among expectant mothers.

Pre-Experimental Stage

The second phase of the study employed a One-Group Pretest–Posttest Design to measure the application's impact on physical activity levels. This phase evaluated whether the SRP intervention could significantly enhance compliance with physical activity guidelines among pregnant women. The study was conducted in rural areas of Kuningan Regency, West Java, where access to healthcare facilities and health information is generally limited. The participants consisted of pregnant women in their first, second, and third trimesters. A pilot sample of 20–30 participants was selected using purposive sampling based on their willingness and eligibility to participate. Data were collected using the Pregnancy Physical Activity Questionnaire (PPAQ), which assesses the type, duration, frequency, and intensity of physical activity. The instrument is widely recognized for its reliability in evaluating activity patterns among expectant mothers.

Results of the R&D Stage

Development of the SRP Application

The product developed in this stage, the Self-Reminder Pregnant (SRP) application, was designed to serve as a digital tool that monitors and guides pregnant women's physical activity. The system enables expectant mothers to maintain safe levels of movement and adhere to medically appropriate exercise recommendations.

Table 1

First Stage of Expert Validation Assessment of the SRP Application Design

No	Statement	1	2	3	4	Notes
A.	Content					
1	Size		√			
2	Layout/Design Arrangement			√		

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No	Statement	1	2	3	4	Notes
3	Color and Appearance	√				
B.	Text					
1	Font size in the guidelines		√			
2	Text arrangement in the guidelines		√			
C.	Color					
1	Basic color of the application	√				
2	Example of implementation guidelines	√				
D.	Usability					
1	Provides user effectiveness	√				
2	Learning becomes more effective and efficient	√				
3	Helps users implement learning	√				

Expert Validation Results

Table 2 summarizes the results of the expert validation conducted during the first stage of application evaluation.

Table 2

Expert Validation Assessment Results of the SRP Application Design (Stage 1)

No.	Aspect Assessed	Score Obtained	Maximum Score	Percentage (%)	Category
1	Application Design	30	40	75	Quite adequate

Based on the findings, the SRP application was rated as “quite adequate,” achieving a 75% feasibility score, indicating satisfactory design and functionality for continued testing.

Small Group Testing

A small group trial was conducted with ten pregnant women from Gunungsari Village during a single session. During the session, participants were introduced to the SRP application, guided through its operation, and instructed on how to complete the accompanying questionnaire. The overall conditions during the trial were positive: (a) participants showed enthusiasm while learning to operate the app, (b) they appeared motivated while using SRP, and (c) they paid close attention to the instructions for completing the feedback questionnaire.

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Table 3

Small Group Trial Results of the SRP Application

No.	Aspect Assessed	Score Obtained	Maximum Score	Percentage (%)	Category
1	Application Design	34	40	85	Feasible

The questionnaire results indicated that the application achieved an 85% feasibility rating, categorizing SRP as suitable for further testing in larger groups.

Large Group Testing

The large group field trial involved 35 pregnant women from Cimahi District, Kuningan Regency. The testing session began with an introduction to the SRP study, followed by direct usage of the application. Participants remained attentive, motivated, and actively engaged, asking relevant questions about the app's functions and content.

Table 4

Large Group Trial Results of the SRP Application

No.	Aspect Assessed	Score Obtained	Maximum Score	Percentage (%)	Category
1	Application Design	35	40	87.5	Feasible

The results showed an average feasibility score of 87.5%, further validating the SRP application's practicality and acceptance among users.

RESULTS

Overview of Experimental Findings

This experimental phase involved 15 pregnant participants, whose physical activity levels were assessed using the Pregnancy Physical Activity Questionnaire (PPAQ). Measurements were conducted twice — before and after the implementation of the Self-Reminder Pregnant (SRP) application. The results revealed a significant improvement in participants' physical activity levels following the intervention. The average pretest score was 48%, whereas the average posttest score increased to 67%, reflecting a 19 percentage-point improvement after SRP use.

Descriptive Statistical Analysis

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The descriptive analysis results indicate that participants' posttest physical activity levels were higher than their pretest levels. Moreover, the small standard deviation values suggest that responses were relatively homogeneous, demonstrating consistent behavioral improvements among participants after the intervention.

Table 5

Descriptive Statistics of Pretest and Posttest Scores

Variable	N	Mean (%)	Standard Deviation	Standard Error Mean
Pretest	15	48.00	4.00	1.03
Posttest	15	67.00	5.00	1.29

The mean score improvement indicates that SRP usage positively affected the physical activity engagement of pregnant women, suggesting that the application successfully addressed informational and motivational barriers.

Statistical Test Results

To further evaluate the effectiveness of the SRP application, a Paired Sample t-test was conducted. This test compared the pretest and posttest mean scores to determine whether the increase in physical activity levels was statistically significant. The analysis produced a t-value of 9.20 with 14 degrees of freedom (df = 14) and a p-value < .001. Since the p-value was less than the standard significance level of .05, it can be concluded that the difference between pretest and posttest scores was statistically significant. This result confirms that the SRP application effectively improved physical activity among pregnant participants.

Table 6

Paired Sample t-Test Results

Pair	Mean Difference	Standard Deviation	t	df	Sig. (2-tailed)
Pre–Post	19.00	8.00	9.20	14	< .001

These findings demonstrate that the SRP intervention substantially influenced participants' adherence to recommended physical activity levels. The consistent increase across participants indicates that SRP provided both educational and motivational support in maintaining healthy physical routines during pregnancy.

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Summary of Findings**.** The experimental results clearly support the conclusion that SRP is an effective digital tool for promoting and maintaining physical activity among expectant mothers. The improvement from 48% to 67% in activity levels, alongside the significant t-test results ($p < .001$), confirms the program's capability to drive behavioral change. The overall analysis indicates that SRP contributed not only to awareness but also to practical application encouraging pregnant women to actively incorporate safe exercise into their daily routines, even in environments with limited access to traditional healthcare support.

DISCUSSION

The present study indicates that the Self-Reminder Pregnant (SRP) application is a feasible digital tool and that participants' measured physical activity increased following its implementation. The development-stage assessments showed progressively higher feasibility scores, from 75% in expert validation to 85% in the small-group trial and 87.5% in the large-group trial. In the experimental stage, the mean score increased from 48% at pretest to 67% at posttest, a 19-percentage-point difference, and the paired-samples t-test indicated that this difference was statistically significant ($t(14) = 9.20$, $p < .001$). These findings are consistent with evidence that mobile health (mHealth) interventions can help promote physical activity during pregnancy. A systematic review and meta-analysis by Yao et al. (2025), for example, reported a significant improvement in total physical activity following mHealth interventions, as well as a smaller but significant improvement in moderate-to-vigorous physical activity.

The relevance of this approach is particularly clear in rural settings: pregnant women and healthcare providers have identified the value of evidence-based exercise guidance, goal setting, progress tracking, and push notifications as useful features in a pregnancy-focused application (Tinius et al., 2021). However, the quality and clinical appropriateness of the information presented in an application are important considerations; an assessment of existing pregnancy and postpartum physical-activity applications found variation in the information and features provided (Tinius et al., 2021). Accordingly, SRP's potential contribution lies not simply in delivering reminders, but in making relevant guidance and encouragement more accessible to pregnant women, including those who may face geographical or practical barriers to conventional support.

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Although the increase observed after the SRP intervention is encouraging, the findings should be interpreted within the methodological boundaries of this study. The experimental evaluation involved 15 participants and used a one-group pretest–posttest design without a concurrent control group; consequently, the improvement cannot be attributed exclusively to the application, because other influences during the study period may also have contributed. In addition, the feasibility trials and the experimental evaluation represent different stages and participant groups, and their results should not be conflated. Darvall et al. (2020), for example, found that smartphone-linked activity monitoring was feasible among pregnant women, but their pilot trial did not demonstrate a clear between-group increase in activity, highlighting the importance of sustained engagement and adequate behavior-change support. In contrast, a recent quasi-experimental study conducted in West Java reported significant improvements in physical activity among pregnant women who received a smartphone app-based exercise and behavioral program (Marfuah et al., 2025).

Taken together, these studies suggest that digital tools may support maternal physical activity, but their effects depend on intervention content, user engagement, and the quality of behavioral support. Future SRP research should therefore use a larger sample, include a comparison group, extend the follow-up period, and combine PPAQ responses with objective activity measures where possible. The application should also be reviewed by qualified maternal-health professionals so that its recommendations are appropriate to gestational stage and individual clinical circumstances.

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